

## **Tiefseebergbau in den internationalen Medien 2015 - 2017**

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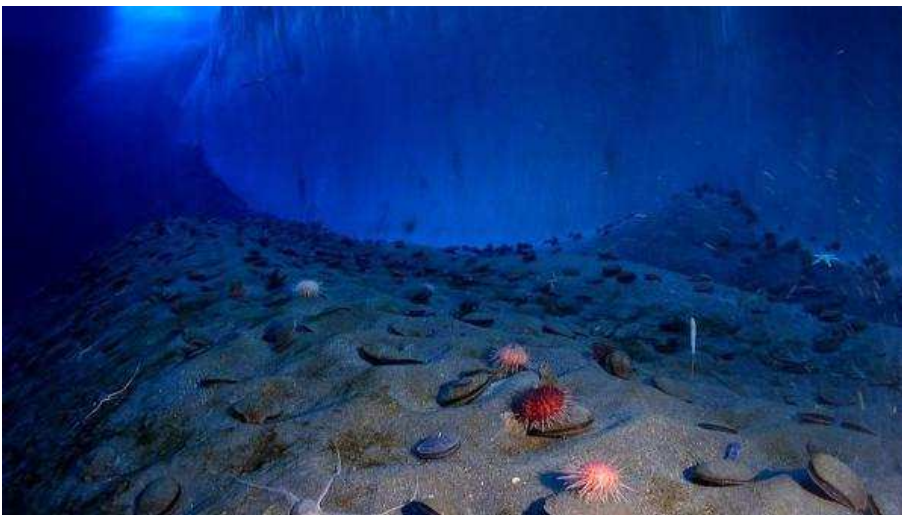
Zusammenstellung:

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### **Locals fear for their environment despite promises of riches**

Luke Hunt, The Diplomat, December 27, 2017



Underwater life

Deep-sea mining is about to take an enormous step into the future. Off the coast of Papua New Guinea, in the Bismark Sea, the extraction of rich gold and copper deposits by a multinational group is promising high returns and they insist they are doing their best to allay environmental concerns. But not everyone is convinced. Court action has been launched amid claims the PNG government is withholding information about the multi-billion dollar project, Solwara 1 field, operated by Nautilus Minerals Inc, a Canadian-based company backed by Russian and Omani mining firms. The Centre for Environmental Law and Community Rights in Port Moresby says there are serious issues with the mining operation and deployment of state-of-the-art heavy digging equipment about 1.6 kilometres below the surface. Locals say have not been consulted properly. Renowned environmentalist and journalist David Attenborough has also opposed the project because thermal vents, where the deposits are often found, are a key source for the earliest signs of life on Earth. He fears they will be damaged and insists they should be protected.

In 2009, Nautilus was granted an environmental permit for the Solwara 1 field – a volcanic area between the islands of New Britain and New Ireland – after the initial finds were made by Australian-based CSIRO in 1996. A mining license was granted two years later. Seabed mining – which

Nautilus described as the next big disruptive technology – is normally focused on areas around metallic nodules, also known as active or extinct hydrothermal vents, which carry valuable metal deposits. The deposits are excavated and drawn to the surface in a slurry, the water is removed and the rock transferred and broken down for minerals like gold, copper and tellurium while the extracted water is discharged on the sea floor. Tellurium is a key metal used in the making of high performance solar panels and its grades are up to 50,000 times more concentrated when dug from the seabed.

Its supporters also say that deep sea mining is an effective alternative to traditional mining on-land, which has proved destructive to the natural environment around the world. “It makes sense to explore this untapped potential in an environmentally sustainable way, instead of continually looking at the fast depleting land resources of the planet to meet society’s rising needs,” Mike Johnston, Nautilus’s chief executive, recently told *The Guardian*. But the area is rich in fish stocks and supports a lucrative tuna industry. Any damage to sea floor, scientists warn would have a detrimental impact on marine life in the area thus the Solwara field is increasingly being seen as a litmus test for an industry gearing up for the next big gold rush. Critics also said the environmental impact assessment is insufficient as it does not include a “rigorous risk assessment” or an environmental management plan.

Like East Timor, PNG wants entry into ASEAN, a trade bloc that has done little to protect its own environment against the forces of developers and corporates with much deeper pockets than the landowners whose real estate they’d like to monetize. Rainforests in Vietnam, Cambodia, Laos and Thailand and the wildlife they house have been devastated, the annual haze, caused by forest fires in Indonesia, is an international embarrassment, islands and river communities have been lost to sand dredging and fish stocks in the Mekong River and other major waterways are pitiful when compared with just 20 years ago. And given the wealth of marine life and an abundance of seabed topography suitable for this type of mining around Southeast Asia — particularly in Indonesia and The Philippines — ASEAN must pay closer attention to this issue if a repeat of the ecological disasters of the past are to be avoided.

### **Chan reaffirms stance against Solwara 1 project**

Jemimah Sukbat, *Loop PNG*, December 24, 2017

The views of Governor Sir Julius Chan and the New Ireland Provincial Government have not changed, they have always been against the experimental seabed mining. This was reaffirmed by NIPG after *Loop PNG* published an article questioning the governor’s stance. In response, *Loop PNG* was told that the provincial government has been demanding that an independent environmental impact study be conducted and the findings be made known to NIPG. “It will be worthwhile to note that the decision for Nautilus minerals to mine undersea had been made by the national government and as it is under the Mining Act, everything in the earth, in and above the sea belongs to the State,” clarified the government.

“Sir J recognises this and is working on amendments to the act, so *mama* and *papa graun* can be fully recognised as owners of these minerals. “The amendments have gone before Parliament as a private member’s bill.” NIPG further said as Nautilus is doing business in New Ireland waters using the road and land as access to its ships, etc, they have demanded that Nautilus give back to the community in projects, which it is doing on the west coast. “Nautilus had so far shown good corporate responsibility but this is not enough to convince NIPG that seabed mining is safe.” Meanwhile, non-governmental organisations have been advised to visit Sir Julius’ Kavieng office and dialogue with their government.

## Solwara 1 funding delayed again

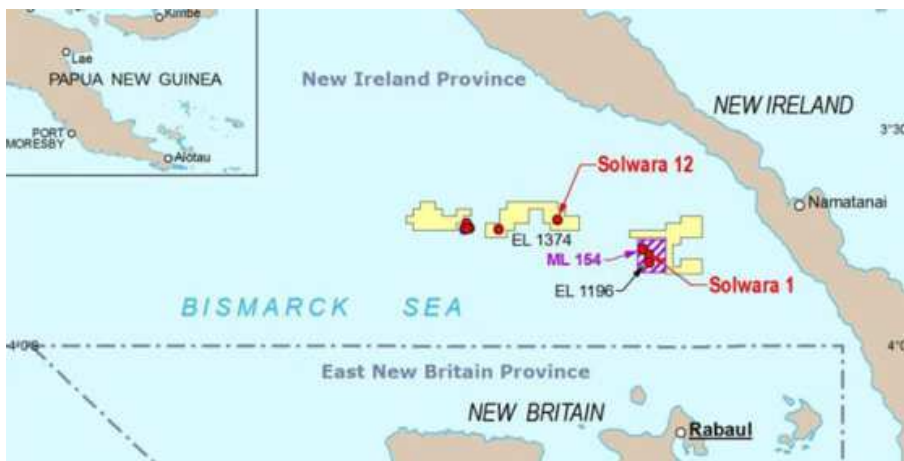
*NAUTILUS Minerals is still seeking funding for its controversial seabed mining project Solwara 1 after multiple delays.* PNG Industry News, 22 December 2017

According to the most recent update, discussions regarding funding requirements with various parties are taking longer than expected. The company initially reported in September that it required significant additional funding to complete the build and deployment of the seafloor production system that is to be used at the pending Solwara 1 project, located in the Bismarck Sea off the coast of New Ireland Province. Nautilus said it needed US\$41 million prior to the end of this year and, more specifically, at least US\$15 million before October 31 in order to meet its contractual commitments. In a November 1 update this deadline was pushed back to November 30 and the funding reduced to US\$10 million. The company revealed on December 4 that discussions with various parties were still continuing, and modified its previous funding deadline again, this time extending it to December 20. Despite stating it remained positive the discussions would be concluded soon,

Nautilus made no assurances it would be successful in securing the additional financing within the required time, or at all. Nautilus was granted its first mining lease at Solwara 1 in 2011. The deposit sits on the seafloor under about 1600m of water and contains a copper grade of about 7%. Earlier this month environmental groups and community representatives formally lodged an application in PNG's national court seeking documents including the original permit, environmental management plan, independent reviews, oceanographic data and any studies or modelling of environmental, social, health, culture and economic impacts. The plaintiffs claimed key documents had not been published. Nautilus responded by stating Solwara 1's key documents had been publicly available for years.

## Money hungry Nautilus weighs funding options as project challenges mount

Henry Lazenby, Mining Weekly, 22 December 2017



Marine mining pioneer Nautilus Minerals is in active discussions with a range of potential financiers and shareholders to secure the funding required to start mining the Solwara 1 project, offshore Papua New Guinea (PNG), the company said on Thursday. The company has thus far been unsuccessful to secure tens of millions of dollars required to keep the project and associated production equipment and support vessel on track to start production in the Bismarck Sea during the first quarter of 2019. Nautilus said in September that it needs to raise at least \$41-million before year end, in order to meet the company's contractual commitments regarding certain equipment forming part of the seafloor production system. The Toronto-headquartered company cautioned that there can be no assurances that it will be successful in securing the necessary additional financing

transactions within the required time, or at all. In the latter case, the company will evaluate all options to maximise shareholder value.

Meanwhile, Fujian Mawei Shipbuilding, the owner of the shipyard where Nautilus' production support vessel (PSV) is being built, has notified the company that MAC Goliath, the buyer of the PSV, has failed to pay the third instalment of the contract price of about \$18-million, plus accrued interest. Should MAC fail to make the payment within 21 days from December 11, the shipyard has the right to sell the about 70% completed vessel. Nautilus has the option to remedy the default on behalf of MAC, or replace MAC as a party to the contract via a novation, but given the current funding shortfall, the company has its work cut out. Nautilus advise that the vessel's derrick substructure was recently delivered to the shipyard for installation on the PSV. Further, the builder is installing foundations for two of the three launch and recovery systems, the bulk cutter winch has been installed, work on the cargo handling system is progressing, and both the 100 T and 200 T cranes have also been installed.

The company advised in October that submerged trials of the first of the seafloor production tools (SPTs), the collecting machine (CM), have been completed at the trial facility in Motukea Island, Port Moresby, PNG. The trial results indicated that the machine can perform to design specifications, and the team is now looking at operating enhancements. The auxiliary cutter has also been trialled and will be followed by the bulk cutter. Nautilus formed a joint venture company with PNG's nominee, Eda Kopa (Solwara), in December 2014 to mine high-grade polymetallic seafloor massive sulphide deposits. Nautilus has an 85% shareholding and Eda Kopa 15%. Nautilus in September 2016 announced a revised work programme, pending the company successfully raising the required capital by June this year. It entails a more staged approach, moving the Nautilus equipment integration phase of vessel construction out until after the vessel has been delivered by Fujian Mawei Shipyard and Marine Assets Corporate in the fourth quarter of 2018, resulting in a 12-month delay to the original schedule.

### **Can science keep deep sea miners from ruining the seafloor?**

*One partially built deep mining ship is in dry dock after the company hired to build it ran out of money and defaulted on an \$18 million payment this month.*

Eric Niiler, Wired, 20 December 2017



GETTY IMAGES

OCEAN EXPLORERS AND entrepreneurs have been thinking about how to scoop up mineral-laden deposits on the seafloor since the HMS Challenger dragged a few up in a bucket during its



globe-trotting scientific voyage in the 1870s. A century later, the CIA used deep sea mining as a cover story for a [secretive plan](#) to recover a sunken Russian nuclear sub. Now, it's a serious engineering proposition. Companies in Belgium and the UK are testing crawlers and rovers to suck up potato-sized nodules on the seabed. And companies backed by Chinese, Japanese, and Korean governments are investigating the idea of drilling into the sides of underwater volcanoes or breaking off chunks of inactive hydrothermal vents—both places where minerals are deposited over time.

But some conservation groups worry that this seabed suction and the resulting clouds of sediment will kill sea life that can't move out of the way: tiny sponges, corals, and slow-moving mollusks that exist nowhere else. And a group of scientists are trying to get ahead of the problem, working with the would-be miners to build dredging technology that will minimize environmental destruction. Andrea Koschinsky, a marine geochemist at Jacobs University in Bremen, is studying just how much sediment impacts seafloor life—and if there's a way to prevent robot harvesters from creating the plumes. The effects of seabed mining are a lot like trawling by fishing boats, Koschinsky says. Both leave scars on the seabed that remain for years, although studies have shown that some animals eventually return and recolonize disturbed areas. "We will not know for sure the complete effects on the deep sea ecosystem, should we decide to do deep sea mining," Koschinsky says.

Those operations plan to dredge up three-inch mineral nodules, deposits of manganese, nickel, copper, cobalt, and various rare earth elements—objects formed over millennia, as phytoplankton ingested and then concentrated the minerals that spewed out of deep sea thermal vents. They'll site the nodules with roving drones, scoop them up with a crawling robot, then lift them 7,000 to 10,000 feet from the ocean bottom to the ship in a suction pump or elevator-like mechanical lifter. From there, the nodules will be loaded on a cargo ship and taken to a processing plant, where they'll either be bathed in chemicals like arsenic or cooked at high temperatures to recover the valuable minerals. The Yukon of deep sea mining is a place called the Clarion-Clipperton Fracture Zone, a remote region about 500 miles southeast of Hawaii that stretches a thousand miles toward Mexico. That's where DEME group, a Belgian dredging firm, plans to launch a full-scale pilot dredging operation in 2019. But before the dredging begins, Koschinsky and lab director Laurenz Thomsen are prepping a series of laboratory tests in Holland to find out what could go wrong—and if it can be prevented.

Koschinsky is studying how quickly the seabed recovers over time from mining operations. She's using data from earlier commercial tests in the early 2000s and comparing them to more recent views of the same place. Thomsen, meanwhile, has built a seabottom crawler called "Wally" that is collecting data about mineral deposits at hydrothermal vents. He tests new modifications in a swimming pool-sized tank on the university campus. About two hours drive away, at the GEOMAR Helmholtz Centre for Ocean Engineering in Kiel, Germany, Jens Greinert leads a separate team of engineers and physical oceanographers trying to build a better nodule harvester for DEME. "We want to figure out what makes the least impact," Greinert says. "The mined area is bugged up anyway. If you put another 5 centimeters of sediment on top of 20 centimeters it doesn't matter. What you don't want is to impact the area outside the mined area."

Greinert says his team is experimenting with boosting the amount of suction into the harvester, which seems counterintuitive. Spewing out a bigger and thicker cloud of bottom sediment with larger bits of material may force the plume to settle more quickly and cover a smaller area, at least according to preliminary tests in the lab. These tests are part of an environmental impact statement that Greinert is writing as part of the German government's collaboration with the DEME group. If all goes well, Greinert will be aboard the German oceanographic research vessel Sonne in March 2019 to monitor the DEME dredger as it picks up nodules. "All mining is environmentally destructive, and seabed mining will be environmentally destructive," says Conn Nugent, director of seabed mining project for the Pew Charitable Trust. "We are most worried about people pretending to

know what's going to happen without it having happened yet. All the extractive studies saying it's going to be different, financially and operationally. Any number of things could go wrong."

For her part, Koschinsky thinks that it's better to work with the mining companies. "This is a question we are discussing as to exactly who we are helping," she says. "We might help promote a development that might have disastrous consequences in the future. But if we don't develop our best knowledge, it might happen in a way that is much more harmful." The scientists have another incentive, too: Deep sea mining gets them access to an ecosystem they might not otherwise get to explore. Watching wildlife near a construction site on land (or even a sun-splashed coral reef) is pretty easy. But trying to count the number of deep sea fishes, clams, or sea worms 10,000 to 15,000 feet below the surface is nearly impossible, where light rarely penetrates and populations are tiny. "You might see some individual species only once," says Koschinsky, "and you don't know what their larvae look like or how they reproduce." But with mining as a call to action, the German government is funding environmental studies on these remote areas.

Of course, the scientists' concerns could never materialize. The International Seabed Authority has regulated the minerals in the Clarion-Clipperton Zone since the early 2000s, and the Jamaica-based authority is taking comments on a new set of environmental regulations governing the mineral leases. These new rules should be finished by late 2018, and they could change who's allowed to mine where. And, double of course, nobody has technically figured out how to harvest deep sea minerals and still make a profit. One partially built deep mining ship is in dry dock after the company hired to build it [ran out of money](#) and defaulted on an \$18 million payment this month. And once operating, it takes about \$50,000 a day to run a deep sea mining ship. "We've taken a conservative look at the worst-case scenarios," says Christopher Williams, director of UK Seabed Resources, a London-based subsidiary of Lockheed Martin that plans a pilot project to mine the seafloor in 2019. "Even given those numbers, we don't see it as a pipe dream. We see it as a realistic process." In this slow-motion race to reap seafloor riches, some companies will likely go under. But scientists say even so, they are hoping learn a lot about new forms of marine life. Maybe, even, the devices they build now could one day be used to explore seas on other planets.

### **Sir David Attenborough against experimental seabed mining**

*"That is where life began, and that we should be destroying these things [hydrothermal vents] is so deeply tragic"* Sir David Attenborough

David Shukman, BBC News, December 15, 2017

Plans for the world's first deep sea mine are taking shape in the waters off Papua New Guinea. The ocean floor is rich in gold, copper and other minerals in big demand around the world. But some scientists warn that digging up the seabed will destroy marine life, and Sir David Attenborough is among those objecting. BBC News science editor David Shukman reports.

Link: <https://ramumine.wordpress.com/2017/12/18/sir-david-attenborough-against-experimental-seabed-mining/>

### **Mining Minister peddling ignorant misinformation about biodiversity and experimental seabed mining.** PNG Mine Watch, 15 December 2017

Papua New Guinea's Minister for Mining, Johnson Tuke, has been peddling some ignorant misinformation in his attempts to defend experimental seabed mining. The Minister has claimed no life exists at 1600m under the ocean where Nautilus Minerals hopes to strip mine the seabed. That is completely untrue and irresponsible according to scientists like Cindy Dover, a professor of biolog-

ical oceanography at Duke University: “We have learned that the deep sea is as exquisitely diverse as any bit of shallow marine or terrestrial environment”. Indeed, dozens of new species are routinely discovered during forays to the bottom of the ocean, even at depths twice as deep as the proposed Nautilus mining operation. This all completely contradicts the Minister’s ignorant claim that:



Underwater life in the McMurdo Sound

“There is a certain dark area (in the seabed to be mined) where it is out of photosynthesis. They say there is no life beyond that point.” To pour further scorn on Minister Tuke’s school boy error, scientists also say that the deep sea is vitally important not just for the biodiversity it contains, it also plays a “critical role in the functioning and buffering of planetary systems” and is “an area we know is very important to society.” The Minister should apologise for misleading the nation and take a science lesson or do some basic research before he opens his mouth to speak again about experimental seabed mining.

### **World-first mining case launched in PNG**

Tom Lodewyke, Lawyers Weekly, 14 December 2017

Citizens of Papua New Guinea have launched landmark legal proceedings against the country’s government over a deep seabed mining project. Coastal communities in Papua New Guinea (PNG) recently commenced proceedings against the PNG government over the Solwara 1 project, the world’s first deep seabed mine. The Centre for Environmental Law and Community Rights (CELCOR) in Port Moresby is representing four community plaintiffs. They are seeking information on the legality of the mine’s approval, as well as the likely environmental, social, cultural and economic impacts. The Environmental Defenders Office (EDO) NSW, a partner of CELCOR, said in a statement that these are “landmark proceedings”. It is the first case relating to the world’s first commercial deep seabed mine, and one of the first public interest access to information cases brought under the PNG constitution, as PNG does not have freedom of information laws.

The EDO said community representatives in PNG have been requesting information on the mine, including the environmental permit, for years without success. “[T]his is a historic case, not just for Papua New Guinea but globally, as communities try to understand the legality and potential impacts of the world’s first commercial deep seabed mine,” said BJ Kim, international program manager at EDO NSW. “It’s so important that the international legal community steps up and supports lawyers in PNG who seek to use the law to protect the environment. Fewer legal environmental protections, and less well-resourced environmental regulators, see worse environmental impacts from mining

and logging operations in the Pacific than in countries like Australia where greater checks and balances exist.

“EDO NSW knows that like-minded organisations in the Pacific can learn a great deal from our experience and expertise, and that’s why we’ve been supporting partners in the Pacific for over 25 years.” EDO NSW CEO David Morris said the case is a “coming of age” moment for public interest environmental law in PNG, which his organisation is proud to be part of. CELCOR executive director Peter Bosip said the relationship between the two organisations is crucial in supporting environmental law in PNG. “This case is a result of the hard work of many partners,” Mr Bosip said. “We are exceptionally grateful to EDO NSW for the dedication they have shown in support of our fledgling public interest environmental law practice. “We have learnt a great deal from EDO NSW about running a successful public interest environmental law practice and their support has allowed us to build a strong CELCOR which is of crucial importance to PNG. But we can’t do it alone. Without international donor support, landmark cases like this could simply not be run. “Communities cannot afford to pay the rates PNG lawyers charge and without organisations like CELCOR, PNG will be left entirely at the whim of the government and maverick resource companies.”

### **Nautilus EIS in public domain for 8 year**

PNG Industry News, 11 December 2017



THE environmental impact statement for Nautilus Minerals’ Solwara 1 seabed mining project has been on the company’s website for more than eight years. The EIS - full document with all the appendices - has been available to anyone who wished to see it since April 2009. “We translated the summary of the document into pidgin [Tok Pisin], and that is available as well. And there are also copies of our EIS at the offices of CEPA (Conservation Environment Protection Authority),” said Mike Johnston, Nautilus chief executive officer. Johnson was responding to a comments by an activist NGO which says it intends to launch legal proceedings against the Papua New Guinea government to “obtain key documents” relating to the Solwara 1 project. “We have had three public hearings for the EML (extractive minerals lease) - in Port Moresby, Rabaul and Kavieng,” said Johnson, who was responding to the claim that there had been “very little information about the Solwara 1 project” by NGO Centre for Environmental Law and Community Rights (CELCoR). Johnston said that all the information about Solwara 1 had been freely available on the company's website and there were public hearings through the EIS process. Solwara 1 is in the Bismarck Sea, about 30km from the nearest coast in New Ireland Province.

"We have had ongoing community engagement and meetings," he said. "All of their claims are baseless, from what I see," Johnston said, predicting that the court would throw out the proceedings. "It is just another publicity stunt by NGOs to try and keep things in the newspapers. I am not sure what they are trying to achieve or where it is going to go. People believe some of this stuff. The government has followed due process, PNG has good mining laws which are very similar to Australia's. The adopted Queensland's mining regulations," Johnston said. On Friday CELCoR said that acting on behalf of "coastal communities", it had launched legal proceedings against the PNG government in a bid to obtain key documents relating to the licensing and the environmental, health and economic impacts of the Solwara 1 project. Activist Jonathan Mesulam, from the west coast of New Ireland Province, said this "information" had been requested for the past four years, but the government had ignored its requests.

### **Shipyard notifies Nautilus of default by major contractor**

GLOBE NEWSWIRE, December 11, 2017, Source: Nautilus Minerals Inc.

TORONTO, Dec. 11, 2017 -- Nautilus Minerals Inc. announces that Fujian Mawei Shipbuilding Ltd (the "Shipyard"), the owner of the shipyard where Nautilus' Production Support Vessel (the "PSV") is being built, has notified the Company that MAC Goliath Pte Ltd ("MAC"), the buyer of the PSV, has failed to pay the third installment of the contract price (~US\$18M + interest). Under the shipbuilding contract between the Shipyard and MAC (the "contract"), MAC is required to rectify the default immediately, and perform corresponding obligations under the contract. If MAC fails to remedy the default within 21 days of the receipt of a notice to MAC from the Shipyard, then the Shipyard may rescind the contract. In the event that the contract is rescinded, the Shipyard has the right to either complete or not complete the PSV and to sell the PSV by private sale either in a complete or incomplete state.

In accordance with the terms of the contract, Nautilus Minerals Singapore Pte Ltd has the option to either remedy the default on behalf of MAC and/or replace MAC as a party to the contract by way of a novation or assignment within fourteen days of receipt of the notice to the Company from the Shipyard. Nautilus notes that the current build of the PSV is progressing well, with construction over 70% complete. The derrick substructure was recently delivered to the Shipyard for installation on the PSV. Foundations for two of the three Launch and Recovery Systems (LARS) are being installed, the Bulk Cutter winch has been installed, work on the cargo handling system is progressing, and both the 100T and 200T cranes have now also been installed (see links below). Nautilus is in discussions with the Shipyard, MAC and third parties with respect to the default and potential remedies, and will issue further updates as matters develop.

### **Troubled Papua New Guinea deep-sea mine faces environmental challenge**

Community groups accuse PNG government of keeping documents for its approval under wraps  
Helen Davidson and Ben Doherty, theguardian, 11 December 2017

A controversial experimental deep-sea mine is being challenged in court by environmental groups who have accused the Papua New Guinea government of withholding key documents about its approval. Nautilus Minerals Inc, a Canada-based company primarily owned by Russian and Omani mining firms, wants to extract gold and copper deposits from 1.6km below the surface of the Bismarck Sea, using a seabed mining technique never before used in commercial operations. Nautilus told the Guardian it has conducted dozens of community meetings – reaching more than 30,000 people from nearby islands – and has had its key documents, including a detailed environmental impact statement, publicly available for years. But members of nearby communities, represented by the Port Moresby-based Centre for Environmental Law and Community Rights Inc (Celcor), claim



they were not adequately consulted and that they hold grave concerns over its impact. There are also concerns over its financial viability and the PNG government's stake in it.

Celcor, which has been assisted by the New South Wales Environmental Defenders Office, formally lodged an application in PNG's national court and served the PNG government last week. It said key documents had not been published, and that under the PNG constitution affected residents had a right to the information. The plaintiffs have previously sought documents including the original permit, the environmental management plan and independent reviews, all oceanographic data on the site, and any studies or modelling of the environmental, social, health, culture and economic impacts. They had also asked for any agreements made between Nautilus and the PNG government or other entities in relation to the project, and evidence of the mining minister's original granting of the exploration licence and his reasons.

"Our major concern is the environmental impact of this project, since there is no independent environmental study," a plaintiff, Jonathan Mesulam, from PNG's New Ireland Province, said. Mesulam criticised the company's consultation approach, and said the community at large did not give "free, prior and informed consent" on the company's permit. "They had no control. It has been organised by the former minister, and a few other people from the local level government," he said. The Solwara 1 field, in a volcanic area between the islands of New Britain and New Ireland, was identified by Australia's CSIRO in 1996. Nautilus was granted an environmental permit for the field in 2009, and a mining licence in 2011. Seabed mining – which Nautilus described as "the next big disruptive technology" – is usually based around areas of metallic nodules, or active or extinct hydrothermal vents, which carry valuable metal deposits. The proposed process uses machinery previously used in other mining industries to excavate materials from the sea floor, then draw it up to the surface as seawater slurry. The slurry is then "de-watered" and transferred to another vessel for shipping. Extracted seawater is then pumped back down and discharged close to the sea floor. Critics have said the environmental impact assessment is insufficient as it does not include a "rigorous risk assessment" or an environmental management plan.

"The mining process would generate plumes of sediment, and our critique of the EIS is that there is not sufficient scientific research or modelling done by Nautilus on what would be contained in those plumes," said Dr Helen Rosenbaum, coordinator of the deep-sea mining campaign. "Our reviews all show there are significant gaps in the document. The gaps are big enough to render the EIS not fit for purpose." Nautilus says the Solwara 1 deposit – Solwara means "salt water" in Tok Pisin – contains high grade copper and gold deposits, up to 10 times higher than typical grades for land-based mines, and has the potential to yield "far superior" ore to mines on land with far less impact on the environment and those who live nearby. The chief executive of Nautilus Minerals, Michael Johnston, said seabed mining did not require large pits to be dug and created no waste, and the company had carefully modelled the impact of mining on the sea floor. He said there was no impact on fishing because the mining took place more than 30km offshore and far from reef fishing areas.

Johnston said the company has run public meetings every two years, reaching more than 30,000 people, on the progress of the project and the modelled potential environmental impacts. He said the project had "broad and strong public support" and across all levels of government, and opposition was being led by "a handful of ... professional activists". "You always get one or two people who jump up and down," he said. "Some people think if they make a lot of noise, they'll be given money to go away, and we don't do that." Johnston said Nautilus had helped in developments on New Ireland island, bringing toilets and running water to 25 schools, and working with health organisations running vaccination programs. He said the company had been transparent with all the information on the project, and he was "struggling to know" how they could be more open. "Our EIS has been on our website since April 2009, and the executive summary has been translated into Tok Pisin," he

said. “It’s with the conservation and environment protection authority offices in Port Moresby for anybody to see, and we will happily print out copies for anyone who wants one. Anyone who is sceptical about the project, we are happy for them to contact us and we’ll talk them through it.”

There have been long-running concerns about the experimental project, including a 2012 petition with more than 20,000 signatures from the residents of the Madang, Oro and New Britain provinces calling for it to be stopped. In 2016 the then PNG attorney general and minister for justice, Sir Arnold Amet, rejected the “Papua New Guinea-pig” project, which he said was approved under the Mining Act and without an adequate regulatory framework. “We are a developing nation, we don’t have the capacity, we don’t have the resources ... There is not a tenable argument that says we ought to be used as an experimental locality,” he told the ABC. In 2016 Oregon State University scientists discovered that hydrothermal vents and methane seeps were emerging as “a major force in ocean ecosystems, marine life and global climate” but were under threat from human activity, including seabed mining.

In June, Blue Ocean Law and the Pacific Network on Globalisation said that compared with industries with a proven track record of sustainability, seabed mining was “a gamble”, risking potentially irreversible environmental impacts and destruction of local fisheries. Beyond the legal challenge, the Solwara 1 mining venture has also been plagued by financing issues and delays, including a three-year dispute between the company and the PNG government over the equity agreement. In 2013, arbitration found PNG had breached the agreement, which had previously been described as “high risk” and “low return”, according to a report by Blue Ocean Law and the Pacific Network on Globalisation.

The PNG’s current stake, held by a government company, is 15%, financed by a loan from the Bank of the South Pacific. Last week the opposition spokesman on treasury and finance, Ian Ling-Stuckey, called for an end to “silly investments best left to the private sector”, labelling the US\$113m Nautilus deal a “foolhardy investment”. Nautilus told its AGM this year “there is increased uncertainty and economic and technical risks of failure associated with this production decision”, and that it required significant additional funding to advance production. This month Nautilus issued a statement to the Toronto Stock Exchange warning of cashflow and financing difficulties, deferring for a third time its due date for a required \$10m funding injection.

### ***MEDIA RELEASE***

Deep Sea Mining out of our depth, 8 December 2017

### **Legal action launched over the Nautilus Solwara 1 Experimental Seabed Mine**

PAPUA NEW GUINEA: Coastal Communities have today launched legal proceedings against the PNG Government in a bid to obtain key documents relating to the licensing and the environmental, health and economic impacts of the Solwara 1 deep sea mining project. “Very little information about the Solwara 1 project has been disclosed by PNG Government or the project developer, Nautilus Minerals”, stated Peter Bosip, Executive Director, Centre for Environmental Law and Community Rights (CELCOR). “Communities likely to be impacted by the project have no choice but to bring legal proceedings against the PNG Government.” “They are seeking information to enable them and all Papua New Guineans to clearly understand whether the project was approved lawfully and what the impacts will be on local communities. The Solwara 1 Environmental Impact Statement contains insufficient information to determine this.” Lucielle Paru, of the Central Province Pressure Group says, “Section 51 of the PNG Constitution provides the right of reasonable access to official documents to every citizen of Papua New Guinea. It is a sad condemnation of our national Government that we have to force them to share information about this experimental seabed mining project.”

“We expect our Government to enact a duty of care towards us but it seems to prioritise Nautilus’s interests instead. The Government’s reluctance to provide the documents makes us wonder if they have something to hide.” “The implications of this high-risk project for communities close to the proposed site are significant. We want to know what risk analysis the Government did before it granted Nautilus an Environmental Permit for Solwara 1“, added Ms. Paru. “I am sure that communities living near other mines in Papua New Guinea will want to know this information too as it might shed some light on how the government generally assesses the impacts of mining projects on surrounding environments” According to Jonathan Mesulam from the West Coast of New Ireland Province, “Civil society in Papua New Guinea has been requesting this information for the past four years [1]. My people live only 25km from the proposed location for the Solwara 1 mine in the Bismarck Sea. If the mine goes ahead it will impact our lives and livelihoods [2].” “We have the right to know the whole truth about Solwara 1. The Government has ignored written requests for key documents so we now have to resort to legal action. Communities along the West Coast of New Ireland are fully in support of the legal action.”

### Notes

[1] For example, as long ago as 2012 the [Deep Sea Mining campaign](#) and [Mas Kagin Tapani](#) sent a letter to PNG PM Peter O’Neill requesting the release of key documents relating to the Solwara 1 seabed mining project. No response was received and those documents are still not in the public domain, <http://www.deepseaminingoutofourdepth.org/letter-to-png-pm>

[2] Reports produced by the Deep Sea Mining campaign highlighting the economic, social and environmental concerns of Nautilus Minerals Solwara 1 deep sea mining project:

‘*Out of Our Depth: Mining the Ocean Floor in Papua New Guinea*’, November

2011, <http://www.deepseaminingoutofourdepth.org/wp-content/uploads/Out-Of-Our-Depth-low-res.pdf>

‘*Physical Oceanographic Assessment of the Nautilus Environmental Impact Statement for the Solwara 1 Project – An Independent Review*’, November 2012,

<http://www.deepseaminingoutofourdepth.org/wp-content/uploads/EIS-Review-FINAL-low-res.pdf>

‘*Accountability Zero: A Critique of Nautilus Minerals Environmental and Social Benchmarking Analysis of the Solwara 1 project*’, September 2015,

[http://www.deepseaminingoutofourdepth.org/wpcontent/uploads/accountabilityZERO\\_web.pdf](http://www.deepseaminingoutofourdepth.org/wpcontent/uploads/accountabilityZERO_web.pdf)

### Locals file case to stop seabed mining

Jemimah Sukbat, Loop PNG, December 8, 2017

The Solwara Alliance has filed a case against the government at the Waigani National Court to stop the operation of seabed mining in West Coast New Ireland. Filed on Thursday afternoon, the Alliance wants the Government to make public all necessary and relevant documents under seabed mining agreement, who is involved in approving the project and on what grounds and why the government is still pursuing the project. Jonathan Mesulam, a West Coast New Irlander and a member of the Solwara Alliance, says the people in the village are strongly against seabed mining because their livelihood will be affected by the project. They want the Government to ban the project. “No one knows the environmental impacts of this project. There is also no independent environmental studies so why is the government pushing for this project? “There will be negative impacts in the local and national economy, especially the fisheries sector,” says Mesulam, who is currently in Port Moresby to file the case.

“Solwara 1 is not a good investment, it will only last for three years.” They want the developer, Nautilus Minerals Limited, to pack up and leave by next year. When asked if the villagers were consulted before the agreement was signed, Mesulam said the developer never consulted the locals.

“This MOA was signed by a few people who only think about themselves.” From the footages taken from the villages along West Coast New Ireland, the people say they own both the land and sea and the mining will greatly affect their lifestyle, especially in shark-calling. Mesulam said New Ireland does not need a seabed mine. They already have fish, cocoa, coconut and other resources where they can depend on for economic benefits.

### **Talks still on over seafloor system**

December 7, 2017, The National Business

NAUTILUS says discussions between the company and various parties involved in the manufacture of the seafloor production system is continuing. Nautilus in a statement said it was making progress with respect to deferring some of its immediate cash-flow requirements. And as a result, the company is updating its previous reference to a funding requirement of US\$10 mil (K31.45mil). Nautilus said there could be no assurances that the company would be successful in securing the necessary additional financing transactions within the required time or at all. Failure to secure the necessary financing may result in the company engaging specialist advisers and taking various steps aimed at maximising shareholder value such as undertaking various transactions including, without limitation, asset sales, joint ventures and capital restructuring.

### ***Pressemitteilung***

### **Forscher von BGR und SAMS veröffentlichen Studie in Nature-Zeitschrift: Starke Winde vor Mexiko haben Einfluss auf möglichen Tiefseebergbau im Pazifik**

Bundesanstalt für Geowissenschaften und Rohstoffe, Hannover, 05.12.2017

Ein möglicher Tiefseebergbau im zentralen tropischen Pazifik muss auch Wettereinflüsse berücksichtigen. So herrschen im Gebirge Mexikos vor allem in Mai bis November starke Stürme. Sie sorgen für die Entstehung großflächiger ozeanischer Wirbel, die in 2500 Kilometern Entfernung von der Küste Auswirkungen auf den Meeresboden in vier Kilometer Tiefe und damit auf den geplanten Abbau von Manganknollen haben. Das fanden Wissenschaftler der Bundesanstalt für Geowissenschaften und Rohstoffe (BGR) und der Scottish Association for Marine Science (SAMS) heraus. Ihre Untersuchungen veröffentlichten sie jetzt in der aktuellen Ausgabe der Nature-Zeitschrift „Scientific Reports“.

Im deutschen Lizenzgebiet im Zentralpazifik zwischen Hawaii und Mexiko erkundet die BGR im Auftrag der Bundesregierung Vorkommen von Manganknollen. Die Knollen liegen hier in großer Dichte auf dem Meeresboden. Sie gelten als eine mögliche zukünftige Quelle für Nickel, Kupfer, Kobalt und verschiedene Hochtechnologiemetalle zur Deckung des weltweiten Rohstoffbedarfs. Bei einem Abbau der Knollen durch Großgeräte würden feine Sedimentpartikel aufgewirbelt, die als Trübewolke in Bodennähe verdriften und sowohl die Lebensfunktionen der dort lebenden Tiere als auch generell die Nahrungskette beeinträchtigen.

Zusammen mit ihren schottischen Kollegen untersuchte die BGR-Wissenschaftlerin Dr. Annemiek Vink das Verdriften derartiger Trübewolken, deren räumliche Ausdehnung noch weitgehend unbekannt ist. Die stündliche Vermessung von Strömungsgeschwindigkeiten am Meeresboden des deutschen Lizenzgebietes über drei Jahre hinweg in 4100 Metern Tiefe lieferte die Daten dafür. Die Beobachtungen zeigen, dass die energiearme Tiefsee regelmäßig für eine Zeitdauer von mehreren Wochen deutlich energiereicher wird, wenn riesige ozeanische Wirbel ähnlich wie Tornados in der Atmosphäre über das Gebiet ziehen.

Landengen im Gebirge von Mexiko – der Tehuantepec und der Papagayo – verursachen stürmische Winde, die diese großen ozeanischen Wirbel mit Durchmessern von 100 Kilometern an der Oberfläche erzeugen. Drei- bis achtmal jährlich lösen sie sich von der Küste und wandern langsam Richtung Westen. Einige dieser Wirbel erreichen das Lizenzgebiet und haben einen starken Einfluss auf die Strömung am Boden der Tiefsee. Sie sorgen dafür, dass sich die Strömungsgeschwindigkeit in einem Zeitfenster von einigen Wochen von 4 auf 13 Zentimetern pro Sekunde erhöht. Eine Computersimulation des SAMS zeigt nun erstmalig, dass Trübewolken, die bei einem Abbau im industriellen Maßstab entstehen würden, unter dem Einfluss dieser Wirbel über Entfernungen von mehreren Zehner Kilometern am Meeresboden transportiert werden. Weiterhin konnte gezeigt werden, dass die Anzahl ozeanischer Wirbel in El Niño-Jahren deutlich zunimmt.

„Mit diesen neuen Erkenntnissen lässt sich das Verdriften solcher Trübewolken durch einen möglichen zukünftigen Tiefseebergbau nun mehrere Monate im Voraus vorhersagen. So könnten Bergbauunternehmen rechtzeitig vor dem Eintreffen der ozeanischen Wirbel Maßnahmen ergreifen, um die Auswirkungen solcher Trübewolken so weit wie möglich zu reduzieren“, erklärt Annemiek Vink. Das internationale Forschungsprojekt MIDAS (Managing Impacts of Deep-Sea Resource Exploitation), in dessen Rahmen diese Studie 2013 bis 2016 unter Beteiligung der BGR durchgeführt wurde, hatte die Europäische Kommission gefördert. „Die Forschungsergebnisse helfen, optimierte Lösungskonzepte für einen umweltschonenden Abbau zu entwickeln, um die Entstehung und Ausbreitung einer Trübewolke schon im Ansatz so weit wie möglich zu reduzieren“, erläutert Frau Dr. Vink. Link: <https://www.nature.com/articles/s41598-017-16912-2>

### **Villagers oppose Solwara 1 project**

Jemimah Sukbat, Loop PNG, December 4, 2017



Concerns have been raised on how seabed mining would affect marine life/resources of the Bismarck Sea

West Coast New Ireland villagers near the Solwara 1 project strongly oppose the Nautilus Minerals Limited operation. John Merebo, a Messi villager, revealed to *Loop PNG* that West Coast New Irelanders were never part of the agreement when it was signed. The seabed mining agreement was signed in 2012 by the then Mining Minister and Namatanai MP Byron Chan, the New Ireland Provincial Government and National Government. He said they do not want the development of the project to go on because they do not see any benefits in it. “There is not a lot of economic activity



out of the project because everything will be done by the company off shore.” But since the government has already signed for the project, Merebo said they want to be part of the negotiating team in the next part of the operation. This is to discuss spin-off benefits. Meanwhile, during a recent conference, UPNG Professor Chalapan Kaluwin said seabed mining would be disastrous for New Ireland Province. Professor Kaluwin stated the project could be catastrophic for our waters given the fact that PNG has 20 percent of the world’s tuna; it also has the world’s warmest waters and fastest currents.

### **Karkar Islanders against seabed mining: Leader**

Jemimah Sukbat, Loop PNG, December 2, 2017



Brian Kramer at the event at UPNG

Karkar Island has joined New Guinea Islanders in the fight against seabed mining. This was the message from senior statesman Sir Arnold Amet. His message was relayed by Member for Madang Brian Kramer at the School of Natural and Physical Sciences forum at UPNG’s main lecture theatre recently. Kramer, who was just there as an observer, relayed Sir Arnold’s written speech as he was unable to attend the forum. Sir Arnold says the Karkar Island, where he comes from, is located in the western part of the Bismarck Sea. Therefore, he and the islanders are pledging their support in the stand against the development of seabed mining.

He said the project will be the world’s first deep sea mine operation and a high level of uncertainty surrounds it. Furthermore, the mine is situated on traditional fishing grounds thus it threatens the villagers’ main source of income, food and the tourism industry. The mine is 25km from Kono and Messi villages of west coast New Ireland. It is also 40km from the Duke of York Island of East New Britain. In 2012, PNG decided to issue the world’s first commercial mining licence to Canadian mining company, Nautilus Minerals Inc, to mine the Solwara 1 project in the Bismarck Sea. The project is expected to be a reality in 2019.

### **Seabed mining would be disastrous for New Ireland Province**

Jemimah Sukbat, Loop PNG, November 30, 2017

The Solwara 1 project is an “experimental project” and is expected to be a reality in PNG in 2019. During a discussion forum at the UPNG main lecture theatre yesterday, Professor Chalapan Kaluwin, acting Dean UPNG, pointed out that the project by Nautilus Minerals is a new global concept. He says the developer is pursuing it because it is an investment, but what about the sustaina-

bility of the ocean resources and the livelihood of the people? Professor Kaluwin states the project could be catastrophic for our waters given the fact that PNG has 20 percent of the world's tuna; it also has the world's warmest waters and fastest currents. "Whose ocean is it? Does it belong to the people or the Government? "These are sustainable development issues," says Professor Kaluwin. He points out that though the country does not have an ocean policy nor a policy on on-shore mining, the Government still decided to support the development of the project. Additionally, environmental activist Rosa Koian says because it is a research project, it would have a short lifespan. She questions the Government as to whose responsibility would it be to clean up after the research project. Meanwhile, during the Mining and Petroleum conference on Tuesday, Minister for Mining Johnson Tuke stated that one of the government's outlook is to see the Solwara 1 project be fully operational in the next 10 years.

### **Environmental and eco risk unknown in Cooks' deep sea mining**

Dateline Pacific, Radio New Zealand, 29 November 2017

The Cook Islands is exploring the benefits and potential of its deep sea resource. Beneath the sunlit zones, where the country's tourism and fishing industries lie, is a largely unexplored and untapped expanse of promise. Also unexplored is the environmental risk and potential threat to other parts of the economy. Dominic Godfrey reports. Five kilometres below the surface of the Cook Islands exclusive economic zone lie manganese deposits which could provide a pathway to prosperity for the country. The problem is not just getting them to the surface but the environmental impact this may have, as New Zealand's principal ocean scientist Malcolm Clark explains.



Seabed mining machine

**MALCOLM CLARK:** "The deep sea is a very poorly understood system. There are no boundaries in the oceans and so - coastal, continental shelf, deep sea, inshore, offshore - it's all linked. And that's especially important in the Pacific Island countries where we're fairly small land-masses in the middle of a large ocean. So the connectivity across potentially quite large areas of ocean space is very important to understand."

Dr Clark says while the actual area of mining may be small, the impact could encompass large areas.

**MALCOLM CLARK:** "In digging up these resources, there's going to be disturbance of the sea bed and the sediment that's been sitting idle is going to be demobilised and it will form a cloud. And that's going to start to move with the currents, away from the area of direct physical impact. That's an aspect that we don't yet well understand but what the effect on the sea-floor communities, the

sea-life, we're not too sure at the moment. We're working on that in a number of research programmes around the world."

The co-ordinator for the Pacific Network on Globalisation, Maureen Penjueli, says the lack of understanding is a major concern as Cooks' seabed legislation contains no reference to avoiding international harm.

She says the 2009 Seabed Minerals Act also has no provision for 'precautionary principle', where human activities could plausibly result in unacceptable harm.

MAUREEN PENJUELI: "There was very little understanding about the potential impacts. There was an over emphasis on the potential economic benefits. So the legislations were set up under the broad narrative that seabed mining was considered small risk, very high return."

Maureen Penjueli says it was drafted with no provision for the possible impact on tourism, fishing and black pearl farming.

MAUREEN PENJUELI: "When you consider that our economies are heavily dependent on the ocean - our people are heavily dependent on the ocean for livelihoods, food security - that's quite problematic in terms of the current legislation."

However, the country's Seabed Minerals Authority commissioner Paul Lynch says 'precautionary principle' and environmental issues were front and centre to the original Act.

He says it was amended in 2015 and is under continual review with input from Ms Penjueli and PANG welcome.

PAUL LYNCH: "We're very open to that but currently we've got the act out for review and we're expecting that out to the community next year and into Parliament should there be any changes needed."

But Mr Lynch says this year the Marae Moana Act was passed to provide an holistic umbrella to all aspects of the Cooks' marine management.

He says it's ground-breaking national legislation that has conservation as its main plank.

PAUL LYNCH: "With zoning for different users, like zoning for fishing, zoning for tourism, zoning for mining. Mining if it takes place in the future, it's going to be quite contained and controlled based on a zoned management marine spatial plan."

In zones beyond the Cook Islands in the north-east Pacific, mining projects are underway managed by the International Seabed Authority under the UN's Law of the Sea.

The environmental organisation Te Ipukarea Society's Kelvin Passfield says the Cooks should learn from these.

KELVIN PASSFIELD: "I'd be inclined to wait and see what the environmental impacts outside of our EEZ were before allowing any mining within our EEZ. The Cooks can wait and see what happens in other jurisdictions or in the high-seas like the Clarion Clipperton Zone and determine what impacts there may be from them."

PANG'S Maureen Penjueli agrees but points to Nautilus Minerals' plans to mine Papua New Guinea's Bismarck seabed.

MAUREEN PENJUELI: "If you simply take PNG as the case study, the Solwara 1 project, it is clear that impacts have already been felt. You don't have to go into it to look at the impact, you can look at PNG."

An annual report from the Canadian company shows both the environmental impacts and profits from the project are unknown.

In the Cooks, Texas based Ocean Minerals has 17 months left in its agreement to apply for manganese nodule prospecting and exploration licences but with weak global demand for rare earth minerals, the economics may not stack up.

## Environmental knowledge key to deep sea mining in Cooks

Radio New Zealand, 29 November 2017

New Zealand's principal scientist says a lot more needs to be known about the Cook Islands' deep sea environment before mining can take place safely.



Mining for copper under the sea Photo: Nautilus Minerals

Malcolm Clark said while technological hurdles were being overcome for extracting resources five kilometres down, the environmental implications were not well understood. He said low commodity prices were a barrier to extracting what are known as rare earth minerals, but he said that would eventually be overcome by market forces.



NIWA scientist Malcolm Clark. Photo: NIWA

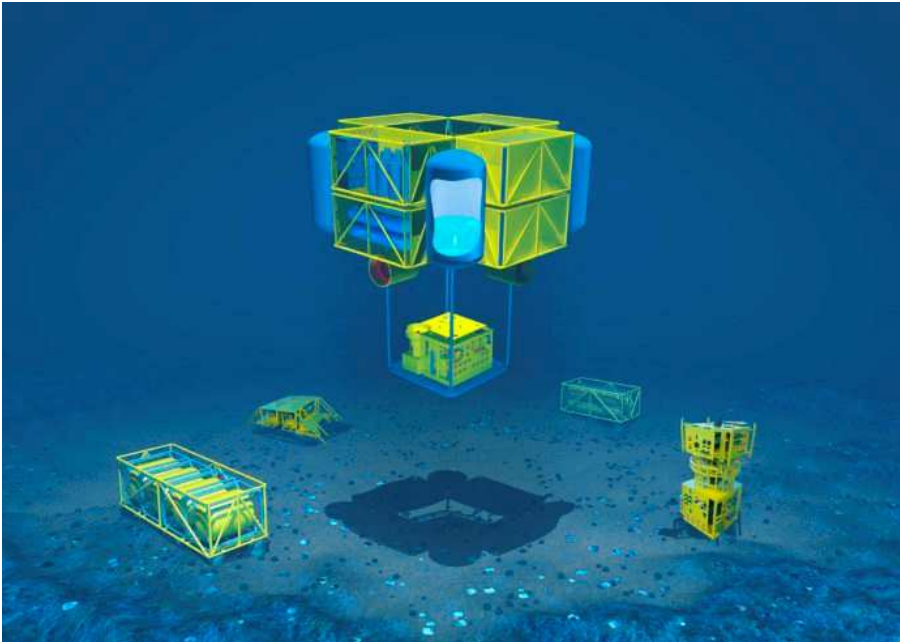
However, Dr Clark said more important environmental concerns needed to be overcome as well. "That I think is the real hurdle that these commercial companies will have to deal with," he said. "The deep sea is not out of sight, out of mind. It's been increasingly recognised that it's a large environment but it's also a fragile one and we've got to know a lot more about it before deep sea mining can take place where we can be confident that the sustainability of that ecological system is not going to be threatened."

## German Developers Promote New Underwater Vehicle Technology

*The Large Modifiable Underwater Mothership (MUM) offers potential applications for deep sea mining.* By Arlo Hemphill, DSM Observer, November 27, 2017

A new German technology is being promoted as the next generation in autonomous underwater vehicles. The [Large Modifiable Underwater Mothership \(MUM\)](#) is a modular, unmanned underwater vehicle capable of being customized cost-efficiently for a variety of missions. Individual base

modules can be freely combined with specific mission modules to form large systems, enabling even unusual and highly specialized tasks to be performed quickly and easily. Possible activities range from payload transportation and operations to research missions and stationary deep sea tasks, making it potentially useful for various stages of deep sea mining from scientific monitoring to extractive activities.



The Large Modifiable Underwater Mothership (MUM)

The floating, wireless underwater vehicle will be equipped with an emissions-free, air-independent fuel cell propulsion system. The goal of the engineers is to develop a vehicle with diving depths of up to 5,000m that can continuously operate for several weeks. With a payload capacity of several tonnes, MUM will be capable of handling even heavy-duty tasks. The individual modules can be reused, permitting a significant reduction in costs compared with conventional vehicle concepts and much quicker development cycles. Newly developed mission modules are also easy to integrate. The technology is being led by a team of engineers from [ThyssenKrupp](#), [Berlin Technical University](#), the [University of Rostock](#), [ATLAS ELEKTRONIK](#) and [EvoLogics](#). The team has secured funding for development from the German Federal Ministry for Economic Affairs and Energy over three years.

### **Deep-Seabed Mining May Come Soon, Says Head of Governing Group**

*New regulations could open the door for sustainable mining, says the head of the International Seabed Authority. However, he and others pointed to environmental, financial, and technical challenges.* By Randy Showstack, Staff Writer, 22 November 2017

The spotlights of a remotely operated vehicle illuminate carbonate rock spires of the Lost City hydrothermal vent field in the Atlantic Ocean during a 2005 scientific research expedition to the site. Recent approval by the International Seabed Authority for mining exploration in deep-ocean areas worldwide, including Lost City, has prompted some ocean scientists to raise concerns about possible harm to the vents and the ecosystems they support. [Credit](#): IFE, URI-IAO, UW, Lost City Science Party; NOAA/OAR/OER; The Lost City 2005 Expedition, [CC BY 2.0](#)

“All the indications are that we are at a decisive point in the long history of attempts to mine the deep seabed,” said Michael Lodge, secretary-general of the International Seabed Authority. The world is “on the threshold of a new industry,” the head of an international body that governs deep-



seabed mining said last week. At a 14 November forum in Washington, D. C., Michael Lodge, secretary-general of the [International Seabed Authority](#) (ISA), laid out environmental and other challenges to deep-sea mining while maintaining that a new regulatory system could allow the seabed operations to proceed in a sustainable manner. “All the indications are that we are at a decisive point in the long history of attempts to mine the deep seabed,” he said.

Although commercial exploitation of seafloor materials has not yet begun and could be years off, [Lodge](#) told the joint [meeting](#) of several boards of the National Academies of Sciences, Engineering, and Medicine (NASEM) that ISA has approved 29 exploration contracts covering more than 1.3 million square kilometers of the seabed in the Pacific, Indian, and Atlantic oceans. He distinguished deep-seabed mining from shallow-water mining for gold, sand, and other materials, which has gone on for centuries. Also, ISA distinguishes between [exploration](#) and exploitation activities. Technology for underwater mining, including remotely operated vehicles and other tools, has advanced enormously during the past few years, [Lodge](#) noted. Still to be developed, however, are a regulatory regime for mineral exploitation and reliable ways of knowing if a region of the seabed contains sufficient resources—such as manganese nodules, ferromanganese crusts, massive sulfides, or metal-rich muds—to support major capital investments, he said.

### Developing New Regulations

ISA currently is crafting regulations, open for comment until 20 December, on the exploitation of deep-sea mineral resources. Established under the 1982 United Nations (UN) [Convention on the Law of the Sea](#), ISA oversees mining in the deep sea beyond the exclusive economic zone jurisdictions of individual countries. The organization currently is crafting [regulations](#), open for [comment](#) until 20 December, on the exploitation of deep-sea mineral resources. [Lodge](#) said that ISA “must develop environmental regulations that ensure that [exploration](#) and exploitation take place in a manner that recognizes the need to protect the environment, both on the ocean floor and in the water column.”

Among those submitting comments, the Deep-Sea Minerals Working Group of the [Deep-Ocean Stewardship Initiative](#) (DOSI) called the consultative approach to developing ISA’s mining code “commendable” but urged more openness. “Exploitation of the Seabed will affect all nations in perpetuity. A clear, open process to develop these Regulations is necessary,” reads the 16 November [comments](#) from DOSI, a network of more than 700 experts from about 40 countries. DOSI’s letter, provided to *Eos*, also recommends that the regulation preamble reflect language from the UN convention about the need to “ensure effective protection for the marine environment from harmful effects which may arise from such activities.” At the forum, [Conn Nugent](#), director of the seabed mining [project](#) for Pew Charitable Trusts in Washington, D. C., said his group’s goal is to help ensure passage of a mining code that reserves large no-mining areas and adopts a precautionary code to govern activities where mining is allowed.

### Environmental Issues

Other speakers in a panel discussion also addressed environmental concerns. “All mining has an impact,” said [Mark Hannington](#), head of the marine mineral resources group at the GEOMAR Helmholtz Centre for Ocean Research. “You’re either impacting society or land-based ecosystems or water quality or you’re affecting ecosystems on the bottom of the ocean.” He said some mineral deposits should be off limits. “Obviously, the hydrothermal vents that are still active are unique ecosystems, and nobody intends to mine those,” [Hannington](#) noted. He said inactive [hydrothermal](#) vents might be attractive for mining but are harder to locate, and “we don’t know what kind of ecosystems might be associated with inactive vents.”

Dozens of scientists, however, last month expressed concern about a recent ISA decision to grant a contract for massive sulfide mineral exploration in a region of the Mid-Atlantic Ridge with active

vents. “These unique hydrothermal vent sites”—known as Lost City, TAG, and Broken Spur—“are irreplaceable, and their vulnerability to nearby exploration, let alone seabed mining, is entirely unknown,” reads a 27 October [letter](#), provided to *Eos*, which was signed by [Beth Orcutt](#), senior research scientist with the Bigelow Laboratory for Ocean Sciences in East Boothbay, Maine, and co-signed by nearly 50 other scientists.

“A critical thing is to understand what our environmental goals are. Clearly, there is going to be habitat destruction, so what is it we are trying to protect?” [Cindy Van Dover](#), professor of biological oceanography at Duke University’s Nicholas School of the Environment in Durham, N.C., and a panelist at the forum, said that it’s “upside down” for exploration contracts to be awarded “before we understand what our regional environmental management plans are.” Van Dover, who said she is neither pro- nor anti-mining, noted that mining degradation won’t just include “what you scrape up.” She said a sediment plume could affect the benthic and pelagic environment, and sound and light disturbances and toxic heavy metals also could disturb the marine environment. “A critical thing is to understand what our environmental goals are. Clearly, there is going to be habitat destruction, so what is it we are trying to protect?” she said.

### **Moving Forward**

Hannington cautioned that although the number of areas with evidence of some valuable minerals is “astounding,” there is a big difference between a potential mineral resource and just a mineral occurrence. Global mining companies, he observed, currently are on the sidelines and don’t necessarily view deep-seabed mining as something of immediate interest. Once new regulations governing exploitation are approved, possibly within a few years, mining likely would start slowly at relatively small scales, according to Lodge and others. “I think it will start off with a few operators who are willing to take the risk and invest that capital,” said Lodge. However, at least one expert attending the seafloor mining forum disagreed with that forecast. [Larry Meinert](#), deputy associate director for energy and mineral resources at the U.S. Geological Survey, told *Eos* that he doesn’t see “a viable way to develop deep-sea mining as an industry.” “No company could afford to put in a billion dollars of assessment to figure out whether this could be done,” said Meinert, who spoke about minerals at an earlier session of the NASEM meeting. “There’s no economic model that could pay for that.”

### **Lack of environmental safeguards highlighted in Cooks legislation**

*The Pacific Network on Globalisation says claims environmental costs would stop seabed mining in the Cook Islands would be thwarted by a lack of safeguards in the country's laws.*

Radio New Zealand, 17 November 2017

PANG co-ordinator Maureen Penjueli says the Cooks' Seabed Minerals Act dates back to 2009 when deep-sea mining was believed to be low risk, high return. She said in 2017 the risks to the environment were still little understood. The country's Seabed Minerals Authority Commissioner Paul Lynch said earlier this week that mineral extraction will likely not go ahead if the environmental cost is too high. Ms Penjueli said there was nothing in the legislation to stop prospecting or mining on environmental grounds. "When you consider that our economies are heavily dependent on the ocean - our people are heavily dependent on the ocean for livelihoods, food security - that's quite problematic in terms of the current legislation."

### **Environmental cost will likely stop Cooks' seabed mining**

*The Cook Islands' Seabed Minerals Authority Commissioner says deep sea mineral extraction in the country will likely not go ahead if the environmental cost is too high.*

Radio New Zealand, 15 November 2017



Photo: Florence Syme-Buchanan/RNZ

Paul Lynch said the country's Seabed Minerals Act ensured a careful, steady approach to any potential exploration or mining. He said the act was the world's first, dedicated national legislation to control seabed minerals activities. Mr Lynch said criticism, based on objections to seabed mineral prospecting in other countries, is superficial and close-minded. The Pacific Network on Globalisation co-ordinator Maureen Penjueli said Pacific Island governments need to be extremely cautious about deep sea mining as it's largely experimental with many potential liabilities. Mr Lynch said, at a depth of 5000 metres, the Cook Islands manganese nodules are a different resource to other countries. He said any future extraction may be 5-10 years away. The Cook Islands government last month entered into an agreement with the company Ocean Minerals to reserve 23,000 square kilometres of the country's exclusive economic zone for up to 18 months. The agreement gives the company exclusive rights to apply for manganese nodule prospecting and exploration licenses.

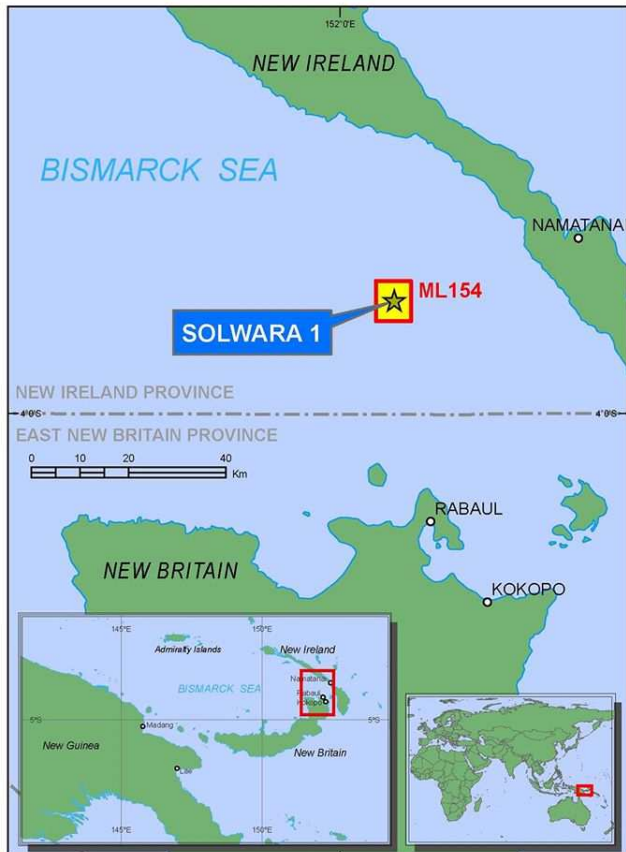
### **Im Goldrausch der Tiefe**

*Die Tiefsee enthält Schätze, nach denen bald alle Welt graben könnte: Gesteinsbrocken am Meeresboden mit wertvollen Edelmetallen. Auch Deutschland hat sich ein Abbaugelände im Pazifik reserviert. Wie gefährlich ist der Tiefseebergbau für die Umwelt? Von Sinan Recber  
ZEIT Wissen, 8. November 2017*



Ein japanisches Testgerät gräbt nach Erzen und sammelt sie ein. Quelle: Japanisches Wirtschaftsministerium

Japan ist jetzt auch mit dabei. Vor ein paar Wochen\_förderte das japanische Ölonternehmen JOG-MEC 1600 Meter unter der Meeresoberfläche Tiefseeerze, sogenannte Massivsulfide. „Der Erfolg des Tests bedeutet einen großen Schritt vorwärts für die Technologie, die notwendig ist, um Meeresbodenschätze zu heben“, schwärmte das japanische Wirtschaftsministerium. Im Herbst diesen Jahres nutzte man die guten Wetterbedingungen vor den südlichen Inseln in der Okinawa-Präfektur, um die Tiefseeerze aufzusammeln und zu einem Schiff an die Wasseroberfläche hochzupumpen.



Unweit der Küste will eine kanadische Firma Massivsulfide vom Meeresboden holen. Quelle: Nautilus Minerals

Bricht nun ein globaler Goldrausch in den Weltmeeren aus? 30 Kilometer vor der Insel Neuirland in Papua-Neuguinea will das kanadische Unternehmen Nautilus Minerals Anfang 2019 am Meeresboden nach Seltenen Erden und Edelmetallen graben. Auch diese unterseeische Lagerstätte, Solwara 1 genannt, beherbergt Massivsulfide: Gesteinsbrocken, in denen Gold, Kupfer, Nickel, Kobalt und andere Metalle enthalten sind. Das Material ist begehrt für die steigende Produktion von Smartphones, Windrädern und Batterien. Am Meeresboden ist die Konzentration der Edelmetalle oft größer als in Erzen an Land: bei Probemessungen von Nautilus Minerals zeigte sich, dass durchschnittlich sieben Prozent Kupfer in den unterseeischen Metallklumpen stecken. An Land geförderte Erze enthalten rund ein Prozent. Die Goldkonzentration beträgt nach Angaben des Unternehmens bis zu 20 Gramm pro Tonne Abbaugestein im Vergleich zu sechs Gramm pro Tonne an Land. Ein Erfolg dieses Projekts könnte daher ein globales Wettrennen um die Schätze der Tiefsee losstreiten.

Massivsulfide sind an den sogenannten Schwarzen Rauchern zu finden, also kleinen Tiefseevulkanen, die zugleich Grundlage für das Ökosystem am Meeresboden sind. Meerwasser dringt an den Grenzen von Kontinentalplatten zwei bis drei Kilometer in den Ozeanboden, wird dort auf über 200 Grad erhitzt und wieder nach oben gedrückt. Dabei wäscht der heiße Wasserstrom verschiedene Metalle und Stoffe aus dem Gestein. Am Meeresboden dringt dann aus diesen „hydrothermalen Tiefseequellen“ heißes, mineralienreiches Wasser in Form von schwarzem Rauch aus. Trifft das heiße Quellwasser auf das 2 Grad kalte Tiefseewasser, fallen Metallsulfide aus, reichern sich an den

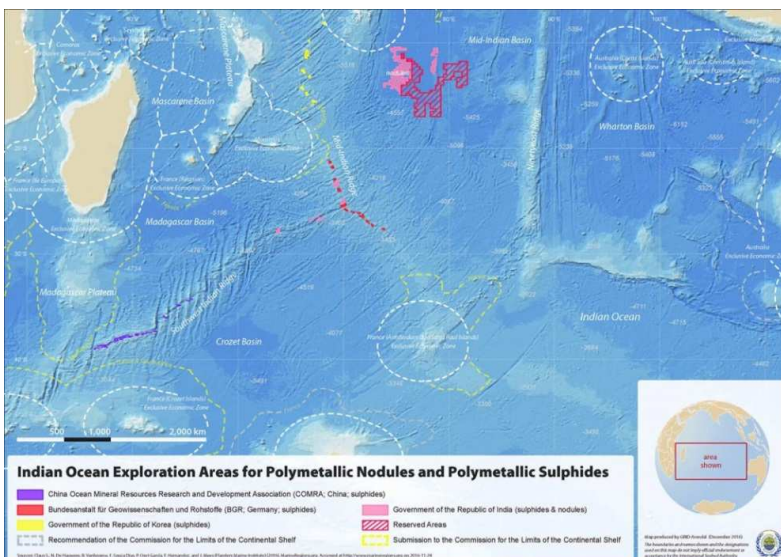


Austrittsstellen an und formen meterhohe Türme, Schlote genannt. Auf dem Grund von Solwara 1 hat Nautilus Minerals bis zu 15 Meter hohe Schlote gesichtet.



Die Schlote der Massivsulfide reichen am Standort "Solwara 1" bis zu 15 Meter hoch. Quelle: Nautilus Minerals

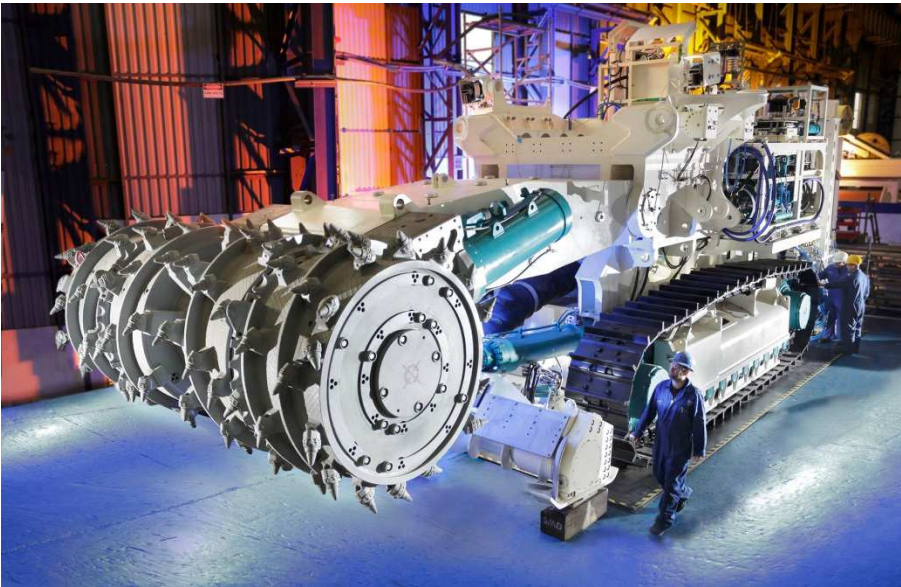
Die Internationale Meeresbodenbehörde (ISA) mit Sitz in Jamaika ist für Meeresgebiete außerhalb der nationalen Gesetzgebung zuständig. Wer sich einen Teil vom Ozean sichern will, kann einen Antrag für eine 15-jährige Lizenz stellen, die ein bis zu 150.000 Quadratkilometer großes Areal abdeckt – dafür gehen die Antragsteller Verpflichtungen ein und müssen beispielsweise ökologische Untersuchungen durchführen, bei denen Sie die Artenvielfalt, Meeresströmungen und Sedimente analysieren. Auch Deutschland hat sich Gebiete gesichert – unter anderem eine Erkundungslizenz für Massivsulfide im Indischen Ozean vor Madagaskar sowie für Manganknollenfelder in der sogenannten Clarion-Clipperton-Zone in der Pazifik (siehe Karte). Manganknollen sind Steinklumpen, die wertvolle Elemente wie Gold, Kobalt, Mangan, Kupfer, Zink und Nickel enthalten. Verantwortlich für die Exploration und einen möglichen Abbau ist in Deutschland die Bundesanstalt für Geowissenschaften und Rohstoffe (BGR) als Oberbehörde im Auftrag des Wirtschaftsministeriums. Im Hype um Tiefseelagerstätten spielt vor allem der Drang, sich von ausländischen Bodenschätzen unabhängiger zu machen, eine Rolle – ein Anreiz für rohstoffarme Länder. Bergbauunternehmen wiederum lockt die Aussicht auf das große Geld. Das ist im Meer nicht anders als an Land.



Genehmigte Erkundungsgebiete im Pazifik: Deutschland und Indien sind Nachbarn. Quelle: Internationale Meeresbodenbehörde



Zurzeit arbeitet die ISA noch an dem sogenannten Mining Code, der internationale Standards zum Tiefseebergbau festlegen soll. Wenn dieser fertiggestellt ist, können die Erkundungslizenzen für die Staaten und Unternehmen in Abbaulizenzen münden und die Jagd nach Rohstoffen wird eröffnet sein. Einen ersten Entwurf für den Mining Code hat die Behörde im August veröffentlicht: er sieht vor, dass die Lizenznehmer Machbarkeitsstudien durchführen, Finanzierungsnachweise erbringen, Umweltdaten liefern, Notfallpläne erarbeiten, Antikorruptionsmaßnahmen ergreifen und einen jährlichen Bericht herausgeben. Die Abbaubedingungen am Meeresboden sind deutlich komplizierter als in Minen: In bis zu sechs Kilometern Tiefe, zum Teil mehr als 1000 Kilometer vom Festland entfernt, herrschen ein extremer Druck und niedrige Temperaturen. An der Meeresoberfläche müssen die Mutterschiffe Strömungen, Stürmen und Wellen trotzen.



Bulk Cutter nennt sich dieses Gerät mit den gigantischen Fräsen. Quelle: Nautilus Minerals

Die Abbaugeräte sehen nach Science Fiction und schwerem Geschütz aus: Tiefseepanzer mit gigantischen Fräsen und Trichtern sollen die Erze abbauen. Das anvisierte Gebiet sei mit 0,1 Quadratkilometern extrem klein, beteuert Nautilus Minerals, „es gibt keine Auswirkungen auf Fischerei, Riffe oder die Küstenbewohner.“ Für Solwara 1 braucht es wie bei dem japanischen Testabbau ein Schiff, das wie eine Art Ölplattform über dem Abbaugelände schwebt und zu dem Pumpen die Tiefseeerze fördern können. Das Pump- und Rohrsystem sei vollständig geschlossen, die Erze würden sich nicht mit dem Wasser vermischen, erklärt die Firma. Außerdem finde der Abbau in mindestens 1300 Metern Tiefe statt, Thunfische oder Wale würden hingegen in Tiefen von 800 Metern und darüber leben.

„Was auf jeden Fall bei einem Abbau passiert, ist, dass man die Lebensgemeinschaften grundlegend stört“, sagt Sven Petersen von GEOMAR, dem Helmholtz-Zentrum für Ozeanforschung in Kiel. Petersen ist Rohstoffgeologe und erforscht die Schwarzen Raucher. „Man geht normalerweise davon aus, dass die Schwarzen Raucher an Gebiete erhöhter vulkanischer Aktivität gebunden sind und die Lebensgemeinschaften angepasst sind, weshalb sie sich relativ schnell regenerieren können. Ein Abbau wird aber dafür sorgen, dass sich die Lebensgemeinschaften anders zusammensetzen. Ob der ursprüngliche Zustand wiederhergestellt werden kann, wissen wir nicht, ist aber eher unwahrscheinlich. Da die abgebauten Gebiete aber relativ klein sind, halte ich das im globalen Maßstab nicht unbedingt für ein Ausschlusskriterium für den Abbau von Massivsulfiden.“

In den betroffenen Küstenregionen regt sich breiter Widerstand gegen das Vorhaben: die Menschen befürchten, dass das Projekt Solwara 1 unter anderem die Fischbestände und marinen Ökosysteme schädigen könnte – gegen diesen „experimentellen“ Tiefseebergbau wehren sie sich, denn die Fischerei und ein intakter Ozean sind Lebensgrundlage vieler Küstenbewohner. „Das geplante Solwa-

ra 1-Projekt befindet sich mitten in unserer Fischfangregion, und die dortigen Meeresströmungen treiben die Schadstoffe direkt an unsere Küsten“, erklärt Jonathan Mesulum von der Alliance of Solwara Warriors, einer Organisation für das Verbot von Tiefseebergbau im Pazifik, auf der Webseite Papua New Guinea Mine Watch.



Um die Schwarzen Raucher gedeihen Ökosysteme in der Tiefsee. Quelle: Bundesanstalt für Geowissenschaften und Rohstoffe

Ähnlich skeptisch äußerte sich Emele Duituturaga, die Generaldirektorin von PIANGO, einem Zusammenschluss von NGOs mehrerer Pazifischer Inselstaaten, auf der diesjährigen Ozeankonferenz der Vereinten Nationen: „Viele Jahre kämpften Vereine kleiner Fischereibetriebe gegen ocean grabbing und die Privatisierung der Fischereiressourcen. Tiefseebergbau ist ein Beispiel für diese wachstumsorientierte Strategie und die umweltschädigende Nutzung von Meeresressourcen. Sie missachtet die Rechte der örtlichen Gemeinden und ihre Existenzgrundlage und befriedigt den Ressourcenhunger von Industrie- und Schwellenländern.“

Die Hoffnung auf neue Arbeitsplätze für die Küstenbewohner von Neuirland hat sich jedenfalls zerschlagen: die Mitarbeiter von Solwara 1 werden hochqualifizierte Fachkräfte wie Forscher und Ingenieure sein, einen breiten Zugang zum Arbeitsmarkt in Papua-Neuguinea gibt es also nicht. „Alle Erfahrungen mit bisherigen Bergbauprojekten an Land sind durchweg negativ“, sagt Jan Pingel vom Ozeanien-Dialog, einem Verein für Anliegen der Zivilgesellschaft pazifischer Inselstaaten. „Die Menschen, denen diese Großprojekte außer Entschädigungszahlungen vor allem Umweltverschmutzung, Krankheiten und Hunger gebracht haben, gehören heute zu den Ärmsten im Inselstaat, obwohl ihnen etwas völlig anderes versprochen wurde.“ Die betroffene Bevölkerung wolle verhindern, dass ihre Inselwelt erneut zum Testgebiet für eine zerstörerische Technologie gemacht werde. Auch die Erfahrungen mit den Atombombenversuchen im Südpazifik hätten die Pazifikbewohner traumatisiert.

Eine Garantie, dass der Tiefseebergbau die Meerestiere und Fischbestände nicht verseucht und die Lebensgrundlage der einheimischen Bevölkerung nicht bedroht, gibt es nicht. „Wir fürchten, dass mit dem Abbau von Massivsulfiden ein umfangreicher Artenverlust in der Tiefsee stattfinden wird, der auch Konsequenzen für die Meeresökosysteme insgesamt haben wird“, sagt Kai Kaschinski von der NGO Fair Oceans in Bremen. Manche Arten in der Tiefsee sind endemisch, das heißt, es gibt sie einzig und allein im unmittelbaren Gebiet. Ein Abbau könnte Arten auslöschen, die noch gar



nicht erforscht sind. „Das größte Problem, was die Biologen gerade haben, ist, dass wir die Zusammenhänge in den Meeresregionen nicht verstehen“, sagt Sven Petersen vom GEOMAR. „Wenn man jetzt einen einzelnen aktiven schwarzen Raucher abbauen würde, wie dient dieses Areal zur Rekrutierung von anderen Arten in anderen Vorkommen? Im Moment verstehen wir zu wenig davon, wie die Netzwerke zwischen Nahrung und den Tieren in der Tiefsee funktionieren.“

Es gibt auch die Befürchtung, dass giftige Schwermetalle, die aufgewirbelt werden, sich über das Plankton in der Nahrungskette konzentrieren könnten. „Die Schwermetallbelastung sehe ich als geringstes Umweltproblem beim Tiefseebergbau an“, sagt hingegen Carsten Rühlemann von der Bundesanstalt für Geowissenschaften und Rohstoffe, die den Meeresboden im Auftrag des Wirtschaftsministeriums nach Rohstoffen absucht. „Es ist ausgeschlossen, dass Stoffe, die in solcher Tiefe entstehen, nach oben gespült werden oder hochtreiben.“ Außerdem seien Schwermetalle nur dann gefährlich, wenn sie nicht in Form von Oxiden gebunden seien, also wenn sie keine Verbindung mit Sauerstoff haben. Doch weil das Wasser am Meeresboden sauerstoffreich sei, würde das Blei sofort in Oxid umgewandelt und sich ablagern.



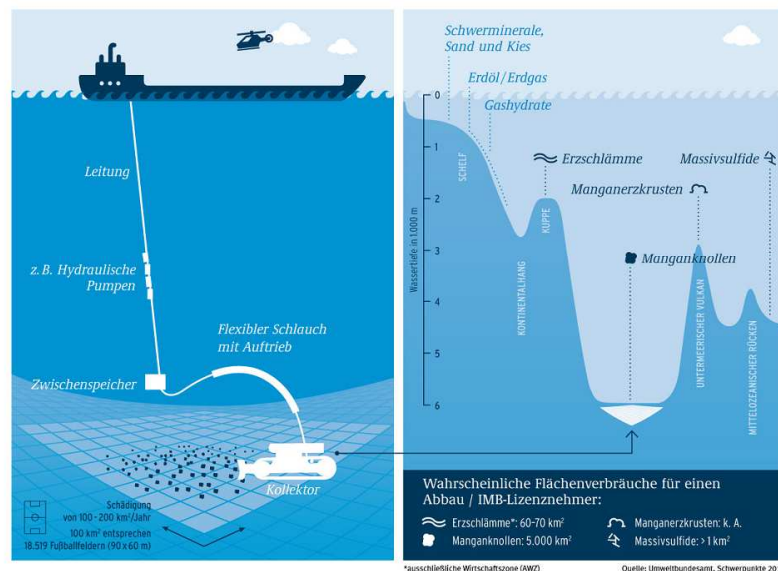
Ein Manganknollenfeld am Meeresboden. Quelle: GEOMAR

Deutsche Tiefseeforscher griffen 1989 in einem Experiment nach harschen Mitteln: sie pflügten ein 11 Quadratkilometer großes Areal am Meeresboden vor Peru um und sahen zu, was passierte - was sie herausfanden, stimmt nicht gerade optimistisch. Das empfindliche Ökosystem, das sich in der Tiefe des Meeres befand, war zu großen Teilen zerstört und sollte sich selbst nach Jahren nicht wieder vollständig erholen. Eine internationale Forschungsmission erkundete 26 Jahre nach dem Experiment den umgepflügten Meeresboden. Nur wenige Organismen hatten sich regeneriert. Auf Manganknollen siedeln sich Schwämme und Weichtiere an. Diese Knollen sind im Gegensatz zum weichen Sedimentboden ein fester Untergrund, auf dem das kaum erforschte Ökosystem der Tiefsee gedeihen kann. Nach dem Umpflügen kamen kaum Meeresbewohner zurück, und Manganknollen entstehen erst nach Millionen von Jahren. Bis sich Lebewesen am Meeresboden nach einem solchen Eingriff wieder ansiedeln, können nach derzeitigem Forschungsstand Jahrzehnte oder gar Jahrhunderte vergehen.

Beim Ausheben von Manganknollen werden zudem Sedimente aufgewirbelt. Was mit den Tiefseebewohnern am Meeresboden passiert, wenn sich diese künstlich erzeugten Sedimentwolken auf ihnen absetzen, ist schwer abzuschätzen. Eine andere Gefahr ist, dass die aufgewirbelten Sedimente und Trümmer sich wie ein wandernder Schleier über den Meeresboden legen. Diese Sedimentfahne kann nach Modellrechnungen mehrere Zehnerkilometer über den Meeresboden driften und so größere Flächen als die eigentlichen Abbaugelände bedecken. „Die Bodenströmungen sind sehr langsam, im Durchschnitt drei Zentimeter pro Sekunde. Diese bewegen sich in eher elliptischen oder

kreisförmigen Bahnen. Bis diese Sedimentfahne über größere Strecken weg vom Abbauort transportiert wird, dauert es sehr lange“, sagt Carsten Rühlemann von der BGR. Problematisch an dem Sedimentschleier: er sinkt über den Filterierern ab, also Tiefseebewohnern wie Schwämmen, Korallen und Weichtieren, die auf klares Wasser und nur wenige organische Partikel eingestellt sind. Die Tiere drohen zu ersticken.

## TIEFSEEERGBAU



Manganknollenfelder befinden sich in größeren Tiefen und verteilen sich viel breiter auf dem Meeresboden als Massivsulfide. Quelle: Umweltbundesamt

Rahul Sharma vom indischen National Institute of Oceanography schlägt vor, einen Abbau streifenweise zu betreiben: ein Streifen wird bearbeitet, die benachbarten Meeresbodenstreifen bleiben zu Regenerationszwecken unberührt. Gewissermaßen Dreifelderwirtschaft in der Tiefsee. Ob dieses Verfahren das Problem mit dem Sedimentschleier löst, ist allerdings fraglich.

„Das Gebiet und seine Ressourcen sind das gemeinsame Erbe der Menschheit.“

Wem das Meer gehört, regelt im weitesten Sinne das UN-Seerechtsübereinkommen von 1994. Dort heißt es in Artikel 136: „Das Gebiet und seine Ressourcen sind das gemeinsame Erbe der Menschheit.“ Mit dem „Gebiet“ wird der Bereich des Ozeans bezeichnet, der nicht mehr einzelnen Staaten gehört. Die sogenannten Hoheitsgewässer eines Staates erstrecken sich rund 22 Kilometer (12 Seemeilen) von der Küste in die See, bis dahin gelten die nationalen Gesetze. In den weiteren 22 Kilometern vor der Küste, der sogenannten Anschlusszone, hat der Staat Kontrollbefugnisse. Danach eröffnet sich die ausschließliche Wirtschaftszone (AWZ), diese reicht bis zu 200 Seemeilen vom Festland ins Meer: dort kann der Staat natürliche Ressourcen ausbeuten, also fischen oder eben auch Bergbau betreiben.

Doch wer haftet dafür, wenn in der AWZ vor Papua-Neuguinea etwas schiefgeht und der Meeresboden samt Fischbeständen verseucht werden? Auch angrenzende Inselstaaten sind auf die Fischerei angewiesen. Der Internationale Seegerichtshof mit Sitz in Hamburg hat dafür im Februar 2011 ein Rechtsgutachten vorgelegt. Die elf Richter der Meeresbodenkammer betonen darin, dass die Staaten dafür sorgen müssen, den Abbau sicher und gesetzeskonform zu gestalten. Ist Papua-Neuguinea bereit, ein solch riskantes Unternehmen zu tragen und die Verantwortung dafür zu übernehmen? Ein Rückblick auf das Verhältnis zwischen der Regierung und dem Rohstoffunternehmen zeigt: es hat gekriselt. Papua-Neuguinea wollte die vereinbarte Firmenbeteiligung von 30 Prozent zunächst nicht wahrnehmen. Die Finanzierung von Solwara 1 stand auf der Kippe und das Projekt

wurde auf Eis gelegt. Das Unternehmen schaltete ein Schiedsgericht ein, das 2014 zu Gunsten von Nautilus Minerals entschied - die Regierung musste 15 Prozent der Anteile im Wert von sieben Millionen US-Dollar übernehmen. Sie hat eine Option auf weitere 15 Prozent, die sie aber bisher nicht wahrgenommen hat. Schätzungen zufolge soll der Abbau und der Transport von Erzen über Solwara 1 mindestens 380 Millionen US-Dollar kosten, während der tägliche Betrieb des Projekts 260.000 Dollar verschlingt. Wenn die Tiefseebewohner vor Papua-Neuguinea Glück haben, werden vorerst noch keine Panzer über ihre Kolonien pflügen. Eine Aktie von Nautilus Minerals ist derzeit weniger als ein Dollar wert.

Quelle: <https://www.facebook.com/notes/zeit-wissen/im-goldrausch-der-tiefe/10155853145680238/>

### South Africa: Alarm at seabed destruction from SA phosphate mining

*If you imagine fish as birds of the ocean, they fly through forests and over fields which grow in the rich soil of the continental shelf. Just as on land, it's Earth teeming with roots and creatures that form the base of the sea's food web and upon which its health depends. Around South Africa's coasts, that could soon change writes DON PINNOCK.*

Don Pinnock, First Thing, 7 November 2017

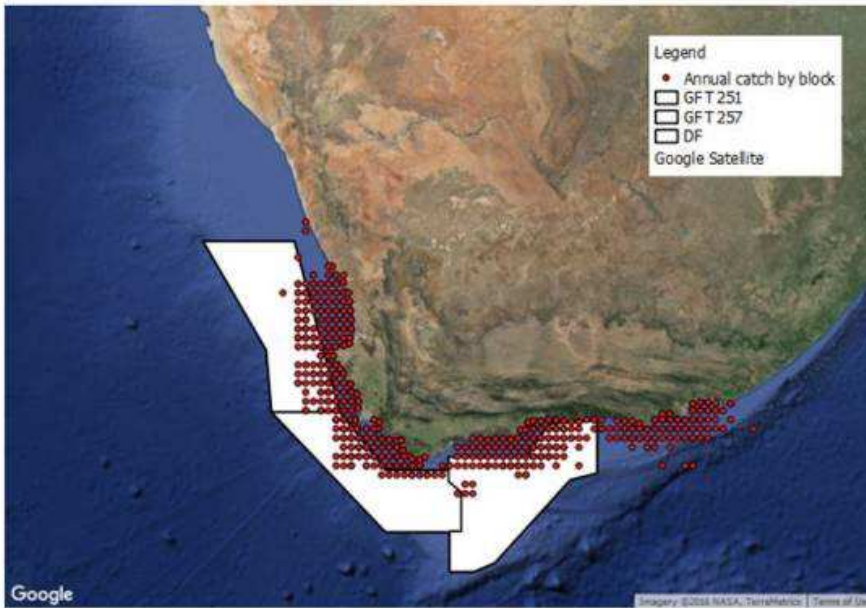
The Department of Mineral Resources has granted three prospecting rights over vast areas of the sea floor that could signal the start of a mining process to grind up the seabed to extract phosphate. The resulting sediment would be dumped back into the water column as liquid "dust", posing a threat to ocean ecosystems, fish and fisheries. What it would do to the seabed is almost unimaginable. The licences cover 150,000km<sup>2</sup> within South Africa's western and southern Exclusive Economic Zone and were awarded to Green Flash Trading 251, Green Flash Trading 257 and Diamond Fields International.



A map shows the three marine prospecting rights on the sea floor..

Studies commissioned by the Safeguard our Seabed Coalition (SOSC), an alliance of non-governmental organisations, has warned that marine phosphate mining "would have severe and irreversible impacts on marine ecosystems and fishery resources and associated jobs, livelihood and food security benefits sustained by our fishing industry".





The proposed fishing and mining areas

Bulk marine sediment mining uses a suction hopper dredge which gouges the sediment to a depth of three metres. It's dredge head, which is about 11 metres wide with cutting teeth and high-pressure water jets, is dragged across the sea floor, crushing hard sediment and sucking it – and everything else in the way – up a tube. Once the phosphate has been filtered out, all excess water and fine particulate is flushed back into the sea, creating a sediment plume. Mining would take place on the continental shelf in what is known as the benthic zone, the area just above and below the seabed. Apart from anchoring aquatic plants, it's home to sea stars, barnacles, mussels, anemones, urchins, snails, crustaceans, molluscs, worms, ground fish and other organisms that make their home on or in the sea floor, at depths where light still penetrates. Much of the food supply is in the form of “marine snow”, small particles of decaying organic matter that slowly descend through the water column and accumulate on the ocean bed. According to Saul Roux, a legal campaigner at the Centre for Environmental Rights (CER), the impact of mining will include:

- Destruction of seabed ecosystems which are the building blocks of marine ecosystems;
- The release of hazardous substances such as radioactive materials, methane, hydrogen sulphide and heavy metals locked in the seabed;
- Destruction of spawning, breeding and feeding habitats for fish species, many of which are commercially important;
- Reduced light penetration and therefore photosynthesis of marine plants;
- Burial and smothering of marine organisms in the mining block and surrounding areas; and
- Habitat destruction and ecosystem changes in mined areas which could be permanent, as recovery would take centuries. The CER has flagged serious gaps in South Africa's legal, governance and institutional frameworks able to manage such bulk marine sediment mining. This would mean, says Roux, that the phosphate mining operations would be “unregulated and not subject to state monitoring or enforcement of its compliance with licences and environmental laws”. This would facilitate severe and irreversible damage to marine environments and fisheries. Only 0.4% of South Africa's Exclusive Economic Zone lies within marine protected areas (MPAs). The government, through Operation Phakisa, has committed to safeguard at least 5% of this zone in a network of 22 offshore MPAs. These have not yet been established and, says Roux, would not be big enough to protect biodiversity from resource exploitation, especially along the West Coast. Even if MPAs are declared, there is considerable doubt about the government's ability to police them. The Tsitsikamma MPA was rezoned for fishing in 2016 and in Table Bay fishing has been taking place in

the Paulsberg MPA. Marine mining technologies worldwide have caused massive environmental disasters, both through human error or equipment failure. The *Deepwater Horizon* spill in the Gulf of Mexico and the *Exon Valdez* spill off Canada are among many many examples. Although a prospecting right doesn't grant a legal entitlement to mine, it provides an expectation that mining will be allowed. The phosphate licensing follows a number of other indications that the government plans to develop a bulk seabed mining industry.



Photo: The bigger picture – offshore oil and gas activities as at 2016. Source: Petroleum Agency SA

In 2015 the Departments of International Relations & Co-operation as well as Mineral Resources announced the development of a Seabed Mining Roadmap aimed at developing this industry. Its media releases allude to the latter's intentions to develop seabed mining in South Africa's EEZ. CER has pointed out that South Africa's EEZ is already under considerable threat from marine petroleum extraction, with 98% already granted for exploration and production. It has called for appropriate governance frameworks for offshore oil/gas exploration and production as well as for seismic activities. In response to the Seabed Mining Roadmap, The Safeguard our Seabed coalition has called for a moratorium on bulk marine sediment mining until a strategic environmental assessment has been done and a network of marine protected areas declared.

A report commissioned by the SOSC highlights the fact that there is no need to undertake marine phosphate mining as there are more socio-economically and environmentally friendly ways to obtain it sustainably. These include the recovery of phosphates from human and animal waste and a more efficient application of phosphate fertiliser to soils. Despite the environmental and economic risks and after almost three years of advocacy, government has not responded to calls by the SOSC for an environmental assessment of marine phosphate mining. Neither has it taken any steps towards establishing a moratorium pending a strategic inquiry into this highly destructive process. This seems to indicate a determination to forge ahead at all costs.

*Illustrative photo: Maddie Dimaggio/(Unsplash).*

### **New Zealand: Locals to join in man's 400km walk against seabed mining**

Tara Shaskey, Taranaki Daily News, November 3, 2017

A hīkoi along the New Plymouth coastline to raise awareness of seabed mining will go ahead whatever the weather on Saturday. The walk will begin in Bell Block and finish at the Wind Wand, Kiwis Against Seabed Mining (KASM) member Chris Wilkes said. The event aimed to continue the

organisation's momentum with raising public awareness of KASM's high court appeal on the Environmental Protection Authority's (EPA) decision to allow Trans Tasman Resources to mine iron sand off the Taranaki coast. In total, seven groups are appealing the decision which included South Taranaki iwi Ngāti Ruanui, Fisheries Inshore New Zealand Ltd Conservation, Forest and Bird, iwi Ngāa Rauru, Greenpeace and Te Ōhu Kaimoana, the Māori Fisheries Trust. Wilkes said the walk was also in support of fellow KASM member Athol Steward's personal hīkoi, Walk the Walk Together for our Ocean. The Whanganui doctor embarked on a 400-kilometre coastal walk on October 28 to raise funds and awareness for KASM's appeal.



Athol Steward and other KASM members protest seabed mining.

"We want to show a bit of solidarity there and allow him as much of a platform to say what he wants to say," Wilkes said, "He's obviously passionate about ocean protection and we want to tau-toko his efforts." Steward has averaged 30km a day and his walk, which began in Raglan, is scheduled to finish on November 12 in Whanganui. "He's been walking the beaches and farmland, it's pretty amazing really," Wilkes said. "He's very passionate and just sick of not being able to do anything. I think we all feel a bit helpless." A free bus will leave Puke Ariki's bus stop in New Plymouth at 12.30pm and head to Bell Block beach ready for a 1pm start. Wilkes expected anywhere between 50 and 100 people would take part in the event.

"Rain or shine it's going to go ahead."

### **Nautilus seeks funding**

November 3, 2017, The National Business

NAUTILUS Minerals, the operator of Solwara 1 project, hopes to secure \$US10 million (K31.41 million) by the end of this month to fund its operations and develop the project. It said in September that based on its cash position and budget, in order to maintain the company's operations and the development of the Solwara 1 project, the company needed to obtain new funding of around US\$41 million (K128.81 million) before the end of the year. In particular, it had needed at least US\$15 million (K47.12 mil) before the end of last month to meet contractual commitments in relation to equipment forming part of the seafloor production system. Yesterday, Nautilus said discussions were continuing with various parties involved in the manufacture of the seafloor production system.

It is making progress with respect to deferring some of its immediate cash flow requirements. As a result, the firm is updating its previous reference to a funding requirement of US\$15 million by Oct 31, to a funding requirement of US\$10 million (K31.41 mil) by Nov 30. "There can be no assurances that the company will be successful in securing the necessary additional financing transactions within the required time," he said. "Failure to secure funding may result in the company engaging

specialist advisers and taking certain steps aimed at maximising shareholder value such as undertaking various transactions including, without limitation, asset sales, joint ventures and capital restructurings.”

### **Vanuatu civil groups against seabed mining, challenge govt**

October 26, 2017, The National Business

CIVIL society groups in Vanuatu have called for a ban on seabed mining activities in its waters. They held a consultation on experimental seabed mining at Port Vila last week. The civil society groups included the Vanuatu Cultural Centre, National Council of Women, Malvatumauri National Council of Chiefs, Vanuatu Council of Churches, Vanuatu Association of Non-Governmental Organisations and Vanuatu National Council of Youth. They passed a resolution last Thursday challenging the national government to impose a ban on seabed mining activities in Vanuatu waters. The resolution was supported by the Media Association of Vanuatu, Vanuatu Environment Advocacy Network, Vanuatu Indigenous Land Defence Desk, Presbyterian Church of Vanuatu, Vanuatu Environmental Science Society, Vanuatu Provincial Tourism Council and Youth Challenge Vanuatu.

The resolution comes after revelation that over 145 seabed mining exploration licences were issued between 2009 and 2013 without proper procedural permission and consultation within the government of Vanuatu, let alone, the people. A national consultation in 2014 later called for a wider consultation in Vanuatu, and non-renewal or new issue of seabed mining exploration licenses. The coalition of CSOs through its resolution now challenges the Vanuatu government to impose a definite ban on all seabed mining activities in the country’s waters. “We Ni-Vans, similar to other Melanesian and Pacific Islands nations have strong connection to our ocean. Rushing ahead with such an experimental project may destroy our ocean, which means destroying our home and our source of life,” Wendy Garai, vice-president of the Vanuatu National Council of Women, said.

Garai said it was important Vanuatu took a precautionary approach and impose a ban that will safeguard “our fishing industry, our local coastal communities who depend heavily on the ocean, our tourism sector and Vanuatu as a whole”. Marie Joemermer of Youth Challenge Vanuatu said: “There is so much talk about the potential economic benefits of seabed mining, but there is still a lot of unknown and uncertainties relating to science, economic and possible impacts, and we the young people of Vanuatu support this call for a ban as it has the potential to affect our future opportunities if we are not careful.”

### **Locals in Namatanai supporting Solwara 1 project**

October 19, 2017, The National Business

THE Mineral Resources Authority says people along the West Coast of Namatanai in the New Ireland are supporting the Solwara 1 project. They are from wards Two, Three, Four, Five, Six, 15 and 16. They told a team from the national government, Namatanai district mining office and Nautilus Minerals that after many awareness programmes conducted in the coastal communities, they understood the project and were confident it would be successfully operated. Valentine Betbet from Ward Four said Nautilus, the MRA and the Conservation Environment Protection Authority (CEPA), had done a lot of awareness on the project. He said ward members saw for themselves in Port Moresby the mining tools which were going to be used.

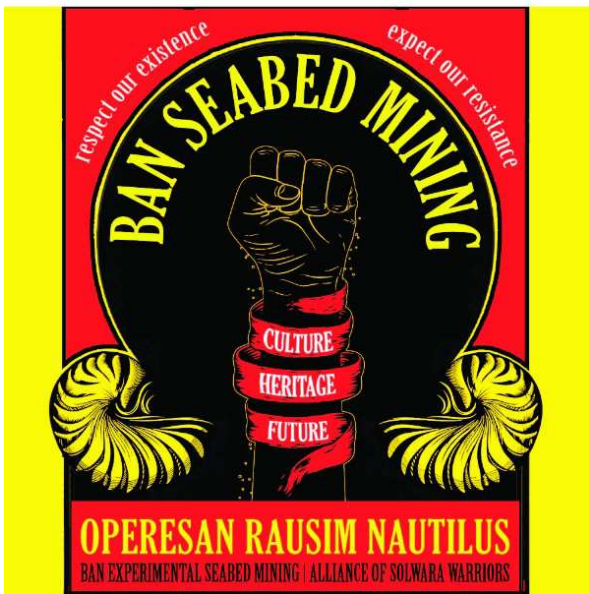
Ward representatives in the provincial government and their counter parts from East New Britain recently went on a familiarisation tour to Port Moresby and viewed the mining tools at the Motukea



wharf. Ward Five member Sokip Sulias urged people to understand the working of the project. Nautilus Minerals' manager for community and government relations Stanley Komunt said the company was committed to working with the people. Meanwhile, Ceba representative Joe Katape said Nautilus Minerals had satisfied most of the requirements of the Environment Act, such as the submission of the inception report and Environmental Impact Statement (EIS). The company has also submitted its Environmental Management and Monitoring Plan to Ceba to be assessed.

### ***MEDIA RELEASE***

**Former Attorney General of Papua New Guinea warns potential investors - Nautilus is a risky deal!** Deep Sea Mining Campaign, 19 October, 2017



PAPUA NEW GUINEA | Sir Arnold Amet, former Attorney General and Minister for Justice of PNG has joined the growing opposition against Nautilus Minerals Solwara 1 deep sea mining project in the Bismarck Sea. "It is understandable that Nautilus shareholders want to protect their own financial interests but new investors should beware - the Solwara 1 project is very high risk" said Sir Amet. "The muddy puddle at the so-called test site at Motukea Island is not fit for purpose. It will not provide any evidence that these machines won't malfunction at the intended operating depth of 1.6 km. The hulks are already deteriorating in our tropical conditions."

Canadian company Nautilus is still desperately seeking funds for its flagship Solwara 1 deep sea mining project. Commercial operation has been delayed year after year since it received its licence to mine the floor of the Bismarck sea in 2011. In a last ditch bid to finance Solwara 1, Nautilus's two largest shareholders have now formed a new company whose sole job is to secure funding for the Solwara 1 project [1]. "Nautilus is not a professional outfit" stated Sir Amet.

"I am concerned that the Papua New Guinean Government has bought a 15% share in a dodgy project, any operating disasters by Nautilus Minerals will quickly translate into an environmental catastrophe for the Bismarck Sea and its communities. The associated financial liabilities will be huge." In recent statements machine operators for the Solwara 1 project voiced their fears about the safety of operating the equipment 1.6 km under the surface and only 25 km off the coast of New Ireland Province [2]. In their Annual information forms lodged with Canadian Securities, Nautilus describes Solwara 1 as an experiment - both the environmental impacts and profits are complete un-



known [3]. Nautilus has declined to conduct a preliminary economic assessment, pre-feasibility study or feasibility study – as per conventional industry practice.

"With this high level of environmental and financial risk, The PNG Government should never have issued Nautilus with its licence. It was issued even though PNG has no legal framework to regulate such a mine and we have no capacity to monitor its impacts. The legal context for the licensing Solwara 1 is highly questionable" continued Sir Amet. Coastal communities in Papua New Guinea are holding the PNG Government to account. Formal letters have been submitted to the Ministry of Mining and Ministry of Environment and Conservation requesting that key documents relating to the licensing of the Solwara 1 project be made public. They have given the PNG Government until October 18 to respond or face the prospect of legal proceedings [4].

## Notes

[1] Nautilus signs funding mandate with major shareholders, Nautilus Minerals press release, October 11 2017  
[http://www.nautilusminerals.com/irm/PDF/1929\\_0/Nautilusignsfundingmandatewithmajorshareholders](http://www.nautilusminerals.com/irm/PDF/1929_0/Nautilusignsfundingmandatewithmajorshareholders)

[2] PNGeans to pioneer new mining technology, Post Courier, 28 September 2017,  
<http://postcourier.com.pg/pngeans-pioneer-new-mining-technology/>

[3] See sections on Risk factors in Annual information forms for financial years 2015 and 2016. For example:

"Our operations are speculative due to the high-risk nature of business related to the exploration and acquisition of rights to potential mineable deposits of metals. These risk factors could materially affect the Company's future results and could cause actual events to differ materially from those described in forward-looking statements relating to our Company." (FY 2016, p 52)

"... Performance, availability, reliability, maintenance, wear and life of equipment are unknown. There can be no guarantee that sub-sea engineering and recovery systems can be developed or if developed, will be employable in a commercially-viable manner." (FY 2015, p54)

"... while Company studies have indicated a low likelihood of risk to the aquatic environment from mining activities, the actual impact of any SMS [seafloor massive sulphide] mining operations on the environment has yet to be determined." (FY 2015, p61)

"Nautilus has not completed and does not intend to complete a preliminary economic assessment, pre-feasibility study or feasibility study before completing the construction and first deployment of the Seafloor Production System at the Solwara 1 Project."

"No independent Qualified Person has confirmed the amount of these costs or recommended that these costs be incurred. There is significant risk with this approach and no assurance can be given that the Seafloor Production System, if fully funded and completed for deployment at the Solwara 1 Project, will successfully demonstrate that seafloor resource development is commercially viable." (FY 15, p52)

[4] Constitutional Right to Key Documents on Experimental Seabed Mining, Centre for Environmental Law and Community Rights (CELCoR) and Alliance of Solwara Warriors media release, 3 October 2017, <http://www.deepseaminingoutofourdepth.org/constitutional-right-to-key-documents-on-experimental-seabed-mining/>

## Japan's Strength in Resource Diplomacy Lies in Its Ocean Floor

Katsutoshi Takagi (staff writer of the Sankei Shimbun)

Diplomacy & Security, October 18, 2017, Katsutoshi Takagi



Does your heart race when you hear adventures about seeking gold and silver at the bottom of the sea? Such stories might soon become reality. The Ministry of Economy, Trade and Industry (METI) and the Japan Oil, Gas and Metals National Corporation (JOGMEC) announced in September that their experiment to stably draw mineral ores from the ocean floor was a record-breaking success. They plan for the mineral ores to become commercialized in the latter half of 2018.

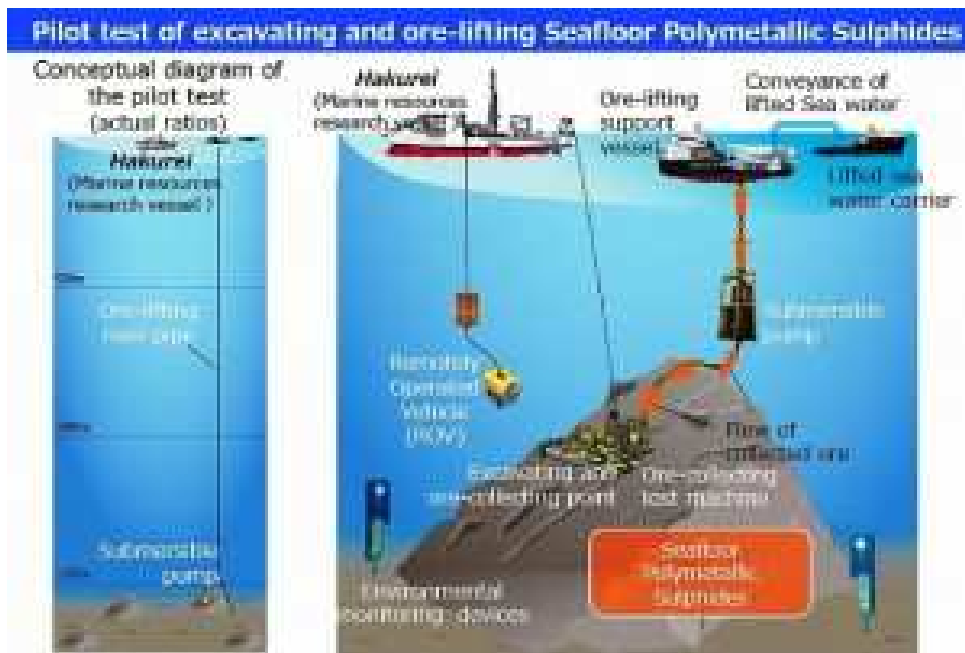


As a country surrounded by sea, and with one of the largest exclusive economic zones (EEZ) in the world, Japan is seeing a dream come true in the development of domestic resources. If commercialization is realized, Japan will no longer have to be complaisant in resources diplomacy. But how do we know that this won't be a short-lived dream?

### Series of Excavation

The experiment in question involved successively drawing up large amounts of mineral ores from hydrothermal mineral deposits. These are formed when water heated by magma erupts from the ocean floor, and the metal in the seawater cools and solidifies. These mineral ores contain large amounts of rare metals, such as gold, copper, and zinc—an essential ingredient for galvanized iron used for bicycles, for example. The experiment was conducted by JOGMEC from mid-August until the end of September in Okinawan waters. An excavator was lowered 1,600 meters into the water,

which was then used to break the mineral ores into 3-cm pieces. The pieces were then drawn up using a submersible pump.



The challenge was drawing up the seawater containing the heavy mineral ores without clogging the pump. In the experiment, excavations were carried out 16 times, once every 10 minutes. A total of 16.4 tons were drawn up. It is thought that the mineral ores contain 7–8% of mineral resources. Until now, there were no means of drawing up mineral ores from the hydrothermal mineral deposits. The only option was to use a submarine to excavate mineral ores, and only tentatively. The trail-blazing achievement of successive excavation of mineral ores from the ocean is the culmination of the advanced extraction technology developed by Japanese companies. The excavator and pump were designed by Mitsubishi Heavy Industries. It also involved impressive ship handling skills, which were necessary to keep the ship still despite the ocean current.



Producing large pumps and low cost excavators are paramount when it comes to commercialization, but Japan's technology is a cut above the rest.

### Deposits in Nine Locations

In order to determine the feasibility of commercialization in 2018, METI will be conducting investigations in other parts of the ocean to determine the amount of resources available, among other data. Hydrothermal mineral deposits have been found in eight other locations aside from Okinawan waters, such as the sea near the Bonin Islands.



It is said that there are 7.4 million tons of mineral resources in Izena Caldera, located on the sea-floor approximately 110 kilometers deep, northwest of Okinawa Island. That amount of resources is equal to the domestic annual consumption. Japan's EEZ is the sixth largest in the world. In addition to hydrothermal mineral deposits, it is said that essential marine resources lie in deeper seas. For example, cobalt-rich crusts are clusters of rocks that contain large amounts of rare metals, such as cobalt, nickel, and platinum. Manganese nodules are round rocks that also contain rare metals. These are also expected to contain rare-earth elements, which are ingredients used in the magnets of high-performance motors. Mud-containing rare earth has also been discovered around Minami-Torishima Island, located at the easternmost tip of Japan, approximately 1800 kilometers from Honshu.



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Hiroshige Sekō, the Minister of Economy, Trade and Industry, said in a press conference: “We expect the presence of mineral ores in the ocean around Japan, of an amount that is greater than the domestic annual consumption. Based on the success of the experiment, we aim to start the development of domestic natural resources in order to lead the country in securing a stable supply of mineral resources.”

### **Hurdles to Overcome**

However, massive hurdles must first be overcome before marine resources on the ocean floor can be successfully exploited. The first hurdle is the sheer depth involved. Even the shallower hydrothermal mineral deposits are located 700 to 2,000 meters under water. Manganese nodules and rare

earth sediments are located at a depth of 4,000 to 6,000 meters, and the cobalt-rich crusts are located at the bottom of deep ocean, 800 to 5,500 meters deep. The excavators are indispensable for the hydrothermal mineral deposits, but an even more sophisticated level of pressure-resistance and sealability will be imperative.

Furthermore, the beneficiation process, which separates impurities from the useful mineral ores, will be different for mineral ores found on land and mineral ores found in the sea. A beneficiation process that is suitable for mineral ores in the sea must be developed. Another issue is that most domestic mines have closed down, along with the beneficiation facilities. “If we compare our situation to hiking, it’s like we finally got all our equipment together and are now standing at the base of the mountain,” Sekō said. Even if the exploitation of marine resources can be actualized, it won’t be happening for the next few decades. However, merely having domestic resources gives Japan a powerful negotiation advantage in what a member of the press calls the “fast-pace race of resource diplomacy.”

In September 2010, a patrol vessel of the Japan Coast Guard collided with a Chinese fishing trawler off the coast of Senkaku Islands (Ishigaki, Okinawa). When the Japan Coast Guard detained the captain of the fishing trawler, tensions rose between China and Japan, and the Chinese government blocked exports of rare-earth elements to Japan. Although Japan was aiming to develop motors that didn’t need rare-earth elements at the time, having domestic resources can empower Japan to confront China more assertively.



“I feel like we have overcome the first hurdle,” said the executive of METI, his countenance showing relief. The executive director of JOGMEC, Takafumi Tsujimoto, gives his stamp of approval on the “turning point of the development of marine resources.” Japan is not a country without its resources. The light of the country’s hope shines in the darkness of the deep ocean.

Quelle: <https://japan-forward.com/japans-strength-in-resource-diplomacy-lies-in-its-ocean-floor/>

### **Nautilus completes trials for seafloor production tools**

Post-Courier, October 16, 2017

Nautilus says the submerged trials of the first of three seafloor production tools (SPT) – the collecting machine – have been completed at Motukea Island outside Port Moresby. The Canadian miner in its market report last Friday, said the results of the CM trial indicated it can perform to design specifications, and the team is now looking at operating enhancements. The firm said trials on the auxiliary cutter are underway and this will be followed by the bulk cutter. The SPTs will be used by



Nautilus and its partner, Eda Kopa (Solwara) Limited, at the Solwara 1 project site in the Bismark Sea. Nautilus chief executive officer (CEO), Mike Johnston, said: “The Company is pleased by the progress that continues to be made with the construction, trialling and delivery of the seafloor production system. The system remains on track for initial production during the first half of 2019, subject to further financing. The firm also reported that the construction of the Production Support Vessel at the Mawei shipyard in China, is 70 percent complete.

It also reported that the assembly of all three SPT Launch and Recovery Systems (LARS) is progressing under the supervision of the supplier AXTech, while the lift winches and spoolers for the SPT LARS have also been shipped from Korea to the shipyard. “The Sichuan Honghua Petroleum Equipment Co. (Honghua) continues to make good progress with the fabrication of the derrick and associated substructure. This equipment, which is required for the deployment of the Subsea Slurry Lift Pump and riser, has now undergone trial assembly at Honghua’s fabrication facility in Chengdu,” the miner said. The derrick and substructure will be shipped to the Mawei shipyard later this month so that installation on the Production Support Vessel can start before the end of the year. Honghua has also commenced fabrication of the dewatering plant structural steel modules at their Qidong yard, following procurement of the required steel over the past two months.

### **K1bn needed for Solwara 1**

Cedric Patjole, PNG Loop, October 14, 2017

More than K1 billion in remaining project financing is needed to fund the Solwara 1 Project in New Ireland Province. Nautilus Minerals Inc. revealed this when announcing the appointment of its exclusive financial advisor – Deep Sea Mining Finance Ltd (DSMF). In a statement, the Canadian company indicated that a remaining project financing of US\$350 million was needed, which DSMF will be leveraging, to complete the build and deployment of the sea floor production system to be utilised at the Solwara 1 Project. Nautilus said DSMF will seek to leverage the international expertise and financial relationships of Nautilus’ two major shareholders to assist in advancing the development of the project. Nautilus has stated that there are no assurances that it will secure the necessary additional funding and a failure to do so may result in it undergoing various transactions, which include asset sales, joint ventures and capital restructurings. DSMF is a newly-incorporated private company in the British Virgin Islands. Nautilus has also announced that it has terminated a ‘Bridge Financing Agreement’ signed in 2016 with Metalloinvest Holding (Cyprus) Limited and Mawarid Offshore Mining Ltd.

### **Nautilus Minerals enters new funding deal**

October 13, 2017, The National Business

NAUTILUS Minerals has entered into a funding mandate agreement with Deep Sea Mining Finance Ltd (DSMF). The DSMF will try to leverage international expertise and financial relationships of Nautilus’ two major shareholders to assist in advancing the development of the Solwara 1 project. Mark Horn will lead DSMF, a newly-incorporated private company in the British Virgin Islands. It intends to be 50 per cent owned by:

- USM Finance Ltd, a wholly owned subsidiary of USM Holdings Ltd, an affiliate of Metalloinvest Holding (Cyprus) Limited; and,
- Mawarid Offshore Mining Ltd, a wholly-owned subsidiary of MB Holding Company LLC.

DSMF has been appointed as the company’s exclusive financial adviser in respect of the remaining project financing of up to US\$350 million (K1.09 billion) to complete the development of the Sol-

wara 1 project. The company may terminate DSMF's exclusivity rights under the agreement if it fails to arrange binding commitments in respect of financings of at least US\$50 million (K156.32 million) by Dec 4 this year.

*Letter to the editor*

**Don't blame Nautilus, but protect the Bismarck sea**

Post-Courier, October 12, 2017

There have been a number of groups and individuals commenting on the Solwara 1 seabed mining project lately. We all understand that the time for talking against this project is long gone. The mining lease was granted in 2011 (six years ago). There's just no scope for complaints within the process after a mining lease is granted by the Mining Minister. It's going to cost the government huge amounts of money if it bows down to these complaints and backtracks on the lease after it had been granted, although that is also highly unlikely. On the contrary, however, controversies stand insofar as the processes that enabled the project to be developed are concerned, as well as its consequences and impact on the land and seascape and the general backdrop. The significance of this DSM issue rests not so much on whether or not Nautilus has complied with all the laws, rather, at the outset, this industry just does not have the social license to be developed within the confines of the Exclusive Economic Zones of our country.

The dynamics of the impact of DSM is cross-dimensional and must be addressed on a wide spectrum of development issues. The controversy is not with Nautilus!!! Rather, it is with the granting of the sea bed exploration licenses by our government at the beginning. On what basis did the government issue exploration licences for an unproven industry and when PNG did not have in place laws and regulations governing Deep Sea Mining, let alone the use of Remotely Operated Vehicles (ROVs), or remote controlled seabed mining tools, for that matter, to boost exploration and mining under the sea? Nautilus has a significant number of exploration licences spanning the Bismarck Sea with 10 advanced to development stage. Solwara I is just but one that has been issued a mining lease. After that is Solwara 5 then solwara 9 in the same area. Then we have solwara 4, 6, 7, and 8 about 30 kilometres away.

Outside Djaul Island, the known fish breeding area, they have solwara 2, 3, and 10. While the project has been granted a legal license in the form of seabed mining lease, there is absence of a social license basically because the New Ireland West Coast, Duke of York, and ENB, communities cannot organise themselves. Under law, the state owns the sea and all that is underneath. However, the user-rights of the local indigenous communities have not been captured. The UN Declaration on the rights of indigenous people as well as human rights laws capture their concerns under these circumstances. The 40-metre radius delving by the seabed mining tool's operation and the hydraulic suction system will inflict irreparable damage to the seafloor and marine ecosystem and habitat destroyed.

If the UN have cautioned against seabed mining, then I doubt if the government and Nautilus have ensured compliance to the strict requirements of the International Seabed Authority as stipulated by the UN Conventions on the Law of the Sea. There will be collateral damage. The government must address the issue of social and environmental insurance for the local people affected. For economic and geographical reasons I believe Solwara 5 will be next to come aboard after the three-year span of Solwara 1. The machinery developed and brought in for the DSM project should be enough to remind the local people that Nautilus is here to stay given its extensive interest in the Bismarck Sea, facilitated by our government and its processes (a matter of bowing down to economic forces).

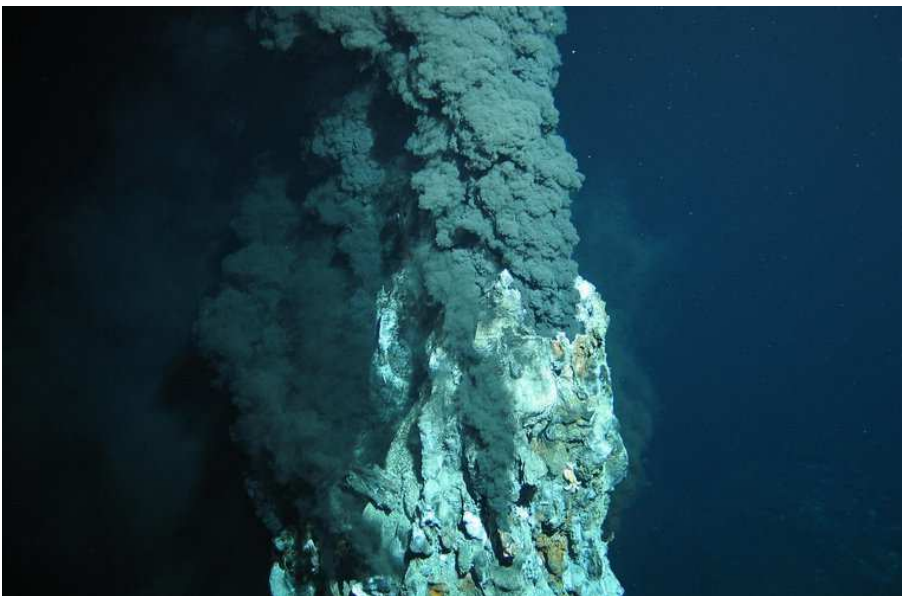
They cannot just invest so many millions on those machineries for a three-year span project then dispose off them.

The project militates against the Coral Triangle Initiative because the corals ecosystems are supported by the deep sea ecosystems and vice versa. It's all part of the whole ecological chain. The solidified 99 per cent gold from the volcanic vents being sought by Nautilus is part of that ecological chain. The activity will unlock the carbon that is locked underneath the sea. The financial yield to the state from the project is minimal. Due diligence on the project by international monitors was never done by government given the sensitivity of the unproven industry. The silence from SPREP on the DSM issue in the Pacific is deafening too!

ALOIS BALAR, BAINING MOUNTAINS, ENBP

### **Behörden im Rausch der Tiefsee**

Wie Beamte und Lobbyisten beim geplanten Abbau von Tiefsee-Rohstoffen Hand in Hand arbeiten  
Tania Röttger, CORRECTIV, 10. Oktober 2017



Die schwarzen Raucher haben ihren Namen aufgrund ihrer Ähnlichkeit mit Industrieschornsteinen.  
Bildnachweis: © ROV-Team; GEOMAR Helmholtz-Zentrum für Ozeanforschung Kiel.

Nach CORRECTIV-Recherchen sitzen mehrere Behördenmitarbeiter im Beirat eines Lobby-Vereins, der sich für den umstrittenen Abbau von Rohstoffen in der Tiefsee einsetzt. Das Umweltbundesamt vergab einen Auftrag an die private Firma des Geschäftsführers des Lobby-Vereins. Umweltschützer und Lobbycontrol kritisieren das. Im lichtdurchfluteten Gebäude des Bundesverbands für Industrie (BDI) in Berlin haben sich am Tag nach der Bundestagswahl knapp 200 Leute aus aller Welt versammelt. Sie interessieren sich für wertvolle Rohstoffe wie Metalle und Seltene Erden, die in mehreren Kilometern Tiefe auf dem Meeresboden liegen, und die, so scheint es hier, bald dort unten abgebaut werden. „Der Tiefsee-Bergbau gehört in die Koalitionsgespräche“, sagt Matthias Wachter auf der International Underwater Mining Konferenz in Berlin. Wachter ist beim BDI für Rohstoffe zuständig. Der Verein „Deep Sea Mining Alliance“, also „Tiefsee-Bergbau Allianz“, veranstaltete die Konferenz. Der Verein will politische und gesellschaftliche Unterstützung für den Abbau finden. Ein Lobby-Verein.

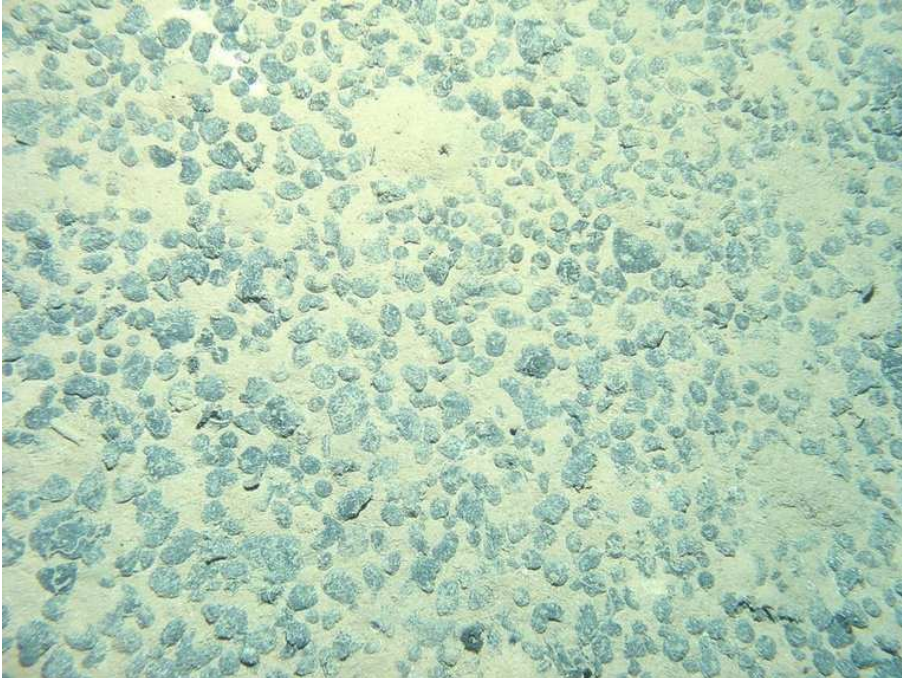
Wissenschaftler fürchten, dass die komplexen, wenig erforschten Ökosysteme auf dem Meeresgrund durch den Tiefsee-Bergbau in Gefahr sind. So könnten selbst geringe Veränderungen Ein-

fluss auf Tiefsee-Lebewesen und damit die Nahrungskette im Meer beeinträchtigen. Das hindert die Mitarbeiter von drei deutschen Behörden nicht, gute Verbindungen zu dem Tiefsee-Verein zu pflegen. Die Verbindungen sind sowohl personeller als auch geschäftlicher Art. So erhielt das private Unternehmen von einem der Geschäftsführer der „Deep Sea Mining Alliance“ Aufträge von Behörden. Und während das Umweltbundesamt prüfen soll, wie und ob in der Tiefsee Rohstoffe umwelt-schonend abgebaut werden können, ist zumindest ein Mitarbeiter mit dem Verein verbunden.

### **Rohstoffe im Meer**

Auf dem Meeresgrund liegen große Mengen natürlicher Rohstoffe. Darunter auch wertvolle Metalle wie Gold, Kupfer, Mangan, Nickel oder Kobalt. Sie haben sich über Millionen Jahre abgelagert: in sogenannten Manganknollen, Kobaltkrusten oder Massivsulfiden, auch Schwarze Raucher genannt. Die Materialien werden gebraucht für die Herstellung von Stahl, Akkus oder Solarzellen. Im Moment importiert Deutschland den überwiegenden Teil des eigenen Bedarfs an diesen Rohstoffen. Zum Beispiel aus dem Kongo, aus Russland oder Australien. Doch die Vorkommen an Land gehen zurück.

Viele Rohstoffe liegen in internationalen Gewässern, also außerhalb der 200-Seemeilen-Zone, in der die Küstenanreiner ein wirtschaftliches Nutzungsrecht haben. Ungefähr 50 Prozent der Erdoberfläche sind internationale Gewässer. Und die verwaltet die Internationale Meeresbodenbehörde in Jamaika. Dort können sich Staaten und auch Unternehmen um Lizenzen für bestimmte Gebiete bewerben. Deutschland hat sich inzwischen zwei Lizenzen gesichert: für ein 75.000 Quadratmeter großes Gebiet im Pazifik und eine 10.000 Quadratmeter große Fläche im Indischen Ozean. Dort untersuchen Wissenschaftler nun, in welcher Menge die Rohstoffe vorkommen. Die Hoffnung ist, dass deutsche Unternehmen ihren Rohstoffhunger durch den Meeresboden in den fernen Ozeanen stillen können.



Manganknollen auf dem Meeresboden. [Konkrecje](#) von [Abramax](#) unter [Lizenz CC BY-SA 3.0 DE](#)

### **Der Industrie-Verein**

Im Lobbyverein „Deep Sea Mining Alliance“ haben sich Unternehmen zusammengeschlossen, deren Geschäft der Rohstoffabbau im Meer ist. Sie bauen die Maschinen dafür, oder entwickeln spezielle Technologie für das komplexe Terrain unter Wasser. Auf der Webseite des Vereins steht, man wolle „als Plattform der Industrie“ eine „abgestimmte Interessenvertretung gegenüber Politik, Wissenschaft und Gesellschaft unterstützen“ – das ist die Definition von Lobbyismus. Dafür hat sich

der Verein Vertreter aus den relevanten Behörden in den eigenen Beirat geholt: Mitarbeiter vom Bundesministerium für Wirtschaft und Energie, von der Bundesanstalt für Geowissenschaften und Rohstoffe und vom Umweltbundesamt. Das sind genau jene Behörden, die den Weg hin zum Rohstoffabbau vorbereiten. Timo Lange von Lobbycontrol sagt, das sei „kritisch“. Schließlich befassen sich die Behörden genau mit den Interessen des Vereins. Der bekomme so einen besonderen Zugang zur Verwaltung. Dabei sollten Behörden ihr Amt eigentlich unparteiisch ausüben, und sich am Gemeinwohl orientieren.

### **Die Verbindungen zu Behörden**

Die Bundesanstalt für Geowissenschaften hat die zwei Gebiete im Pazifik und im Indischen Ozean ausgewählt. Der Abteilungsleiter Carsten Rühlemann leitet die Expeditionen zu den Manganknollen im Pazifik. Und er sitzt im Beirat der „Alliance“. Die Bundesanstalt schreibt, Rühlemann sei „einzig und allein dem Forschungsauftrag der Bundesregierung verpflichtet“. Seine Arbeit werde durch den Verein nicht beeinflusst, er sitze im Beirat, um seine Fachexpertise dort einzubringen.

Die Bundesanstalt für Geowissenschaften ist schon in der Vergangenheit durch Nähe zur Industrie aufgefallen. In den 1980er Jahren sollen Unternehmen der Rohstoff-, Chemie- und Energie-Industrie über eine Stiftung Gelder an die Bundesbehörde gezahlt haben. Im Gegenzug soll die Behörde Gutachten im Sinne der Industrie verfasst haben. Über Fracking etwa, und die Eignung des Salzstocks Gorleben als Endlager. Das berichteten „Süddeutsche Zeitung“, WDR und NDR im vergangenen Jahr. Den Vorwurf weist die Bundesanstalt auf Anfrage von sich.

Auch das Wirtschaftsministerium will der deutschen Industrie zu einem Stück vom Tiefsee-Kuchen verhelfen. Aus dem Ministerium sitzt Rodin Knapp im Beirat der „Deep Sea Mining Alliance“. Er war unter anderem für Elektromobilität zuständig. Für manche Autobatterien werden die Metalle Kobalt, Nickel und Mangan gebraucht, die auf dem Meeresboden vorkommen. Inzwischen ist er in der für den Tiefseebergbau zuständigen Abteilung „Maritime Wirtschaft“. Das Wirtschaftsministerium sagt dazu: „Das Bundeswirtschaftsministerium steht auf vielen Ebenen in Kontakt mit der Wirtschaft und wahrt dabei den für die professionelle Arbeit einer obersten Bundesbehörde gebotenen Abstand.“

### **Umwelt in Gefahr?**

Es ist die Aufgabe der Bundesanstalt für Geowissenschaften und dem Wirtschaftsministerium, die deutsche Wirtschaft zu unterstützen. Doch anders ist es beim Umweltbundesamt. Das Amt soll wissenschaftlich erforschen, wie es der Umwelt geht. Dazu gehört, inwieweit der Tiefsee-Bergbau umweltschonend ablaufen kann. Auch von dieser Behörde sitzt ein Mitarbeiter im Beirat des Tiefsee-Lobbyvereins: Hans-Peter Damian. Damian beschäftigt sich unter anderem mit Schadstoffunfällen im Meer. Das Umweltbundesamt schrieb auf Anfrage, dass es bewusst einen Mitarbeiter in den Beirat des Vereins geschickt habe. Er soll dort Informationen über die Industrie sammeln, und an einem „direkten Austausch von Auffassungen“ teilnehmen. Damian soll der Industrie außerdem Anforderungen an die Umwelt vortragen. Das Umweltbundesamt hofft, dass diese „direkt in Planungen fließen können“. Allerdings hat das Amt nach eigener Aussage keine Erkenntnisse darüber, ob das tatsächlich geschieht.

Kritiker haben große Zweifel an dem gesamten Unterfangen. Britta König, Sprecherin der Umweltschützer vom WWF, meint, man könne gar nicht umweltschonend abbauen. Denn die Manganknollen selbst, die vom Meeresboden entfernt werden, seien ein Lebensraum für Organismen. Außerdem würde durch Abbaumaschinen Sediment aufgewirbelt. Das breite sich in der Tiefsee aus und könne so auch andere Lebewesen und Ökosysteme beeinflussen. Der Lebensraum sei geprägt von extremen aber konstanten Bedingungen. Die würden durch den Tiefsee-Bergbau auf jeden Fall geändert. König sagt, es müsse stattdessen über Recycling der vorhandenen Materialien nachgedacht werden. Es ist noch sehr teuer, die Rohstoffe in der Tiefsee abzubauen. Besonders nah am tatsächli-



chen Bergbau im Meer soll jedoch die kanadische Firma Nautilus Minerals sein, die bei Umweltverbänden bereits in der Kritik steht. Nautilus will im Jahr 2019 mit dem Bergbau beginnen. Vor der Küste Papua Neu-Guineas sollen große Bohrmaschinen den Meeresboden aufbrechen, Massivsulfide ausgraben und an die Wasseroberfläche bringen. Die Plastikschläuche an den Maschinen kommen aus Deutschland, von dem Kunststoffhersteller ContiTech AG. Die Firma ist Mitglied in der „Deep Sea Mining Alliance“.

### **Geschäftsbeziehungen**

Das Wirtschaftsministerium und die Lobby des Tiefsee-Bergbaus arbeiten schon lange zusammen. Im Jahr 2011 erstellte die private Marketing-Agentur eines der Geschäftsführer des Vereins, Michael Jarowinsky, eine Marktstudie über die Abbauchancen in der Tiefsee. Ein Jahr später erhielt Jarowinsky den Auftrag, den „Nationalen Masterplan Maritime Technologie“ zu koordinieren. Im Juli 2016 erhielt die MC Marketing Consulting schließlich als eines von zwei Unternehmen nach öffentlicher Ausschreibung den Zuschlag, eine Geschäftsstelle einzurichten, um den „Nationalen Masterplan Maritime Technologie“ umzusetzen.

Auch das Umweltbundesamt hat vor einigen Jahren MC Marketing Consulting engagiert. Jarowinsky und seine Kollegen sollten im Jahr 2013 eine Studie schreiben über die „ökologischen Auswirkungen des Tiefsee-Bergbaus auf die marine Umwelt“. Allerdings hat das Umweltbundesamt den Bericht nicht veröffentlicht, weil sie „mit den vorgelegten Empfehlungen inhaltlich nicht übereinstimmen“. Außerdem sei die Agentur nicht genug auf die ökologischen Auswirkungen des Tiefsee-Bergbaus eingegangen, schreibt das Umweltbundesamt nun. Daher habe es auch keine weiteren Aufträge an MC Marketing Consulting vergeben.

Michael Jarowinski sagt, das Umweltbundesamt habe die Studie „vollständig akzeptiert“, von Unstimmigkeiten wisse er nichts. Die angeblichen Bedenken hielten das Amt auch nicht davon ab, einen Beirat in den Lobby-Verein „Deep Sea Mining“ zu entsenden in der vagen Hoffnung, dass Tiefsee-Abbau auf umweltverträgliche Weise möglich ist.

### **Nautilus: We still need to raise K1 billion to fund Solwara 1 preparations**

Nautilus Minerals Inc, October 5, 2017

*Nautilus says it needs to raise approximately US\$41 million before the end of 2017, and an additional US\$270 million in order to complete the build and deployment of the seafloor production system for Solwara 1*

#### ***Resignation of Mark P. M. Horn as a Director***

Nautilus Minerals Inc. announces that Mark P. M. Horn has resigned as a director of Nautilus. Mark P. M. Horn has advised the Company that he will lead Deep Sea Mining Finance Ltd. ("DSMF"), a recently formed joint-venture between the two major shareholders of Nautilus, Metalloinvest Holding (Cyprus) Limited ("Metalloinvest") and MB Holding Company LLC ("MB Holding"). DSMF and Nautilus are in discussions concerning the potential engagement of DSMF as Nautilus' financial advisor to implement a financing strategy for Nautilus, by leveraging the international expertise and financial relationships of Nautilus' two major shareholders. Russell Debney, a director of Nautilus who is independent of each of DSMF, Metalloinvest and MB Holding, is negotiating or directing the negotiation of any such transaction on behalf of Nautilus. Nautilus needs to raise approximately US\$41 million before the end of 2017, and an additional approximately US\$270 million is required in order to complete the build and deployment of the seafloor production system to be utilized at the Solwara 1 Project by the Company and its joint venture partner (as to 15%), the Independent State of Papua New Guinea's nominee, in early 2019.

Mark P. M. Horn stated on behalf of DSMF: "Nautilus is a world leader in seafloor mining technology. This is a very exciting time in the mining industry, as deep-sea mining is on the verge of becoming a reality. Nautilus' two largest shareholders are very pleased to be playing an important part in the development of this new industry." The Company is currently seeking the appointment of a new independent director and is in active discussions with various candidates.

#### About Mark Horn, MB Holding and Metalloinvest

Mark P. M. Horn has represented Metalloinvest on the Board of Nautilus since September 2013. Since 1987, he has worked as an international Fund Manager, Financial Analyst and Corporate Financier. Mark started his career at the Co-operative Insurance Society, then moved to Globe Investment Trust, before joining Rockefeller and Co. He subsequently worked for Kleinwort Benson Investment Management, before becoming Head of Research at Canaccord Capital (Europe). He holds an ALM, (Harvard University, USA); BA, BA (Hons) (First Class), MA, (Rhodes University, South Africa); BSc, BSc (Hons) (Geosciences), B.Eng (Hons), (Open University, UK); LLB (Hons), LLM, MBA (Banking) (London University, UK); Dip.B.Admin (Manchester Business School, UK). He has been called to the Bar of England and Wales as a Barrister of the Honourable Society of Lincoln's Inn.

Mawarid Mining LLC of Oman ("MML") holds 29.3% of the current outstanding shares of Nautilus through MML's wholly owned subsidiary Mawarid Offshore Mining Limited ("MOML"). MML is a wholly owned mining and mineral business vertical of MB Holding and is actively engaged in exploration and development of concessions in the Sultanate of Oman, Saudi Arabia, Namibia, Tanzania and Rwanda. MB Holding is a multinational corporation with operations spread across the globe in the Middle East, Europe, Africa, Asia, Asia-Pacific. The dynamic group which started operations in 1982 has diversified businesses including integrated drilling & oilfield services, exploration & production of oil & gas, marine, manufacturing & engineering services, mineral & mining and investments. MB Holding employs more than 4,000 employees from over 54 nationalities who are committed to achieving its vision and mission.

Metalloinvest currently has a 18.5% interest in Nautilus. Metalloinvest is wholly owned by USM Holdings ("USM"), a diversified international holding company with significant interests across the metals and mining, telecoms and internet sectors. The main shareholders of USM are Alisher Usmanov, Vladimir Skoch and Farhad Moshiri. USM's assets include Metalloinvest, the largest mining company in Russia and the CIS and the leading global manufacturer of hot briquetted iron, Baikal Mining Company, which owns the largest copper reserves in Russia, MegaFon, a major telecommunications operator in Russia, and Mail.Ru Group, the Russian internet leader and owner of the country's most popular social networks VKontakte and Odnoklassniki. The group is also a prominent global investor in the digital space and is a major investor in one of the key players in the global esports market. Furthermore, it manages a number of other industry-leading businesses including UTH Russia, one of the country's largest media and entertainment groups with a unique portfolio of popular national TV channels in Russia and Kazakhstan and one of the leading Russian property development company. (All information in this news release concerning Mark P. M. Horn, MB Holding and Metalloinvest has been provided by each of those respective parties.)

#### **Autonomy, seabed mining high in Konga, Chan talk**

October 5, 2017, The National National

EAST New Britain Governor Nakikus Konga will meet his New Ireland counterpart Sir Julius Chan today to discuss autonomy and seabed mining. Discussions have been on-going between the two regarding a benefits sharing agreement on seabed mining to be done by Nautilus Minerals and how best the two provinces can push for autonomy. Speaking on the seabed mine, Konga said this may

be the final meeting on benefit sharing between the provinces and if all went well, both provinces would benefit greatly from the mine. “Benefits from the mine rightfully belong to the people, so it is the prerogative of both provincial governments to ensure the benefits go down to the people,” said Konga. “This meeting is to pave the way for such to happen.” The subject of autonomy is of special interest to both provinces and discussions held during the meeting will pave the way for the direction the current regime under the two governors will take to further their cause.

“We want greater autonomy politically, administratively and economically. “It’s not about breaking away from PNG but about acquiring the necessary powers for economy building and a system of government that will enable meaningful development and progress for ENB and NI as provinces.” Konga said the push for autonomy stemmed from the fact that there has been progressive deterioration of social and economic conditions in the provinces, as well as a further decline in living standards under the present Organic Law on Provincial and Local Level Governments. A team comprising the chairman of the ENB Autonomy Committee Sir Ronald ToVue, provincial administrator Wilson Matava and others will be accompanying Governor Konga to the meeting in Kavieng, New Ireland.

### **Negotiations ongoing for Solwara One**

Post-Courier, October 5, 2017

The State hopes to recommence negotiations for a memorandum of agreement (MoA) for the Solwara One project by October or November this year. Mineral Resources Authority (MRA) managing director Philip Samar confirmed this when responding to queries by the Post-Courier on concerns raised by two community leaders from the west coast of Namatanai. The leaders queried the benefit sharing arrangement that would be applied especially given the project would be at sea, a place where the law states there are no landowners. MRA’s project coordinator for the Solwara One, Moses Mambu said these are the issues to be addressed in the project agreements. Mr Mambu said for the Solwara One discussions had begun in 2009 and are still ongoing. “There are one or two things still outstanding including royalty and equity. This has to be agreed to by the two host provincial governments – New Ireland and East New Britain,” he said.

He explained that under the agreement, parties would have commitments to deliver on. “Nautilus Minerals Inc is already delivering benefits through its community service responsibilities. Government will also provide packaged benefits to the community area of benefits which are the seven wards of the West Coast of Namatanai, Watom and Duke of York Islands in ENB,” he said. “But we cannot say at this stage what government will provide as these have not been agreed to.” However he assured that whatever the benefits are they would be linked to the LLG and provincial government plans. Nautilus vice president PNG operations, Adam Wright said the MoA would be devised on the current Mining Act and will be binding. He assured of the company’s firm commitment to fulfill all its commitments. “On royalty that is money that will be paid to the government and it is for them to decide how they will distribute it, It has nothing to do with the company,” he said.

### ***Letter to the editor***

### **Uncertainty surrounds Solwara 1**

Post-Courier, 5 October 2017

Watching a so-called customary landowner commending the Nautilus Solwara 1 project on TV was pathetic. This shows how multinational corporations can stoop so low to put words into the mouths

of unsuspecting resource owners in order to drive forward their hidden agenda. The principle of free, prior and informed consent requires developers to disseminate adequate information to resource owners so that they can make informed decisions on issues that will affect their lives now and into the future. Nautilus, therefore, is required to provide both the pros and cons of Solwara 1 to its stakeholders, not just the pros. Under the Customary Land Act, land ends where the sea water comes in at high tide and meets the land. Therefore, land under the sea is not defined as land, but the sea. Consequently, any land and natural resources under the sea do not technically belong to so-called customary landowners who may reside along a particular coastline or on an island. Who owns land and natural resources under the sea in PNG are currently ambiguous issues that need to be properly defined in our laws. But for the moment, we have to go along with this ambiguity and accept the benefits that will be given out to so-called customary landowners, whether they are sufficient or not.

The biggest concern to NGOs and concerned citizens is the environmental impact of the project on marine ecosystems and the sustainability of human subsistence and livelihood, with respect to the sea. Deep sea mining has never been trialled anywhere in the world, therefore we have no documented information on the adverse impacts of this project on marine organisms and human lives. We need baseline data to make comparisons in the near future to determine if any adverse environmental damage had been done by Solwara 1. We need to document marine species, their abundance and quality under pristine environmental conditions before the commencement of the project. We also need to document information on the dependence of human subsistence and livelihood on the sea and marine resources before the commencement of the project.

Let us hope CEPA, MRA, respective provincial governments, fisheries, the office responsible for community development, environmental NGOs and other stakeholders in Solwara 1 have done their studies and have documented social, economic and environmental baseline data that could be used in the monitoring and evaluation of the project. Let us hope that so-called customary landowners and environmental NGOs are ready with their legal and technical ammunitions to battle it out in court with Nautilus over impending social, economic and environmental issues with Solwara 1. A clause in the Environment Act protects corporations from being sued in court for environmental damage if a project is of national interest, so be prepared for this legal monster. National interest is not defined in the Environment Act, so ambiguity is the name of the game. You have been warned.

ENVIRONMENT WATCH PNG

### **Cooks govt enters into ocean mining agreement**

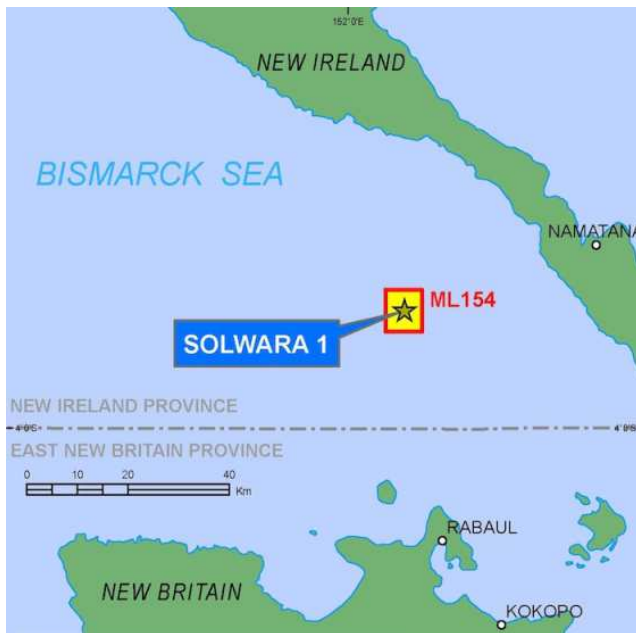
Radio New Zealand, 4 October 2017

The Cook Islands government has entered into an agreement with a company called Ocean Minerals to reserve 23,000 square kilometres of the country's exclusive economic zone for up to 18 months. The agreement which earned the government \$US71,000 gives the company the exclusive right to apply for licensing to undertake prospecting and exploration activities for manganese nodules. If Ocean Minerals does apply for an exploratory license within the agreed timeframe, the company will be expected to go through the necessary processes required by the Cook's Seabed Minerals Act, the recently passed Marae Moana Act, and the Environment Act. This is the second agreement negotiated with the company.



## Coastal Area Benefit for offshore mining projects

Cedric Patjole, PNG Loop, October 3, 2017



The Department of Mineral Policy and Geohazards Management has created the concept of Coastal Area Benefit as the benefit sharing agreement instrument for offshore mining projects. Department of Mineral Policy and Geohazards Management Secretary, Harry Kore, says the concept was developed out of sentimental attachment locals have with the sea as a resource for their livelihood. The CAB concept will be first implemented across several wards adjacent to the Solwara 1 Deep Sea Mine Project in New Ireland Province. Secretary Kore said the CAB, as per its structure, is implemented with a ward that is directly opposite the offshore project. However, the CAB can be extended to three more wards on both sides of the first ward, bringing in a maximum of seven wards as allowed under the Offshore Policy.

“The seven wards is the maximum, if there is only two or if there’s only one then those are the only wards that benefit. But if there is more than that is as far as we can go.” The Coastal Area Benefit concept will be first introduced in seven wards along the West Coast of New Ireland Province. They cover 22 villages and a population of over 8,000 people. While the CAB for the New Irelanders is yet to be finalised, Secretary Kore says the concept aims to capture the locals’ attachment to the sea. “Customarily we own the sea as well, but it’s communally owned by everybody in a particular area. And people have right of way to pass through your area for fishing or for customary activities out at sea, like shark callers.” The offshore policy is one of the new policy developments contained in the revised Mining Act, which is yet to be endorsed by the National Executive Council.

## PNG Communities Contest Experimental Seabed Mining

Scoop, 3 October 2017

Coastal Communities in Papua New Guinea have formally requested that the PNG Government make public key documents relating to the licensing and the environmental impacts of the Solwara 1 deep sea mining project by October 18 or face the prospect of legal proceedings. Letters were lodged with the Ministry of Mining and Ministry of Environment and Conservation on September 5, 2017, signed by representatives of four communities across the Bismarck Sea and PNG. The letters note that Section 51 of the PNG Constitution provides the right of reasonable access to official documents for every citizen of Papua New Guinea. “Very little information about the Solwara 1

project has been disclosed by PNG Government or the project developer, Nautilus Minerals”, stated Peter Bosip, Executive Director, Centre for Environmental Law and Community Rights (CELCOR).

“Papua New Guineans have the constitutional right to see this information especially as their Government has invested heavily as a shareholder in this project. In the interest of transparency and informed debate, PNG Government should release the information requested,” added Mr Bosip. Lucielle Paru, Central Province Pressure Group said, “There is a high level of community concern across PNG about experimental seabed mining. This is the world’s first venture. As a national issue, there should be an equally high level of transparency from both the PNG government and Nautilus Minerals.” According to Jonathan Mesulam from the West Coast of New Ireland Province, civil society in Papua New Guinea has been requesting this information for many years, “Why is the Government keeping secrets from its people? Communities on the west coast of New Ireland Province live only 25km from the proposed location in the Bismarck Sea. We are on the front line of Solwara 1 mine and if it goes ahead it will impact our lives and livelihoods.”



"We will exercise our legal rights to be fully informed. We have the right to know the whole truth about Solwara 1. The Government must release the documents we have requested" Pastor Matei Ibak, Karkar Island Community in Madang said, "Nautilus and PNG Government do not have the consent of local communities to go ahead with this mining experiment." "Our people chased Nautilus away from our waters, now the people of New Ireland and East New Britain face pollution in their traditional waters if Solwara 1 goes ahead. Instead of protecting Papua New Guineans the Government is protecting the interest of the company." "We are giving the Government of PNG until October 18 to provide the licensing and environmental impact documents, or legal proceedings will be filed against the Government," continued Mr Mesulam.

### **Limited benefits in Solwara One project**

Post-Courier, October 1, 2017

Given that there will be minimal spin-off benefits to landowners as a result of the world’s first deep sea mine, the developer says it will heavily focus on its community service obligation. The issue of benefits has been one of the main concerns of the leaders of both New Ireland and East New Britain who were in Port Moresby last week to witness the trials being conducted on the Nautilus Minerals Inc’s mining equipment. For the ENB delegation the issue had been raised by Florence Paisparea who is the forest and environmental coordinator of the ENB provincial administration. Nautilus Minerals Inc vice president for the Papua New Guinea operations, Adam Wright said unlike the traditional land-based mines, the foot print of the Solwara One project, would be quite small and likewise the benefits. Mr Wright said employment would be limited as the firm will be employing about 200 people compared to Newcrest Lihir’s 3000. He said other spin-off business would also be

limited as its operations would be out at sea and there would not need services including buses, security and laundry services all associated with the land-based mines.

Mr Wright said it had already begun implementing this project especially in the coastal areas along the West Coast of New Ireland in the coastal areas of benefits (CAB) ahead of production. Mr Wright told the leaders from ENB the firm would be delivering its first project—a community health post on Wotum Island by the year’s end. He said apart from health, education, infrastructure development, and business development would be other focus areas. “What we want to do is help generate businesses that will still be going once we are gone. We are looking at areas of cocoa and copra and trying to help people rehabilitate plantations and get those industries running. Royalty was stated as another benefit, which Mr Wright said would be paid when the company begins production. He said from discussions held, the intention is to have that distributed down to the local level government level. Mr Wright said there is already a draft agreement, which once finalised would be signed off. He added that this is the agreement that will address all these issues.

### **Nautilus explores funding options**

Post-Courier, October 1, 2017

Nautilus Minerals Inc is still exploring financing opportunities in order to maintain the development of the Solwara One project and the company’s operations. According to the firm’s market report released last Tuesday, the Canadian miner stated it requires a significant and additional funding, in order to complete the build and deployment of the seafloor production system (SPT) to be utilised for the project. “Based on the its current cash position and budget, the company needs to obtain new funding of approximately K131.2 million (US\$41 million), before the end of 2017 and. And in particular, at least approximately K48 million (US\$15 million) is required before October 31, 2017 to meet the company’s contractual commitments in relation to certain of the equipment forming part of the seafloor production system. “The company is in active discussions with various parties, including existing shareholders, regarding potential financing transactions and alternatives. The firm further stated that failure to secure the necessary financing may result in it engaging specialist advisors. It aims in taking various steps aimed at maximising shareholder value such as undertaking various transactions including, without limitation, asset sales, joint ventures and capital restructurings.

### **Nautilus Giant Seabed Mining Machines Will Wreak Havoc**

Pacific Scoop, September 29, 2017

Coastal communities across the Bismarck Sea under the umbrella of the Alliance of Solwara Warriors claim that Nautilus and the PNG Government do not have their consent to go ahead with experimental seabed mining in the Bismarck Sea. “Who are these leaders from New Ireland province that Nautilus has hand selected?”, said Jonathan Mesulam of the Alliance of Solwara Warriors. “I am from the West Coast of New Ireland Province and I hear my people’s concerns. Landowners on the west coast of New Ireland Province live only 25km from the Solwara 1 seabed mining site.” “In June this year, more than 300 hundred people attended forums held in Namatanai and Kokopo hosted by Caritas Kavieng and the Archbishop of Rabaul. Papua New Guineans are worried about the impacts of this Canadian company’s experiment”, claimed Mr. Mesulam. ”There are too many unknowns and challenges in operating this equipment in our precious oceans. These are giant instruments of torture for our marine environment that is already stressed by pollution, over fishing and rising sea levels. Why is our Government burdening our island and coastal communities with extra problems?”



Canadian company Nautilus is busy showing off its seabed mining machinery to a small select group of people from New Ireland and East New Britain – landowners and community leaders are unimpressed.

Lucielle Paru of the Central Province Pressure Group said “My community lives near the testing site at Motukea Island. We do not support the development of this equipment. The dockyard on Motukea Island is nothing like the conditions on the sea floor where the mining tools will be used. These trials will not provide any evidence that the equipment is safe to use. Did the Government do any due diligence checks before it used the money of Papua New Guineans to purchase a 15% share in such a high-risk project?” “It is foreign to Melanesian culture to become so excited about giant machinery. Our traditions protect community and nature. This foreign company is pushing their values for their own financial gain at the expense of our people. Once they try out their destructive equipment in the Bismarck sea they plan to take it to mine all around the PNG coastline. No one living next to the sea will be safe.”

Dr. Helen Rosenbaum of the Deep Sea Mining Campaign said, “Nautilus is showing off its equipment to a small select group of people from New Ireland and East New Britain to try and buy support for Solwara 1. They know local communities strongly oppose this project. Nautilus is also desperately trying to convince investors that they are making progress. The company is struggling financially because Solwara 1 is very risky economically as well as environmentally.” “This level of risk has scared off responsible investors who refuse to gamble with people’s lives and futures.”

### **Solwara One, a game changer**

Post-Courier, September 29, 2017

With production set to commence in early 2019, the much debated Solwara One seafloor mining project is set to pave the way for what has already been described as the advent of a new era in the global mining industry. “Solwara One will be the first deep sea mine in the world and Papua New Guinea has taken a bold step forward into what will be a new industry. Papua New Guinea has chosen to be at the forefront of this new industry and that is something that I think that everyone here can be proud of. This deep sea mining will be the future of mining,” said Nautilus Minerals Inc. vice president, Adam Wright. However, pioneering the game changing technology that hopes to revolutionise the mining industry has come with a hefty price tag. The initial capital investment made by Nautilus Minerals Inc. has been valued at roughly US\$580 million (K1.8billion).

Operating in a low, to zero visibility environment and water pressure up to 280 bars, Solwara One has come with its fair share of challenges, but after 10 years of research and experimentation, Nautilus Minerals has the utmost confidence that the project will be a success. Nautilus Minerals Inc. has



already invested in three, 320 ton machines that will be responsible for the mining and collection of minerals from the seafloor which are already completed and are in country. Also completed is the pump and riser which have been fabricated in US in Houston while the Production Support Vessel which is being constructed in a dockyard in China is nearing completion.

The mine site itself, is situated 1.6km below sea level, in the middle of the St George channel between East New Britain and New Ireland provinces. According to Mr Wright, Solwara One will lead the way, for similar project not just in country but around the globe. “Before the 1960s oil was only found on land and there were only terrestrial operations mining oil, but slowly during the 1960’s oil was starting to be found offshore and people began mining offshore in the Gulf of Mexico. After about 10-20 years, a third of all the oil in the world was being mined offshore,” Mr Wright said. “We think the same thing will now happen with mining. This will be the first mine that’s offshore and in years to come, perhaps 20 years from now, there will be many mines offshore.

### **Nautilus: East New Britain receptive**

Post-Courier, September 29, 2017

Nautilus Minerals yesterday concluded the second of two visits planned for stakeholders to see the trials it is conducting on the equipment that will be used in the world’s first ever deep sea mine. Thursday’s program was specifically for the provincial and community leaders from East New Britain province which it had flown into Port Moresby for the occasion. They were joined by state representatives from the Mineral Resources Authority (MRA). On hand to receive them at the Motukea Dockyard where the equipment are being trailed was Nautilus PNG vice president PNG operations, Adam Wright, PNG country manager, Mel Togolo and senior managers. Mr Wright said the visit by this delegation was very important especially as the firm nears production. From the outset he had commended the provincial government of East New Britain for the long term view it had formed of the risks and opportunities and the effort that they had also put in trying to understand the project.

He said the intent of bringing the delegation to Port Moresby was to see the mining equipment which is being trialed, and which the company would be trialing in this industry. They were also to meet the Papua New Guineans that would be operating them, and also to ask any lingering questions so that they could then form their views on the facts and go back and relay to their people back in their communities. Mr Wright said he believed it would be a more effective way and would bear more weight than if the company was to do this. The team was satisfied and expressed a general sense of pride by the fact that two nationals would be at the helm of this operation. ENB deputy provincial administrator-socio-economic sector, Levi Mano on behalf of the delegation, thanked the Canadian miner for making the trip possible and had assured of continued support towards the project.

### **Japan Starts Mining Hydrothermal Deposits**

Subsea News, 28 September, 2017

Japan has carried out the world’s first mining and lift test of hydrothermal deposits at about 1,600 meters depth in the ocean near Okinawa, the country’s Ministry of Economy, Trade and Industry and the Japan Oil, Gas and Metals National Corporation (JOGMEC) confirmed earlier this week. The success of this test, which reportedly extracted zinc and other metals, should be a major step toward establishing the technologies required for ocean mineral resource development. In addition to the results of this test, Japan plans to carry out economic evaluation such as resource amount assessment and environmental survey. According to the Ministry, the first test confirmed that there is no serious influence on the surrounding environment. “We are planning to comprehensively pro-

mote efforts towards commercialization of submarine hydrothermal deposits by promoting economic evaluation and environmental investigation,” the Ministry said in a statement.

### **Solwara One seabed mining set for 2018**

BY MICHAEL ARNOLD, Post-Courier, September 28, 2017

After almost a decade of preparations, awareness, experimentation and a capital investment of about K800.7 million, the experimental seabed mining project, Solwara One is now only 18 months from fruition. “It’s been over ten years that we’ve been working on this project, and over that time we’ve engaged with the community. We’ve gone out to the communities and explained what we are trying to do. We have been faced with a lot of concern and a lot of questions over that time,” said Nautilus vice president Adam Wright. Initially, the project received much resistance and criticism with many questions being raised over the years of the subsequent damage that an undersea mining project might cause to the surrounding marine environment. However, Mr Wright revealed during a visit by New Ireland community leaders to Motukea yesterday that after four independent reviews, Nautilus has assured that Solwara One will have very minimal impact on the marine environment and the ecosystem it supports.

“If you look at deep sea mining and you compare it to terrestrial mining, there is in fact an environmental advantage to going off shore. I think that this is going to be one of the main reasons that we see this new part of the industry develop. Cost of deep sea mining is very small compared to the cost of land-based mining. “This is why I think that we will see a migration away from land based mines to deep sea mines and Papua New Guinea will be at the forefront of that transition,” he said. Production for the Solwara One project is expected to kick off during the first quarter of 2019 and extraction at the project site will continue for the next three years. A further 20 prospects are being explored in the Bismarck Sea for potential mine expansion and this will be at a significantly reduced cost for the company according to Mr Wright.

### **PNGeans to pioneer new mining technology**

BY MICHAEL ARNOLD, Post-Courier, September 28, 2017

With 18 months to go till the commencement of the production phase of the Solwara One project, two Papua New Guineans now find themselves at the helm of pioneering some of the world’s first experimental seabed mining technology. Sharing over 40 years of terrestrial mining experience between them, Herman Sumun from Madang and Leslie Kewa from Jiwaka are not only the first Papua New Guineans qualified to operate the experimental seabed mining technology, but are also essentially the first in the world. Although there were similarities with what they had experienced in terrestrial mining, both operators highlighted some of the many challenges faced with operating 320 tons of machinery at a depth of 1,600 meters and in excess of 280 bars of water pressure. “We’re pretty much sinking a machine in water. We don’t do that. Machines don’t like being sunk in the water, especially machines that are running with a high voltage and hydraulics.

Getting a perfectly good machine and sinking it in the water is very new for me. The other thing is pressure. There’s a lot of pressure down there that we have to cater for. There’s also technology here that I’ve never seen before, which we are using now to cater for the pressure that we will be working at. So it’s very different,” said Mr Kewa. “There are a few similarities. Let’s put it this way, it’s mining. So there’s a lot of new thing we’re looking at and a lot of new skills we have to learn. The similarities are only in the equipment. How we’re gonna mine is totally different.” Nautilus Minerals vice president Adam Wright, said that the experimental project was not only a step forward for the two Papua New Guineans, but also represented a bold move by Papua New Guinea

as a whole in pioneering what he described to be the future of mining. “Leslie and Herman are the first operators of this mining equipment anywhere in the world.

### **Solwara: Stakeholders tour Motukea**

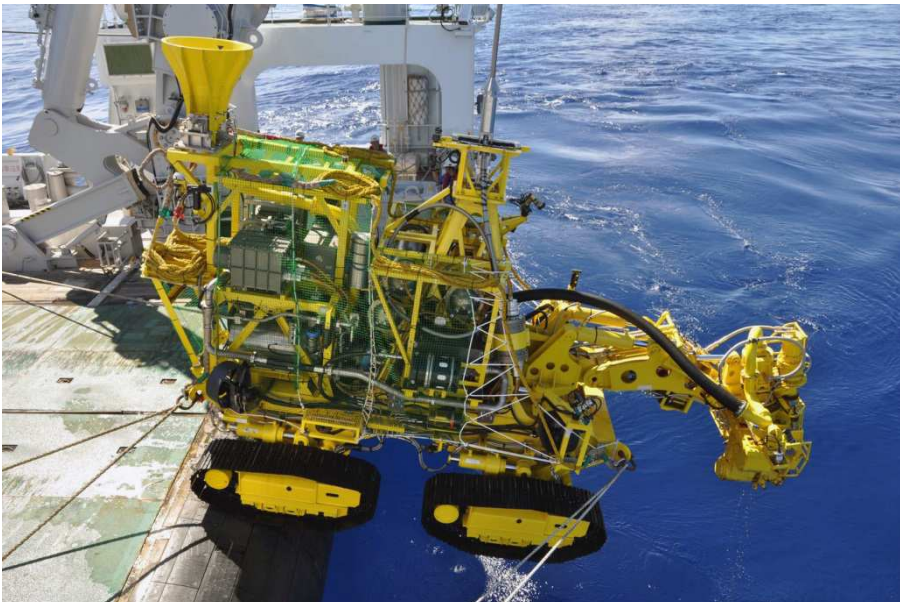
Post-Courier, September 28, 2017

NAUTILUS Minerals Inc. yesterday conducted the first of two visits to the Motukea dockyard for its stakeholders to see first-hand the trials being done on the Seafloor Production Tools (SPTs). Yesterday’s visit was specifically for the delegation from the New Ireland province, who will host this mine, which the company had flown into Port Moresby. The group had comprised of representatives from the New Ireland Provincial administration while also the ward counselors of the seven coastal area of benefit (CAB) from West Coast Namatanai and Sentral New Ireland. A second similar visit will be conducted today (Thursday), for a delegation of the project’s East New Britain stakeholders.

Nautilus vice president Adam Wright in welcoming the team to Motukea said the project was ten years in the making. The purpose of bringing the group here was to allow them to see first hand the progress the firm had made but more so to see the mining equipment which they had only just heard of. “Seeing is believing and so we have brought community members from New Ireland to see first hand the mining equipment and to witness in operation. “This is to they can go back to the community and say yes I have seen the equipment and yes its operating in the way we were told it would. So it’s a vitally important day,” Mr Wright added. The visit included a tour of one of the three control consoles.

### **Japan successfully undertakes large-scale deep-sea mineral extraction**

The Japan Times, Kyodo, Sep 26, 2017



A mining machine is put into water off the coast of Okinawa Tuesday to extract minerals from a deep-water seabed. AGENCY FOR NATURAL RESOURCES AND ENERGY. VIA KYODO

Japan has successfully tapped into a deposit of mineral resources from a deep-water seabed off the coast of Okinawa, the economy ministry said Tuesday, the largest such extraction of its type. It is the first time metals have been mined from the seabed in such quantities using ship-based extraction technology, according to the Economy, Trade and Industry Ministry and Japan Oil, Gas and Metals

National Corp. The effort was undertaken after a series of recent discoveries of ore deposits off the coast of Okinawa, according to the ministry. From mid-August through late this month, JOGMEC deployed excavators to access the ore deposit at a depth of about 1,600 meters, sucking mineral ore up to the sea surface. The ministry believes the mined deposit includes an amount of zinc equivalent to Japan's annual consumption. The ore deposit also includes gold, copper and lead.

Six ore deposits have been found in the past three years in waters around the island prefecture, all within Japan's exclusive economic zone. The ministry expects more ore deposits to be found in the area and is planning to commercialize mining at the sites around the middle of 2020 following an economic evaluation scheduled for fiscal 2018, which starts next April. Japan relies heavily on mineral imports. After establishing a highly efficient means of extraction, the country "could possibly become a resource-producing nation if abundant quantities of deposits were confirmed," the ministry said. The deposits, known as hydrothermal minerals, are formed when material-laden water leaches out of rock in the Earth's crust before being heated by magma and expelled out of the sea floor.

### **Caritas joins fight against sea bed mining**

Post-Courier, September 6, 2017

The Caritas Kavieng office is taking the lead in seeking a ban on sea bed mining in New Ireland Province. It has already engaged churches, schools and communities in its campaign. According to Caritas coordinator Patrick Kitaun, the diocese is taking the lead in enforcing the Church's stand towards the Solwara 1 project. Mr Kitaun said the Caritas- Kavieng Diocese is working in partnership with West Coast Development Foundation, Alliance of Solwara Warriors, Sea Bed Mining Campaign Group, Bismarck Ramu Group and other concerned organisations and institutions to speak on behalf of the communities who will be potentially impacted by the project. He said the campaign started early this year with a one day workshop on sea bed mining followed by a three day program of workshop and awareness in the selected areas of the two main parishes of St Mary's- Karu and St Martin de Tours- Namatanai.

"This program was mainly to help the local people with all the facts and information of this Solwara 1 project, the stand of the Church and also to get their views on this project," Mr Kitaun said. "As a result of the two previous programs, we came up with a resolution of hosting an open forum for the public all over New Ireland province to express their views on this sea bed mining. "The resolution after the forum was "no sea bed mining in our waters" and a form was compiled for all signatures to be put on in leading us to any further doings," he said. He said a similar forum was held at other parishes under the Kavieng diocese and will continue. Meanwhile Nautilus when contacted stated: "The Company would like to re-iterate that the Solwara 1 Project will have no discernible impact on fisheries and coastal communities. "Statements about destruction and a need for the ocean to heal itself are misleading."

### **More groups join appeal against seabed mining in New Zealand**

Laurel Stowell, Wanganui Chronicle, September 4, 2017

After much discussion the Taranaki/Whanganui Conservation Board has taken the unusual step of appealing against consent for seabed mining offshore from Patea, chairman Brendon Te Tiwha Puketapu says. This despite the Conservation Department it works with having made no submission on Trans-Tasman Resources' application to mine iron-sand across 66 square kilometres in the South Taranaki Bight. Having made no submission on the application, the department cannot appeal it. But the board did make a submission, opposing the consent, and can appeal. It has been advised that



there are points of law on which the consent can be appealed, and that they fall within the board's conservation management functions. The board will ask whether the consenting body, the Environmental Protection Authority (EPA), had the best available information to work from, whether it used the precautionary principle and whether the consent given falls within the scope of an adaptive management approach.



On August 20 more than 100 people went to Patea's Mana Beach to protest against seabed mining.

"It has also sought to clarify how the EPA should have taken into account the Resource Management Act and in particular the strong directives of the New Zealand Coastal Policy Statement," Mr Puketapu said. Te Ohu Kaimoana (the Maori Fisheries Trust) has also appealed the consent. Chief executive Dion Tuuta said that it did so in support iwi of the area, and that seabed mining was an unproven industry and a risk to fisheries. Taranaki iwi Ngāruahine borders Patea and Hawera iwi Ngāti Ruanui but is not appealing the consent. Its pou whakarae Will Edwards said it was completely opposed to the mining venture and would support other iwi in their fight against it. "We will utilise different strategies at different points at different times. Not all of these are played out on Facebook, in court, or in front of cameras." Another five groups have filed appeals against the mining consent. They are Te Rūnanga o Ngāti Ruanui, Kiwis Against Seabed Mining with Greenpeace in support, a fisheries group, Te Kāhui o Rauru and Forest & Bird. The appeal period closed on Thursday and the appeals will be heard in the High Court.

### **Five parties appeal New Zealand seabed mining decision**

Laurel Stowell, Wanganui Chronicle, September 1, 2017



Trans-Tasman Resources proposes to use an undersea crawler to suck up iron-sand from the seabed. Graphic/ supplied

A "suck it and see" approach to the uncertainties of seabed mining is not good enough and is illegal - and that's the essence of an appeal to the High Court. Kiwis Against Seabed Mining (KASM) is appealing the Environmental Protection Authority (EPA) decision to allow Trans Tasman Resources to mine ironsand from the South Taranaki seabed. KASM's appeal to the High Court is on 15 points of law, new chairwoman Cindy Baxter said. One of them is that the EPA's many conditions amount to an adaptive management approach. Adaptive management is about changing the way an activity is managed in response to as-yet-unknown effects. KASM's lawyers say such an approach is prohibited under government's exclusive economic zone (EEZ) legislation. Another point KASM wishes to appeal on is the EPA's failure to impose a bond on the mining company. And it says the decision makers failed to apply caution and environmental protection or to take cumulative effects into account. KASM is asking the court to overturn the decision. Yesterday, the final day for appeals, Forest & Bird and Ngā Rauru joined KASM, Ngāti Ruanui and a collective of fisheries interests in making appeals. Ngāti Ruanui has employed distinguished lawyer Francis Cooke QC. For South Taranaki iwi Ngā Rauru the decision to appeal was easy on cultural, environmental and ethical grounds, chairman Marty Davis said. But the legal challenge will be costly for the small tribe.

Forest & Bird chief executive Kevin Hague said the EPA has decided to allow mining based on uncertain and inadequate information - especially about its effect on the 30 marine mammal species in the bight. The society was also concerned mining would affect the rich marine life in the Patea Shoals. The decision making process was unfairly weighted toward the mining company, Ngā Rauru kaiwhakahaere Anne-Marie Broughton said. "There is no legal assistance fund available to community, hapū and iwi groups to appeal the decision, unlike under the Resource Management Act." That put a cost on iwi and others, and was a deliberate strategy to disempower communities and support extractive industries, she said. Ngā Rauru would be lobbying the Attorney-General and Minister for the Environment to change those conditions. The iwi is urging others to get involved. Seabed mining will spread quickly across the country unless it is stopped, Mr Davis said. Other groups may appeal the EPA decision. Te Ohu Kaimoana (The Maori Fisheries Trust), the Taranaki/Whanganui Conservation Board and Whanganui and Ngāruahine iwi all have interests in it.

### **KASM, Forest & Bird appeal New Zealand seabed mining decision**

New Zealand Herald, 31 August, 2017

Kiwis Against Seabed Mining (KASM) has today lodged an appeal against the Environmental Protection Authority's controversial decision granting consent to ironsands miner Trans Tasman Resources. The company was this month given the green light to extract 50 million tonnes of material from the seabed off South Taranaki and export five million tonnes of ironsand every year for 35 years. KASM today announced it would be appealing the decision under 15 points of law, under the Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012, including "failing to take into account natural justice", to apply environmental bottom lines, to take a precautionary approach, and to require "adequate information" from TTR. KASM has called for the High Court to set the decision aside.

"We have gone through the nearly 400-page decision and we think the EPA has erred on a number of points of law, right across its decision," KASM chairperson Cindy Baxter said. "KASM is appealing because the EPA made a bad decision, a decision that we believe is wrong in law as well as in principle - and we have seen an overwhelming response against it." Forest & Bird today also announced it has lodged an appeal in the High Court. "The EEZ Act recognises that seabed mining could have significant impacts on the marine environment, and requires protection from such impacts," the group's chief executive, Kevin Hague, said. "We think the EPA's decision to grant con-

sent fails to protect the environment, and doesn't meet the requirements of the EEZ Act." Ngāti Ruanui is also among several groups that have opposed the EPA's decision.

## **NZ Greens propose marine sanctuary to stop seabed mining off South Taranaki**

Catherine Groenestein, Stuff New Zealand, 29 August, 2017



A large crowd including many students welcomed the Green Party announcement for plans of a new marine sanctuary in South Taranaki. GRANT MATTHEW/STUFF

The Green Party wants to stop seabed mining by creating an enormous new marine mammal sanctuary off the Taranaki coast. Green Party leader James Shaw announced the plan at a Hawera beach when he, MP Gareth Hughes and Te Tai Hauauru candidate Jack McDonald joined a seabed mining protest by more than 200 people on Tuesday. The South Taranaki Whale Sanctuary would prohibit new prospecting, exploration and mining for minerals, but existing petroleum wells would be allowed to continue to operate until their permits expired. The controversial Environmental Protection Agency decision allowing Trans Tasman Resources (TTR) to dredge 50 million tonnes of sand a year from the seabed off Patea would be stopped. Fishing would be allowed to continue in the area, whereas the seabed mining would disrupt fishing activities and was opposed by the commercial operators, Shaw said. "Seabed mining vacuums up the seabed, filters out minerals and dumps the mud back into the ocean. For the whales it's like someone dumping the contents of a vacuum cleaner on their plates."

The South Taranaki Bight is home to 38 different mammals, including blue whales and the highly endangered Maui's dolphins. "At around 30,000 square km, or fifty times the size of Lake Taupo, this will be New Zealand's largest marine mammal sanctuary." The sanctuary would stretch from Foxton north to Hawera, and west to Kahurangi Point near the top of the South Island, covering the area where blue whales were most commonly seen. The protest, organised by the community of Te Kura Kaupapa Māori o Ngāti Ruanui, began with songs from the youngsters, and ended with a heartfelt haka, then the participants formed a human chain around the grassy reserve above the beach. Principal Mama Kumeroa said she felt overwhelmed by the number of people, who had answered her call for support. "There are representatives here from every school, every kindergarten and educational institution in Hawera. These little ones are going to be the caretakers of the future, these young people will grow up and see this seabed mining happening, and it's going to take three or four generations ahead of us to clean it up. If companies want to do this mining they should do it in their own backyard. This is our backyard."

Ngati Ruanui kairataki Debbie Ngarewa-Packer said the iwi was pleased with the Green Party initiative. "We are pleased to see the Greens thinking outside the square. It gives us hope that there's some better options out there. Hopefully the other parties will be just as innovative." Ngati Ruanui is preparing to lodge its appeal against the application later this week. Maori Party candidate for Te Tai Hauauru Howie Tamati said he supported the idea of a marine sanctuary. "I'm still upset at the decision of the EPA to let the iron-sand mining go ahead considering all of the evidence that was there to say it would have a huge impact on the sea life in the area." Labour candidate for Whanganui Steph Lewis said not enough information had been provided on the effects of the TTR operation, which could run over 35 years. "I'm not convinced the jobs it is allegedly going to create will go to people in Patea, there's not enough evidence to support it and real big concerns about the environmental impact." In its application, TTR has said it would be "a sustainable and world leading development" that would have little environmental effect. But the venture is opposed by Kiwis Against Seabed Mining, Patea-based iwi Ngati Ruanui, environmental groups Greenpeace and Forest & Bird, and by Talley's Fisheries which also submitted against the mining when a previous application by TTR was declined by the EPA in 2014.

### **Who is standing up for the seabed in New Zealand?**

Paul Brooks, Wanganui Chronicle Editorial, 24 August, 2017

THE SEABED mining dispute in South Taranaki has many of us wondering exactly what constitutes the role of the Environmental Protection Authority and its large staff of former politicians, accountants and the odd person actually versed in environmental matters. Its decision to allow seabed mining of iron sands in an ecologically sensitive area highlights its political -- as opposed to its environmental -- nature. Its title is an oxymoron. It is also worth noting that the decision by the committee appointed by the EPA was split, two for approving the application and two against it, with the casting vote made by chairman Alick Shaw, a former politician and professional committee member. To quote from the EPA website: "Mr Shaw is currently a member of the Housing New Zealand Board and the New Zealand Parole Board (until the end of September 2016). He completed two terms as a board member for the New Zealand Transport Agency.

Mr Shaw has held numerous positions on a variety of governance boards, and is a former Councillor and Deputy Mayor of Wellington City Council." And his knowledge of the seabed and consequences of its destruction come from ... ? It was his decision to allow seabed mining to go ahead. That decision went against the wishes of the people who live in the affected area, the people who are protesting and putting a legitimate case against the mining proposal. To suggest their petitions and submissions were taken into account before the decision was made is, in the vernacular, bollocks. The decision was political. It was made by a committee appointed by an agency run by a Government which has systematically withdrawn funding from environmental protection and conservation. That decision was a foregone conclusion despite the well-paid months the committee sat and pondered. The promises of jobs and local prosperity, even if true, mean nothing in comparison with the environmental damage to the region and the pillage of valuable breeding grounds. But who is listening?

### **Seabed mining sparks environmental concerns**

August 23, 2017, The National Business

LEADERS of Rabaul district in East New Britain want the Nautilus Minerals Explorations Limited to provide evidence that the proposed Solwara One seabed mining operation will not destroy environment and marine resources. They are concerned about a potential impact on the coastal areas of New Ireland and East New Britain. A committee which met at the office of Rabaul MP Dr Allan

Marat on Thursday raised the concern in response to the intention by the company to carry out community projects on Watom Island and on the north coast of the Gazelle Peninsula. Rabaul district administrator Marakan Uvano said Nautilus planned to build health facilities on the island and on the north coast of Rabaul as part of its services to the people who would be affected by the deep-sea mining operations.

Uvano said the company was already delivering health facilities in strategic locations along the west coast of New Ireland. Statesman Sir Ronald Tovue urged the committee to voice its objection to seabed mining activities in the Bismarck Sea. Marat has maintained his objection to under-sea mining operations since Nautilus applied to the government for mineral exploration rights in the Bismarck Sea which covered New Britain and New Ireland. Marat warned that the safety of the livelihood of the coastal people of Rabaul would be affected if the Solwara One project was allowed to proceed.

### **Samoa cautioned about experimental seabed mining**

Joyetter Feagaimaali'i-Luamanu, Samoa Observer, 20 August 2017

Experimental deep-sea mining is on the agenda for a five-day National Focus Group Dialogue hosted by the Samoa Umbrella for Non-Governmental Organizations (S.U.N.G.O.) which starts today. But S.U.N.G.O. President, Roina Vavatau, believes Samoa needs to proceed with caution. During an interview with the Samoa Observer, the President of S.U.N.G.O said Samoa should not be easily enticed by the millions promised if they opt to support deep-sea mining activities. “The money is very attractive however we have to consider the social impact of deep sea mining on us,” she said. “This is our livelihood, everyone depends on the ocean and if this deal comes to pass, what is going to happen to us.” Mrs. Vavatau urges the public to come as one and voice the rejection of Samoa to be a part of deep-sea mining activities. “Although the P.A.C.E.R Plus has been signed... however unless a total of eight Pacific countries do not sign on, there is no deep sea mining in our oceans.”

To be held at Tui Atua Tupua Tamasese Efi conventional centre, the meeting will focus on disability; climate change; Sustainable Development Goals; Land Act and Laws and Deep Sea Mining. “These topics will form the basis of dialogue throughout the week,” she said. “Experts in these identified areas have been invited to provide information and guidance throughout the week to ensure participants are well informed in the approach to formulate Position Papers and Action Plans that S.U.N.G.O. will advocate on behalf of Samoa’s Civil Societies.” The President invited members of the public so they can be informed about the conversations around the topics. “There will be representatives from government agencies whose mandates deal with the issues discussed as stated earlier.” According to Mrs. Vavatau, their main goal is to afford the public the opportunity to gain knowledge of the said topics. “That way they can make informed decisions when they come across these issues.”

Last year, a World Bank report recommended that Pacific Island countries supporting or considering deep-sea mining activities proceed with a high degree of caution to avoid irreversible damage to the ecosystem, and ensure that appropriate social and environmental safeguards are in place as part of strong governance arrangements for this emerging industry. The report says that Deep sea exploration of minerals and resources is increasing across the globe, but its short and long-term impacts on the environment, economy and society in general remain largely unknown, according to the report, *Pacific Possible: Precautionary Management of Deep Sea Mining Potential in Pacific Island Countries*. “Given the immense uncertainty, deep sea mining in Pacific Island countries should be approached with the highest degree of caution and transparency,” said Tijen Arin, Senior Environmental Economist and co-author of the paper.



“Work in this space is already progressing in many countries, and progress has been made in legislation, but strengthening and increasing institutional capacity still remains a significant challenge and therefore we recommend stronger regional cooperation in this area.” Fiji, Papua New Guinea, Solomon Islands, Tonga and Vanuatu have granted permits for deep-sea mining exploration, and the Cook Islands undertook a minerals exploration tender process. So far, Papua New Guinea is the only country in the Pacific region to have granted a license for ocean floor mining.

### **Many protest New Zealand seabed mining consent**

"We will end up like Papua New Guinea... We're going to ruin it for the sake of corporate greed"  
Laurel Stowell, Wanganui Chronicle, 20 August, 2017



Protesters line up across Mana Beach to oppose seabed mining. Photo/ Lewis Gardner

At least 150 people were waiting in strong wind until the organisers arrived. They came from as far away as Hawera and Whanganui. It had been cancelled but so many people turned up that a protest against seabed mining took place as planned at Patea Beach on Sunday. The protest was against the Environmental Protection Authority granting marine consent to Trans-Tasman Resources to mine iron-sand from the seabed 22km offshore. That consent can be appealed until August 31. After a brief prayer to Tangaroa, the god of the sea, speakers thanked everyone for coming and asked them to line up on Mana Beach and be filmed. Organiser Bianca Mitchell is hoping the footage will go viral when it's up on the internet. There were so many people that there was barely room for them to stand shoulder to shoulder between the breakwater and Patea River. There were strong feelings among the crowd.

Patea's Tom Matiaha objected to a chairman's casting vote deciding whether consent would be granted. "In my opinion the environment will be raped, both animal and mineral," he said. It would be like the damming of the Patea River, done without thought for the piharau (lamprey) that used to be there in season. "I haven't seen piharau here for a long time." Te Huatahi Hawira said seabed mining was more than just a Taranaki issue and iwi should unite against it. She noted Ngā Rauru, Ngāti Ruanui and Whanganui were all represented. "Once we open up these doors and allow them to come in they will try and mine all around Aotearoa. We will end up like Papua New Guinea." The joint manager of the award winning South Taranaki Reef Life Project, Bruce Boyd, said the granting of the consent had hurt him and it was tough to talk. His project had showed the abundance of sea life on a reef 11km offshore.

He believed life would be equally prolific where the mining is planned. He had hoped to prove that, but was unable to get out there. "It's just we've had the worst season ever as far as boating condi-

tions go." Daniel Boyd said by the time the 35-year mining consent was finished he would have grandchildren. "I will be telling them how we used to fish here. We're going to ruin it for the sake of corporate greed." The commodore of the Patea Boat Club said the 163 members had fought the seabed mining application, after deciding it would be very destructive and wouldn't help anybody. Whanganui's David Scoullar said undersea mining was a dreadful backward step. "I'm here to show some solidarity with the people of South Taranaki in their opposition." Another Whanganui man, Athol Steward, had worked with Kiwis Against Seabed Mining and submitted at the consent hearing. He's had T-shirts printed with slogans and is planning an event in Whanganui. "The fight is just starting, I think. This is when people will really come out and voice their concern."

### **NZ: Legal battle looms over seabed mining**

Simon Hartley, Otago Daily Times, 16 August 2017

The gloves are coming off as mining interest groups and environmentalists prepare for a legal battle over consenting issues. Similar legal challenges to Bathurst Resources' coal mining consents on the West Coast dragged on for two years and the global coal price collapsed, forcing Bathurst to mothball much of its proposed operations. Mining industry lobby group Straterra has applauded the granting of marine consents for Trans Tasman Resources to move towards ironsand extraction from Taranaki's seabed. The Environmental Protection Authority (EPA) granted the consents last week, but environmental groups vowed to lodge appeals within the 15-day appeal period. Submitting group Kiwis Against Seabed Mining (KASM) had said it would appeal and yesterday said its lawyers were working on an appeal, spokeswoman Cindy Baxter said.

"Apart from the fact that we consider this decision very flawed, and that such a huge operation with potentially devastating consequences only got the go-ahead because the chair of the committee had two votes, we have to look at the precedent it sets," she said in a statement. Straterra chief executive Chris Baker said the EPA's decision making committees's decision sent a strong signal to extractive sector investors "that New Zealand is open for business". "The [decision] committee had to satisfy itself, on best available information, that effects can be well managed," Mr Baker said. Ms Baxter said after Trans Tasman's first application was refused in 2014, many of the companies with permits on North Island coasts subsequently dropped them. She said Trans Tasman's application failed on several fronts, saying there were no surveys or studies on any marine mammals, penguins, fairy prion petrels or bottom dwelling organisms, nor measurement of existing ambient noise; which was an issue for marine mammals.

"They made no effort to undertake any baseline monitoring of the seabed, despite the lack of it being one of the grounds the EPA refused their first application," Ms Baxter said. Mr Baker noted more than 100 conditions were imposed on Trans Tasman, including a two-year monitoring plan before mining could take place. Trans Tasman's two applications and ongoing research and development costs are now understood to have cost it a total about \$86million. Trans Tasman wants to suction dredge about 50million tonnes of sands from the seabed annually, to extract 5million tonnes of ironsands, for the next 35 years. More than 13,000 people opposed the application. Much of the opposition centres on the effects from the "plume" of sands when being returned to the seabed.



frustrating with Government allocating funding to clean up freshwater earlier in the same week it approved work that will devastate the underwater environment, Ms Broughton said. "While the decision paper is 368 pages long, the section with the dissenting commissioners' opinions makes it incredibly clear what risk is being taken and what damage will be done by this approval."



Ngaa Rauru's Anne-Marie Broughton, Ora Hohaiia, Mary Bennett, Renee Bradley, Ngaire Luke, Arareina Davis, Learaa Kauika-Stevens and Mahalia Tapa-Mosen are against seabed mining. Photo/ supplied

She wanted to mihi to (congratulate) the two commissioners; Gerry Te Kapa Coates and Sharon McGarry, who stood for the environment and common sense. Ms Broughton said impacts from the approved mining would be huge. "We are talking about excavating 50 million tonnes of seabed per year for 35 years over an area of 66 square kilometres, up to 11 metres deep - every scoop destroying the seabed and marine life and driving away the threatened blue whales who aren't just passing through but live in the South Taranaki Bight." This was "dinosaur thinking", she said. "Environmental protection is the new economy. We already have sewage from Whanganui being dumped out at sea, plus the nutrient run-off from intensive farming. "Enough is enough! We need to overturn this decision, put a moratorium on seabed mining and bring some sense to managing our environment."

### **Appeals planned over seabed mining in New Zealand**

Simon Hartley, Otago Daily Times, 11 August, 2017

Environmentalists are preparing to appeal a controversial decision yesterday by the Environmental Protection Authority to allow seabed mining for ironsands off Taranaki's coast. In a split decision, the EPA has granted consent to Trans Tasman Resources, which wants to mine 50 million tonnes of seafloor sand in order to export about 5 million tonnes of ironsand a year, for the next 35 years. About 13,000 people opposed the application by Trans Tasman. Its first application in 2014 was turned down by the EPA. Kiwis Against Seabed Mining (KASM) chairman Phil McCabe said a "whopping" 99% of more than 13,733 submitters opposed the application, including iwi, the fishing industry, recreational fishers and coastal communities. Local iwi Ngati Ruanui are understood to be considering an appeal, as were other other parties. Mr McCabe said KASM had to take "the only responsible route" by appealing the decision, on behalf of the future of coastal people and the environment and sea life.

"The only logical next step is to challenge that decision on their behalf," he said in a statement yesterday. There is a 15-day period for appeals, which can only challenge points of law, and the consents will not start until any appeals are resolved. Mr McCabe said the decision was a "dangerous



precedent" for New Zealand's marine environment and the EPA was "acting prematurely", given seabed mining was an "untested activity". EPA chief executive Allan Freeth said two committee members, including chairman Alick Shaw, voted in favour of the project and there was a "strong dissenting view" from the other two. As a result, Mr Shaw used his chairman's casting vote in favour of granting the consents, BusinessDesk reported. Mr Freeth underscored it was highly "complex and challenging" for the EPA and the fact there was a split decision reflected that complexity. The central issue of the application was the sediment plume, he said.

The committee found the sediment plume would have significant adverse effects on benthic (sea-floor) life for up to 3km, because of light reduction and direct effects such as smothering. "The impact on benthic life within the mining site, while being expected to be a 100% loss in the short term, is expected to be temporary in the view of the majority committee decision. "Conditions have been imposed to monitor this recovery, and take steps to ensure it occurs over the medium to long term," Mr Freeth said in a Wellington media briefing. Trans Tasman's first application was rejected in 2014 when a committee ruled the environmental impacts of the proposal were too difficult to gauge on the evidence available. The company went back to the drawing board and a second hearing was held between February and May this year, BusinessDesk said. The project has sparked controversy, as those opposed argue it will change the physical, chemical and biological nature of the seawater and degrade the quality of the oceans as a whole.

Forest & Bird chief conservation adviser Kevin Hackwell said the proposed mining area was home to critically endangered blue whales, possibly one of only five known in the southern hemisphere outside the Antarctic. "It's also habitat for at least a further 33 species of marine mammals, including Hector's and Maui dolphins, and an important migratory corridor for humpback whales," he said. Seabed mining, and return of sediment to the seafloor, could cause "catastrophic damage" and affect seabirds, fish, and marine mammals. "It's completely irresponsible to put New Zealand's only resident population of critically endangered blue whales in the firing line for Trans Tasman Resources to suck up the seabed and make a buck," Mr Hackwell said. Chatham Rock Phosphate, which separately wants to mine the Chatham Rise seabed for phosphate, welcomed the decision. It is working on a new application, after its first application was also declined by the EPA.

### **Seabed mining approved in New Zealand despite environmentalists' concerns**

Valentina Ruiz Leotaud, mining.com, 11 August 2017

New Zealand's Environmental Protection Authority approved Trans-Tasman Resources' application to mine iron sands from the seabed of South Taranaki Bight, located 22 kilometres to 36 kilometres offshore from Patea. The approval means that Trans-Tasman is now allowed to recover resources from the country's Exclusive Economic Zone. In detail, the company wants to dig up 50 million tonnes of the seabed a year, for 35 years, to get five million tonnes of iron ore per year. The South Taranaki Bight has reported JORC iron sand mineral resources of 1,698Mt at 11.16% Fe<sub>2</sub>O<sub>3</sub> for the Mine Area and adjacent Kupe Blocks at a 3.5% Davis Tube Recovery cutoff and a further 2,137Mt at 9.66% Fe<sub>2</sub>O<sub>3</sub> for Stage 2 Block mine areas. The sand will be processed aboard a purpose-built 345-metre integrated mining vessel, whose construction TTR would start soon. The company expects to begin exporting iron ore from the site to Asia in 2020.

The decision around the proposed offshore mining project, however, comes following months of debates and consultations, and it was not unanimous. Some members of the EPA's Decision-making Committee did not agree in the final deliberations, citing concerns over localised adverse environmental effects. "The committee's rationale for granting consent is set out in the over 300-page decision document and includes conditions and operating constraints to limit the scale, intensity and duration of the discharge effects of residual material to the seabed, known as sediment



plume, as well as impacts on marine mammals,” the agency’s report reads. In response, TTR’s Executive Chairman, Alan Eggers, sent out a press release stating that his company has undertaken “extensive marine environmental work in the STB” and that he is convinced that a low impact sustainable export industry can function in the area.

But environmentalist groups such as Kiwis Against Seabed Mining do not buy Eggers’ idea and are threatening with legal actions. “We have to take the only responsible route here by appealing this decision, on behalf of the future of our coastal peoples and environment, the blue whales, Maui dolphins and little penguins. We saw at least 13,700 people object to this proposal, and the only logical next step is to challenge that decision on their behalf,” said KASM Chairperson, Phil McCabe, in a statement. McCabe also said that his organization cannot believe that government officials gave a go-ahead to what they call an experimental industry. “We have no choice but to lodge an appeal,” he added. Previous to this new development, scientists working with the National Institute of Water and Atmospheric Research also voiced their concerns over mining operations within New Zealand’s EEZ. According to their studies, unique seafloor communities could be at risk of disappearing if deep-sea mining activities take place in the area.

### **Iwi angered by approval of first seabed mining project**

Ani-Oriwia Adds, Maori Television, 10 August 2017



Local iwi Ngāti Ruanui and Ngā Rauru Kītahi are furious seabed mining has been approved in their region. The landmark decision by the EPA allows a mining company to dredge 50 million tonnes of ironsand from the South Taranaki bight. Chief Exec of EPA Allan Freeth said, “The decision is to grant consent in posing conditions that provide an appropriate degree of caution in particular establishing conservative environmental thresholds. It is well reasoned and carefully set out traversing a lot of evidence and submissions from a wide variety of individuals and interest groups.” Spokesperson for Ngāti Ruanui Debbie Ngarewa-Packer says, “They were in disbelief and I guess also being very practical people they were in quite a bit of shock and couldn't really make sense that such a impractical decision could be made.”

The vote was split between the deciding committee but a member of the committee used his chairman’s casting vote to create the majority decision in favor of granting the consent Ngarewa-Packer says, “For 50% of a decision making committee to actually take the side of the community but then someone uses some ridiculous rule to push it across the line actually doesn't make anyone feel good.

They don't feel that the process is right. Ngarewa-Packer says that this now has opened the door for much more activity like this to happen to other little communities. "We will be appealing the decision into point of law, so that involves high court but you know we would have better spent our energy and our money investing into things that are making our community stronger." The consents commence after any appeals have been resolved

### **Seabed mining in Taranaki could put endangered marine life at risk**

Te Kuru o te Marama Dewes, Maori Television, 8 August 2017

Local iwi Ngāti Ruanui and Ngā Rauru Kītahi have voiced strong opposition to a bid by Trans Pacific Resources Ltd to mine the iron sand seabed off the coast of Pātea. If the bid is accepted by The Environmental Protection Authority (EPA), spokesperson for Forest and Bird Melanie Nelson says it will be detrimental to marine life including the endangered blue whale. Soon New Zealand will find out if the first seabed mine in New Zealand has been approved. Forest and Bird spokesperson Melanie Nelson says: "There are a number of whale species there that will be devastated by the sonic echoes so we should be careful we need to look after those endangered whales." Ngāti Ruanui spokesperson Debbie Ngarewa-Packer says Taranaki iwi are still fighting for their environment. "We're hoping that it's a decision that's going to reflect the views of the community and that is that these resources of ours are here for future generations and we're obliged today as kaitiaki to make sure that our taonga are here for future usage."

The Environmental Protection Authority has considered the application by Trans-Tasman Resources Limited for marine consents and marine discharge consents to extract and process iron sand within the South Taranaki Bight. Melanie Nelson says that if it goes ahead it will have major implications for local marine life. "The discharge that will erupt from the seabed is another major problem facing the many marine mammals there such as dolphins, fish and all marine mammals." Debbie Ngarewa-Packer says no matter the outcome, the tribes of Taranaki will continue to assert their right to protect the environment. "The thing for us is if it does continue and the application is approved we will then be forced through another legal battle." The EPA is now preparing the decision for publication.

### **Discovery could throw monkey wrench into deep-sea mining**

Todd Woody, Oceans Deeply, Aug. 2, 2017



Hydrothermal vents, known as black smokers, are relatively common at the Alarcon Rise hydrothermal vent field. Photo courtesy of MBARI

At the bottom of the ocean lie hydrothermal "chimneys" the height of 10-story buildings that spew superheated chemical fluids into an oxygen-deprived, lightless void. These hydrothermal vents nourish communities of otherworldly creatures - such as 6-foot-long tubeworms that lack mouths and digestive tracts - and create untold mineral wealth now coveted by countries and corporations. The mineral deposits laid down over the eons by the sulfides emitted by hydrothermal vents contain copper, zinc, silver and gold. Over the next three weeks, the International Seabed Authority is meeting in Jamaica to, among other things, draft environmental regulations to govern the mining of the deep sea. The mission: to fulfill the United Nations-chartered organization's mandate to preserve the biological diversity of the mostly unexplored seabed while allowing the extraction of metals that make possible smartphones, solar panels and other products used by the most committed environmentalist and rapacious industrialist alike. That job just got harder.

A new discovery appears to blow a hole in a major premise of seabed mining - that if a marine ecosystem reliant on one hydrothermal vent field is destroyed, life will go on at adjacent vents and, over time, the mined site could be recolonized by the same species. Deep-sea expeditions led by scientists affiliated with the Monterey Bay Aquarium Research Institute have found that hydrothermal vent fields as close as 45 miles to each other have spawned unique animal life based on local geology and the particular chemistry of the fluids flowing through the hydrothermal chimneys. The Alarcon Rise vent field at the southern end of the Gulf of California off Mexico, for instance, shares just seven of 61 animal species with the Pescadero Basin vent field less than 50 miles to the north, according to the study published in the Proceedings of the Royal Society B.

"Someone might want to mine the Alarcon Rise for precious metals and would say the Pescadero Basin is right next door so there will be a movement of animals between the two. But that's not the case," said the study's lead author, Shana Goffredi, a marine biologist at Occidental College in Los Angeles who works with MBARI. In fact, the Pescadero Basin hydrothermal vent field and its marine life are unlike any yet discovered. Similar to other hydrothermal vent fields, the Alarcon Rise, discovered on a 2012 MBARI expedition, lies at a depth of about 7,550 feet and is covered in geologically young lava that spews sulfide-rich liquids at temperatures as high as 680F. Pescadero, on the other hand, lies at a depth of 12,000 feet and hydrothermal fluid flows through thick seafloor mud, creating pools of methane and hydrocarbons.



Giant tubeworms of the genus *Riftia* live on dark volcanic rock typical of the Alarcon Rise hydrothermal vent field. ((c) 2015 MBARI)



"This combination of habitat characteristics is unlike any seen on Earth," said Goffredi of the Pescadero vent field, which MBARI discovered on a 2015 expedition. "There's the possibility that these sites are unique but there's also the possibility that as we explore other sites, we'll find others like it or other unique sites." The scientists sent remote operated vehicles to the vent fields to video the marine life, retrieve biological specimens for DNA analysis and collect fluids for chemical analysis. At least 10 species found by the MBARI expeditions are new to science. But all hydrothermal vent creatures are unique in that life does not rely on light - photosynthesis - but chemicals. Seabed bacteria synthesize the minerals from hydrothermal vents and provide nutrition to tube-worms, clams and other animals.

"These are habitats that we didn't know about until the 1970s and they rely on chemical energy, not light energy," said Goffredi. "The base of the food chain and the foundational animals that create the rest of the habitat is this bacteria." The MBARI scientists found that even nearby thermal vent fields that share similar geological traits to Alarcon Rise developed unique ecosystems. Alarcon, Pescadero and two other relatively close vent fields shared only three species of 116 identified at the sites, with 73 occurring at only one vent field, according to the study. "How important are these sites to the rest of the deep sea?" asked Goffredi. "Is it underpinning the health of the region? That's something we're still trying to figure out."

The International Seabed Authority has issued exploration licenses to private companies and state-owned corporations that cover close to 500,000 square miles of the seabed outside national jurisdiction. (The vent fields explored by the MBARI scientists are within Mexico's Exclusive Economic Zone that extends 200 miles from its coastline.) Most exploration licenses are for areas of the seabed that contain potato-size polymetallic nodules rich in manganese, nickel and cobalt. Others are for ferromanganese crusts found in underwater mountains called seamounts. An expedition by scientists in the United Kingdom recently discovered that a single seamount in the Atlantic Ocean contained tellurium - a key material in some solar panels - in concentrations 50,000 times greater than found on land.



Tubeworms of the genus *Oasisia* are the most abundant animals at hydrothermal vents in the Pescadero Basin. ((c) 2015 MBARI)

Goffredi said the MBARI expedition underscores the need to conduct biological surveys to determine the biodiversity of vent fields before allowing mining. "I imagine that mining companies will be visualizing these sites by sonar mapping so you can see the chimneys on the seafloor," she said, noting that 285 vent fields have so far been discovered. "The habitats will look all the same but it's not until you send an ROV or sensors down there that you understand that they're different." In advance of the International Seabed Authority's meeting this month to develop environmental regulations for deep-sea mining, a group of leading marine biologists published a letter in the journal *Nature* in July warning about the impact on seafloor biodiversity. "Most mining-induced loss of biodiversity in the deep sea is likely to last forever on human timescales, given the very slow natural

rates of recovery in affected ecosystems," the scientists wrote. "It is incumbent on the International Seabed Authority to communicate to the public the potentially serious implications of this loss of biodiversity and ask for a response."

link: <https://www.newsdeeply.com/oceans/articles/2017/08/02/the-discovery-that-could-throw-a-monkey-wrench-in-deep-sea-mining>

### **Nautilus delivers financing notice to two investors**

July 27, 2017, The National Business

NAUTILUS has delivered a financing notice to two of its investors in respect of a private placement of an aggregate of 11,761,682 common shares proceeds to the company of US\$2 million (K6.2 million). Nautilus said on Tuesday that the notice was pursuant to its subscription agreement with Mawarid Offshore Mining Ltd and Metalloinvest Holding (Cyprus) Limited dated August 21 last year. Nautilus delivered the notice on Friday to the investors at an issue price of C\$0.214 per (K0.529) share. According to the company, the private placement will be allocated equally between the two investors. In accordance with the subscription agreement, the issue price equals the five-day volume weighted average trading price of the company's shares on the Toronto Stock Exchange immediately prior to the date of the financing notice.

Closing of the private placement under the financing notice is required to occur during August this year and within 10 business days following payment of the subscription proceeds by the investors to the company, pursuant to the subscription agreement. The private placement forms part of up to US\$20 million (K62 million) financing approved by the company's shareholders at the extraordinary general meeting of the company held on October 26 last year. Meanwhile, a spokesperson from Nautilus told The National on Tuesday: "Nautilus still needs to raise additional funding to bring the project to fruition. The company will update the market and its stakeholders as and when the time warrants."

### **Taranaki seabed mining decision delayed by a week**

Andrew Owen, Taranaki Daily News, July 25 2017



Ngati Ruanui, of Patea, protest in Parliament grounds, Wellington, against the mining application. MONIQUE FORD / Fairfax NZ

The decision on a controversial application to mine thousands of tons of iron sand off the Taranaki coast has been put back by a week. The Environmental Protection Authority's (EPA) decision-



making committee is considering an application by Trans-Tasman Resources Ltd (TTR) to extract billions of dollars in iron ore in shallow waters about 25 kilometres off the coast of Patea. The 20-year project would involve extracting about a quarter of a cubic kilometre of iron sands, weighing a billion tonnes, from under the sea within the South Taranaki Bight. Iron ore would be separated out on a ship before 90 per cent of the material was piped back onto the mined seabed. A hearing on the application took place earlier this year and a decision was expected to have been given to the EPA on Thursday. But the committee announced on Tuesday that it "requires a further extension of one week to deliver its decision to the EPA". It is now expected to be presented on Thursday, August 3 and will be made public in the week beginning August 14.

"As you can appreciate this is an important application and the committee is determined to ensure it has given full consideration to all of the information presented at the hearing and prepare a fully reasoned decision," Diane Robinson, EPA Group Manager: Communications, said in a statement. "As is usual with such applications, we fully expect the decision document itself could run into hundreds of pages. Once we have received it, the document will need to be proof-read before hard copies are produced and bound for publication." This is the second application by TTR, which is about 45 per cent foreign-owned, to get approval for the project. Its previous application was rejected by the EPA in 2014 but the company then modified its proposal and now describes the potential effects on the marine environment as "very small to negligible". However, the application has attracted a great deal of opposition from iwi and hapu members in South Taranaki, as well as opposition from further afield. Environmental groups including Greenpeace and Forest & Bird, along with fisheries companies, are opposing the mining permit, concerned about the impact on blue whales, Maui's dolphins and other marine life.

### **Call to stop deep sea mining**

July 14, 2017, The National National

A representative of Caritas Oceania has called for an immediate stop to all deep sea mining activity in the region, including exploratory testing. Director of Caritas Aotearoa (New Zealand) Julianne Hickey told a United Nations gathering in New York that deep sea mining would undermine the ability to achieve the UN sustainable development goals. Hickey said this while speaking at the event associated with a United Nations high level political forum on the progress towards achieving the sustainable development goals. Hickey expressed deep concerns about the long-term impact on the oceans and marine life arising from experimental deep sea mining, saying that the technology involved was still in its infancy and was not credible to talk about so-called 'best-practice' regulatory regimes in the Oceania region.

"A factor that exacerbates the risks is the huge reliance of communities on the oceans. For example, our community partners in Kiribati and the Solomon Islands rely on the oceans and healthy marine ecosystems for their very livelihoods," Hickey said. The specific goal on which Hickey made her presentation was Goal 14 – Conserving and sustainably using the oceans, seas and marine resources. Caritas Oceania works closely with organisations in Samoa, Kiribati, Fiji, Tonga, Solomon Islands, Vanuatu and Papua New Guinea.

### **Nautilus makes gains on mining plans**

Post-Courier, July 14, 2017

Nautilus is making significant ground with its plans to develop the world's first ever deep sea mine in Papua New Guinea. Among the gains is the completion of its sea floor production tools, which are currently being trialled at Motukea Island outside Port Moresby. In addition to this the firm re-

cently reported to shareholders at its annual general meeting that company chairman Russell Debney had stated work on its production support vessel (PSV) which is now 64 percent complete. Responding to questions by the Post-Courier a company spokesperson said: “The PRSV is currently completed to deck level. “Nautilus is not paying for the build of the PSV. Marine Assets Corporation (MAC), a marine solutions company based in Dubai which specialises in the delivery of new build support vessels for the offshore industry, will own and provide the marine management of the vessel.”

“The vessel will be chartered to Nautilus for a minimum period of five years at a rate of US\$199,910 per day (K471, 875), with options to either extend the charter or purchase the vessel at the end of the five year period,” the company spokesperson said. Mr Debney had also announced at the meeting in Toronto, Canada that the firm had also delivered the launch and recovery equipment (LARS) to the Mawei shipyard in China. The firm explained LARS consists of very large A-frames, lift winches, hydraulic power units, electric power units and deck control cabins. It will be used to launch and stabilise the SPT during deployment from the vessel down to the seafloor and during retrieval from the seafloor back up to the vessel. Meanwhile, the firm has assured it will be conducting awareness programs on the SPT which are being trialled at Motukea about August/ first week of September. “It all depends on when the elections are over and the new government is formed,” the miner advised.

### **Caritas Calls For Halt To Experimental Deep Sea Mining**

Caritas Aotearoa, SCOOP, 13 July 2017



“We call for an immediate halt to all deep-sea mining including exploratory testing as this will undermine the ability to achieve sustainable development goal 14” said Julianne Hickey, Director of Caritas Aotearoa New Zealand, speaking in New York at an event associated with a United Nations High Level Political Forum on the progress towards achieving Sustainable Development Goals. Mrs Hickey expressed deep concerns about the long-term impact on the oceans and marine life arising from experimental Deep Sea Mining. “Such mining is far from being an established practice around the world. The technology involved is in its infancy and it is not credible to talk about so-called ‘best-practice’ regulatory regimes in the Oceania region.

The fact is that many of the countries in which multinational mining corporations are seeking licenses do not have established regulatory scrutiny of such activities.” “A factor that exacerbates the risks is the huge reliance of communities on the oceans. For example our community partners in Kiribati and the Solomon Islands rely on the oceans and healthy marine ecosystems for their very livelihoods” said Mrs Hickey. But there was some good news too. Caritas welcomed two specific initiatives towards better care of the oceans and marine resources. In particular Mrs Hickey highlighted the development of special Marine Protection Areas in Tonga.

“The development of Marine Protection Areas at Felemea in the Ha’apai Islands of Tonga signals a very welcome approach to sustainable use practices in the region” said Mrs Hickey. “We also

acknowledge and welcome the move by the New Zealand government to ban plastic microbeads which have been shown to be harmful to waterways, fish and shellfish” said Mrs Hickey. Mrs Hickey was speaking in New York this morning (NZ time) to an event associated with a United Nations High Level Political Forum on the progress towards achieving Sustainable Development Goals. The specific goal on which Mrs Hickey presented was Goal 14: conserving and sustainably using the oceans, seas and marine resources – with regard to the Oceania region. Mrs Hickey is representing Caritas Oceania in order to ensure that the voices of Pacific peoples are heard on the world stage. Caritas works closely with partner organisations around the Pacific region – including Samoa, Kiribati, Fiji, Tonga, Solomon Islands, Vanuatu and Papua New Guinea.

## **De Beers Hoovers Up Its Best Diamonds From the African Seabed**

Kevin Crowley and Julius Domoney, Bloomberg, July 11, 2017



Photographs by Simon Dawson/Bloomberg

For years oil was the big commodity found offshore. These days diamond giant De Beers finds some of its most valuable gems on the Atlantic Ocean seabed off the coast of Namibia. They are literally vacuuming them off the ocean floor. The world’s biggest diamond producer has spent \$157 million on a state-of-the-art exploration vessel that will scour 6,000 square kilometers (2,300 square miles) of ocean floor for gems, an area about 65 percent bigger than Long Island. The Anglo American Plc unit mines in the area in a 50-50 joint venture with the Namibian government. The vessel will scan and sample the seabed to identify the most profitable areas for the ships, which suck up diamonds before they’re flown by helicopter to shore.

The investment will help the company maintain annual production of at least 1.2 million carats for the next 20 years, Chief Executive Officer Bruce Cleaver said in an interview. Those stones are “very important to our global mix and to our customers who are looking for higher-value diamonds,” Cleaver said. Namibia’s diamonds, which have been washed down the Orange River from South Africa over millions of years and deposited in the ocean, are key to De Beers because of their high quality. While not the biggest, the gems have few flaws after being broken from larger stones on their way to the sea bed. Only the strong and good quality ones survive, Cleaver said. De Beers’s Namibian unit sold its diamonds for \$528 a carat last year, much higher than the \$187 average for the whole company’s stones and accounting for about 13 percent of total earnings.



The giant subsea "crawler" tractor is lowered into the ocean from the deck of the Mafuta.



De Beers finds some of its most valuable diamonds on the Atlantic Ocean seabed.



The Mafuta exploration vessel dredges the seabed at depths of around 150 meters off the Namibian coast.



## Experimental Seabed Mining and the Controversial Solwara 1 Project in Papua New Guinea

Peter Neill - Director, World Ocean Observatory, Huffington Post, July 11, 2017



The Deep Sea Mining Campaign is a collaboration of organizations and citizens from Papua New Guinea, Australia and Canada concerned with the likely impacts of deep sea mining on marine and coastal ecosystems and communities.

It has been some time since we've reflected on the issue of deep sea mining—the search for minerals of all types on the ocean floor. We have seen already how marine resources are being over-exploited—over-fishing by international fisheries being the most egregious example, mining for sand for construction projects and the creation of artificial islands, the exploitation of coral reefs and certain marine species for medical innovations and the next cure for human diseases based on understanding and synthesis of how such organisms function. The Deep Sea Mining Campaign, an organization based in Australia and Canada, has been following the saga of Solwara 1, proposed by Nautilus Inc. for offshore Papua New Guinea that continues to seek financing year after year since 2011.

The project is basically a kind of corporate speculation premised on the lucrative idea of the availability of such minerals conceptually in the region—indeed the company has declined to conduct a preliminary economic study or environmental risk assessment, the shareholders essentially engaged in a long odds probability wager comparable to those who invested in marine salvagers attempts to find and excavate “pay-ships” lost at sea with purported vast cargos of silver and gold. The idea that they should be required to justify their endeavors to governments, third-world or otherwise, or to coastwise populations whose livelihood and lives depend on a healthy ocean from which they have harvested for centuries, is anathema. Deep Sea Mining [recently reported](#) on the recent Nautilus Annual General Meeting where CEO Michael Johnston was asked:

- Is it true that without the normal economic and feasibility studies, the economic viability of Solwara 1 is unknown?
- Is it true that the risk to shareholders of losing their entire investment in Nautilus is high and the potential returns promoted by Nautilus are entirely speculative?
- Is this why Nautilus is struggling to obtain the investment to complete the construction of its vessel and equipment?

According to the release, Johnston declined to have his responses recorded and evaded providing clear answers. He did, however, affirm the description accuracy of the Solwara 1 project in the Annual Information Forms as a ‘high’ and ‘significant’ risk. Local communities are also not interested in the Nautilus experiment. In recent weeks, two large forums against the Solwara 1 deep sea mining project in the Bismarck Sea have been held in New Ireland and East New Britain provinces of Papua New Guinea. Supported by the Catholic Bishops and Caritas Papua New Guinea, both forums called for the halt of the Solwara 1 project and a complete ban on seabed mining in Papua New Guinea and the Pacific. Here are some comments from those meetings:



Patrick Kitaun, Caritas PNG Coordinator: “The Bismarck Sea is not a Laboratory for the world to experiment with seabed mining. Our ocean is our life! We get all our basics from the ocean so we need to protect it. We will not allow experimental seabed mining in Papua New Guinea. It must be stopped and banned for good.” Jonathan Mesulam of the Alliance of Solwara Warriors: “Nautilus, we are not guinea pigs for your mining experiment! We in the Pacific are custodians of the world’s largest ocean. These oceans are important to us as sources of food and livelihoods. They are vital for our culture and our very identity. In New Ireland Province, we are only 25 km away from the Solwara 1 site. It is right in the middle of our traditional fishing grounds. We will stand up for our rights!” Vicar General, Father Vincent Takin of the Diocese of Kavieng: “In order, for any development to take place, the people must be the object of development and not subject to it. The people have not been fully informed about the impacts of Solwara 1 on the social, cultural, physical and spiritual aspects of their lives. Therefore they cannot give their consent.”

Nautilus Inc. does not appear to be major international energy company with the assets available to force this project forward as others might. The opposition is well organized and vocal with arguments and expectations that the company cannot overcome. We hope. As with offshore oil exploration alongshore and in the deep ocean, this project is isolated in an opposing political context and shifting market. It is not for this time, for these people in these places, who have no concern for the loss of the `stranded assets of invisible gamblers in the face of the gain of conserving and sustaining their ocean resources for local benefit and the future.

### **Nautilus defends awarding of project**

Post-Courier, July 6, 2017

Nautilus Mineral Inc have defended the awarding of its WASH project in New Ireland to a Goroka-based company. The Canadian miner was responding to assertions that had been made by a Jonathan Mesulam, at a forum on deep-sea mining, which was organised by the Catholic Church in Kavieng recently. Mr Mesulam reportedly was aggrieved at the outsourcing of projects, which he argued ought to have been given to the locals. Nautilus had, in a response provided to the Post-Courier, stated the contract had been awarded on merit to APT Projects. “APT were awarded the program because they had experience in PNG delivering similar projects, and there was no similar expertise in New Ireland.” “The program is aligned with the New Ireland Provincial government’s programs to improve village life and has been a major success.”

“The program contained a large training element, and it is hoped that eventually the skills will be available in New Ireland for future project; that will be undertaken by locally based companies and groups,” Nautilus had stated. The company had stressed that while the company had yet to begin operations in the country, it has been working with communities since 2007. During this period, it has completed a variety of initiatives focused on health and education. These were running water and toilets to 22 schools in the impact communities, health baseline survey, health patrols that had seen the team attend to 7,000 patients, construction of the Pubanom Bridge and education baseline study. In addition, various donations to schools, community groups and activities.

### **Namatanai Churches taking stand to ban deep-sea mining**

*Mainline churches in Namatanai are backing the people there in a bid to ban deep-sea mining in their waters.* BY SHARON LOWA, Post-Courier, July 5, 2017

Mainline churches in Namatanai are backing the people there in a bid to ban deep-sea mining in their waters. This move was made known at a recent forum, where churches took the lead to gauge

views of the people particularly on matters pertaining to the marine environment, which they believe will be endangered if deep-sea mining does take place. Spokesman Jonathan Mesulam said there was strong opposition from the people with the support of the churches not to allow the mining operation in their waters. Nautilus was granted licence by Papua New Guinea in 2009. However, since then, there have not been any mining activities taking place. Mr Mesulam claimed the delay in the start of the company's operation was due to lack of financial confidence by investors in the project and other issues. Meanwhile, Nautilus yesterday brushed aside all the assertions made by Mr Mesulam, stating all to be incorrect.

From the outset, the company had stated it has written to the Catholic Church to provide a brief and clarification on misconceptions that have arisen on the Solwara 1 project, however, they have yet to hear from the Cardinal. The company, in a detailed response, had stated from the outset that the company has been working with the impact communities since 2007, and has completed a variety of initiatives in health and education, even though it has not yet begun operations. The company assured that it has and continues to work with government, adhering to all the rules and regulations. "The company's major shareholders and technology partners continue to support the project through a bridge financing facility and active investor support," the company had stated.

"Nautilus' Environmental Impact Study (EIS) was independently reviewed for the Department for Environment and Conservation in 2009/10 by Cardno." "The EIS was approved with a series of conditions and has not been superseded by the company's Environmental Monitoring Management Plan that is being developed by regulators." On claims of inconsistency of information presented to communities, the Canadian firm stressed it has and will continue to endeavour to provide the communities with the most up-to-date information. It had clarified that all programs have been put on hold due to the election but will restart once this national process is completed.

### **Nautilus seeks Solwara funding**

June 30, 2017, The National Business

By SHIRLEY MAULUDU

NAUTILUS Minerals is still exploring funding options for its Solwara 1 project, chief executive officer Mike Johnston says. Johnston told The National, in response to a question on whether Nautilus had already secured funding for the project, that it had strong support from its shareholders. "Nautilus has strong support from its major shareholders, who continue to provide a monthly bridge finance facility," he said. "Additionally, we continue to explore other sources of funding for the Solwara 1 project, and remain in active discussions with a number of parties. "We will continue to update the market as those discussions progress." Nautilus was granted its first mining lease in January 2011 for Solwara 1 in New Ireland. An environmental permit was awarded in December 2009.

The Solwara 1 deposit, which sits on the seafloor at a water depth of some 1600 metres, contains a copper grade of approximately 7 per cent. The company last July said it was seeking alternative sources of financing to maintain the development of the Solwara 1 project and its operations. Nautilus said then that it required significant additional funding to complete the building and deployment of the seafloor production system to be used at the Solwara 1 project. Failure to secure bridge financing and/or project financing could result in the company taking steps to maximise shareholder value. It includes suspending or terminating the development of the seafloor production system and Solwara 1 project, and engaging in various transactions including, without limitation, asset sales, joint ventures and capital restructurings.

## ***MEDIA RELEASE***

### **NAUTILUS AGM: Solwara 1 Deep Sea Mining Venture Remains a Speculative Pipe Dream. 29 June, 2017**



At its annual general meeting in Vancouver last week, *wannabe* deep sea miner Nautilus Inc failed to inspire shareholders with confidence in its Solwara 1 venture in Papua New Guinea[1]. Without sufficient funds to complete its equipment build, Nautilus' 2019 mining start date for its flagship Solwara 1 project is unlikely to be met. Its financing strategy has been spectacularly unsuccessful with commercial operation delayed year after year since 2011. Investors and local PNG communities have raised serious doubts about the company's credibility. Nautilus CEO Mike Johnston was put on the defensive by questions posed at the AGM regarding investment risk. At the AGM, the Deep Sea Mining Campaign and the Vancouver-based Mining Justice Alliance reminded shareholders that Nautilus' [Annual Information Forms](#) for financial years 2015 and 2016 describe serious environmental and economic risks that render its Solwara 1 project a purely speculative venture[2]. The Forms describe Solwara 1 as an experiment as both the environmental impacts and profits are complete unknowns. Nautilus has declined to conduct a preliminary economic assessment, pre-feasibility study or feasibility study – as per conventional industry practice.

"This level of risk has scared off responsible investors. More importantly in terms of risk, the Solwara 1 project is opposed by local communities who are deeply concerned that the project will pollute the marine environment and ruin their livelihoods, health, and culture, all of which are strongly linked to the sea. The cost of conflict to mining projects has been well documented"[3] says Dr. Helen Rosenbaum of the Deep Sea Mining Campaign. According to Kate Murray of the Mining Justice Alliance, "experience with other mining projects shows us that local opposition often results in legal and/or public relations disasters for companies. In the case of Solwara 1, local opposition appears to be mounting." She also posed the following questions to CEO Mike Johnston at the AGM:

- "Is it true that without the normal economic and feasibility studies, the economic viability of Solwara 1 is unknown?"
- "Is it true that the risk to shareholders of losing their entire investment in Nautilus is high and the potential returns promoted by Nautilus are purely speculative?"
- "Is this why Nautilus is struggling to obtain the investment it requires to complete the construction of its vessel and equipment?"

Johnston declined to have his responses recorded and evaded providing clear answers. However, he did affirm the accuracy of the description of the Solwara 1 project in the Annual Information Forms as a "high" and "significant" risk.

## **NOTES**

[1] If it proceeds the Solwara 1 mine will be located in the Bismarck Sea of Papua New Guinea, approximately 25 km from the coastline of New Ireland Province, about 35 km from Duke of York Islands and 60 km from Kokopo township in East New Britain.

[2] See sections on Risk factors in [Annual information forms](#) for financial years 2015 and 2016. For example:

"Our operations are speculative due to the high-risk nature of business related to the exploration and acquisition of rights to potential mineable deposits of metals. These risk factors could materially affect the Company's future results and could cause actual events to differ materially from those described in forward-looking statements relating to our Company." (FY 2016, p 52)

"... Performance, availability, reliability, maintenance, wear and life of equipment are unknown. There can be no guarantee that sub-sea engineering and recovery systems can be developed or if developed, will be employable in a commercially-viable manner." (FY 2015, p54)

"... while Company studies have indicated a low likelihood of risk to the aquatic environment from mining activities, the actual impact of any SMS [seafloor massive sulphide] mining operations on the environment has yet to be determined." (FY 2015, p61)

"Nautilus has not completed and does not intend to complete a preliminary economic assessment, pre-feasibility study or feasibility study before completing the construction and first deployment of the Seafloor Production System at the Solwara 1 Project."

"No independent Qualified Person has confirmed the amount of these costs or recommended that these costs be incurred. There is significant(FY 15, p52) risk with this approach and no assurance can be given that the Seafloor Production System, if fully funded and completed for deployment at the Solwara 1 Project, will successfully demonstrate that seafloor resource development is commercially viable."

[3] For example: Davis, Rachel and Daniel M. Franks. 2014. "Costs of Company-Community Conflict in the Extractive Sector." Corporate Social Responsibility Initiative Report No. 66. Cambridge, MA: Harvard Kennedy School.



IMAGE: Participants at the Seabed Mining Forum in Namatanai, New Ireland Province, PNG calling for a Ban on Seabed Mining in PNG & The Pacific. June 8th, 2017.

## **Can deep-sea mining avoid the environmental mistakes of mining on land?**

*Ambitious research aims to limit environmental damage on the sea floor – but some scientists fear mining this pitch black world will do more harm than good*

Carol J Clouse, The Guardian, 28 June 2017

Each of the three mining machines outweighs the 200-ton blue whale – the largest animal the world has ever known – and they look fearsome, especially the bulk-cutter designed to grind up the ocean floor with its enormous roller, covered in spikes. If all goes as planned, come 2019 these giant remote-controlled robots will steamroll across the bottom of the Bismarck Sea off the coast of Papua New Guinea, chewing it up in pursuit of rich copper and gold reserves for a Canadian company called Nautilus Minerals. Nautilus chief executive Michael Johnston is anxious to demonstrate something besides making handsome profits. He also wants to show that his company has designed the mining expedition to have a small environmental footprint, especially when compared to the land-based counterpart. “People have a view of mining, and they think we’re going to transport that view into the ocean, and it’s going to be ugly,” says Johnston, a soft-spoken New Zealand native and a 30-year veteran of mining. “It’s important to all of us, especially those of us who’ve worked in mining for a number of years, to show people that you can do it better. I think a lot of people will be surprised,” says Johnson, 54, who joined Nautilus in 2006.

Johnston will have a lot to prove. The project, Solwara-1, will be the first ever attempt to extract minerals from the deep sea, and with the world watching closely. Deep sea mining presents an ethical conundrum and an opportunity to avoid the costly environmental and social mistakes of land-based mining. That has prompted a group of policymakers, businesses and academic researchers to design rules that they hope will minimize environmental harm. They have proposed ideas that range from setting aside no-mining zones within a region rich in minerals to using technology that will reduce the extent of sediment plumes during dredging. “We have the opportunity from the very beginning to understand the science, to understand the impact and to understand how to ameliorate the impacts,” says Dr James Hein, a senior scientist with the US Geological Survey.

“This will really be the first time we can approach it from step one.” But whether any of those ideas will work as designed to reduce environmental impact won’t be known until the machines are put to work. Some of Nautilus’s proposals, such as relocating some of the wildlife temporary to another location during mineral extraction – and recolonizing the spot afterward – attract strong skepticism. “Nautilus’s claims that they can simply relocate parts of the site’s ecosystem elsewhere don’t stand up to scientific scrutiny, and the effectiveness of any measures to reduce other impacts will be difficult, if not impossible, to verify independently,” says Dr David Santillo, senior scientist at Greenpeace Research Laboratories at the University of Exeter in the UK.

### **Earth’s last mining frontier**

The deep ocean plays a critical role in the Earth’s biosphere – it regulates global temperatures, stores carbon and provides habitat for a huge array of creatures. Scientists and environmental advocates fear that mining this pitch black, frigid world will not only kill any marine life that gets in the way of the machines but could potentially devastate far wider areas by stirring up plumes of sediment and introducing chemical, noise and light pollution. Their worries underpin a sentiment that deep-sea mining appears inevitable. Demand for minerals to make virtually everything we use, including the phones and computers that run our lives, will only increase. Even technology that promises to cut our oil addiction and reduce emissions requires a reliable supply of raw materials, from tellurium for solar panels to lithium for electric vehicle batteries. The vast treasure of untouched resources on the ocean floor – copper, zinc, cobalt, manganese, titanium and other minerals – has tantalized mining companies around the globe.



The Clarion-Clipperton Zone (CCZ) is a particularly a coveted mining area that's roughly the size of the continental US and lies between Mexico and Hawaii. It contains potato-sized nodules of manganese, cobalt, nickel, copper and molybdenum worth roughly \$25.2tn, according to Hein's calculations. Not all of this amount would be economically recoverable, Hein says, but even 30% would equal \$7.56tn. Moreover, these minerals exist at much higher grades than on land, where supplies that are easily accessible have mostly been depleted and mining companies are blowing the tops off mountains, cutting down wider expanses of forests and digging ever-bigger holes to extract from harder-to-reach deposits. Mining copper in the Andes, which produces about 40% of the world's supply, would require the removal of 50 tons of barren rock to get to a 20 million ton ore deposit with 0.5% copper in it, Hein says. In a marine environment, you can find a 7% copper deposit sitting right on the seafloor. Of the 28 exploratory contracts signed with the International Seabed Authority, which regulates undersea mining in international waters, 16 are for mining in the CCZ. The US hasn't ratified the treaty and joined the ISA. US aerospace and defense firm Lockheed Martin has obtained two exploratory contracts through its British subsidiary UK Seabed Resources.

Deep-sea mining is an expensive undertaking. Nautilus has encountered delays for its roughly \$480m project and still needs to raise \$150m to \$250m to move ahead. Around the world, extensive work is now going into mapping ocean floor ecosystems and researching ways to mitigate the environmental impact of deep-sea mining. In the US, the National Oceanic and Atmospheric Administration has done exploratory and mapping work off the coast of Hawaii, along with projects by university researchers. The European Union has contributed millions of dollars to organizations such as MIDAS (Managing Impacts of Deep-Sea Resource Exploitation), and Blue Mining, an international consortium of 19 industry and research organizations. A UK-funded expedition conducted the first ever controlled deep-sea sediment plume experiment in the Atlantic last year, about 300 miles from the Canary Islands. Sediment plumes are big dust clouds kicked up by mineral extraction, and scientists worry that the plumes could travel great distances, choking sea life along the way.

“There's a lot more research to be done on sediment plumes,” says Dr Bramley Murton, who led the expedition and heads the marine mineral research at the UK's National Oceanography Center. “But we got some data and, at the moment, the initial indication is that we can't see the plume from a kilometer, or roughly 0.6 miles, away.” That's an encouraging result, because scientists previously suspected that sediment plumes would travel much further. Another way to minimize impact is to aside protected areas within mining zones. Back in 2013, a team of scientists led by Dr Craig Smith, a professor of oceanography in University of Hawaii's Mānoa's School of Ocean and Earth Sciences and Technology, recommended the ISA to designate roughly a quarter of the CCZ as a protected area.

The ISA accepted the team's recommendations provisionally but will need to decide whether to include them in the final rules, which could take three to five years to finalize. Improving the precision of mining robots will also help to reduce environmental disturbances. Companies with the technology that could solve the problem include the Seattle-based BluHaptics, which has developed software that enables a robot to recalibrate its aim and movement to improve precision by learning from each trip it makes to the seabed. “We use machine learning software to identify and track objects in real time, with high resolution situational awareness, so it can see through sediment or oil spills,” says Don Pickering, BluHaptics' CEO.

### **What will Nautilus do?**

At the Solwara-1 site, 25km off the Papua New Guinea coast, Nautilus plans to launch its project from a ship 230 meters long and 40 meters wide, with roughly 130 employees on it. The company will go after minerals born 1,000–3,000 meters deep in volcanically active zones, around vents that

spurt super hot, acidic water containing metals dissolved from the earth's crust. The active vents are populated by numerous species, including tubeworms, clams, snails, shrimp, crabs and any [species that are not yet known](#). The three Nautilus robots, designed by UK-based SMD, will be lowered into the water, break up the rocks and collect them to be piped back to the vessel. The ore will then be transported by smaller boats to China and sold to the Tongling Nonferrous Metals Group Holding Co. The ship plans to remain at the first project site for roughly three years, bringing up 2.5 million metric tons of ore containing metals worth roughly \$1.5bn, give or take shifts in commodity prices.

To address sediment plumes, SMD designed the robots to suck the plume into the slurry with the ore and pump it up into the vessel. "Our ultimate goal is to recover as much of the material as possible, not to blow it away," Johnston says. Using a steel riser and pump system designed by GE Oil & Gas, once the ore is dropped into the vessel, the icy water will be pumped back down to the sea floor so it doesn't mix with the warmer surface water and potentially cause algae blooms and other environmental disturbances. To minimize the use of bright light, which could disrupt marine life in the pitch black world, Nautilus will use sonar and digital cameras to create 3D maps to guide its extraction with the remotely operated robots.

"These populations grow fast and they reproduce a lot, so in some sense one can argue that they might recover quickly. But the environmental issue is that these habitats are relatively rare on the sea floor, and they're different from one site to the next because the animals have adapted to the fluid chemistries," says Dr Cindy Lee Van Dover, director of the Duke University Marine Laboratory in North Carolina and a member of the Deep-Ocean Stewardship Initiative, an international group of scientists, lawyers and advocates that makes environmental recommendations to the ISA. "We aren't talking about stopping mining, just thinking about how to do it well. We can map these environments to show where the highest density of animals is and avoid those high-density places. That's a very rational approach," says Van Dover. "I'm reasonably optimistic that we can come up with progressive environmental regulations."

### **Fiji: No plans for deep sea mining**

Felix Chaudhary, The Fiji Times, June 28, 2017

SEABED deep sea mineral mining will not be conducted in waters around Fiji in the near future, says Ministry of Lands and Mineral Resources permanent secretary Malakai Finau. "The costs involved are absolutely huge," he said. "Current exploration interest is in its very early or preliminary stages, we haven't even reached the advanced stages as yet. "Seabed resource exploration requires a lot of resources. One of the biggest costs is the need to engage a state-of-the-art marine research vessel. "Getting exploratory work done on land is very expensive, so you can imagine what it's like when you are attempting to do this out at sea." Meanwhile, a report by the World Bank released in April last year titled "Precautionary Management of Deep Sea Mining Potential", called on Pacific Island countries to be extra vigilant and cautious over any plans for seabed mining. The report said any Pacific country supporting or considering deep sea mining activities must proceed with a high degree of caution to avoid irreversible damage to ecosystems.

The World Bank report also emphasised the need for strong governance measures to ensure that appropriate social and environmental safeguards were in place. Pacific Island countries that have granted permits for deep sea mining exploration include Papua New Guinea, Fiji, Tonga, Vanuatu and Solomon Islands. The Cook Islands has advanced its efforts and done a minerals exploration tender process. Mr Finau is chairing the Science Technology and Resources (STAR) Network's 2017 conference at the Tanoa International Hotel in Nadi. The conference is supported by the Geoscience Division of the Pacific Community and sponsored by Standard Concrete Industries (Fiji),

XINFA Mines (Fiji) and the UNDP neglected development minerals project with support also from the Circum-Pacific Council.

### **Mine will not be in breach of law**

Post-Courier, June 28, 2017

Canadian miner, NAUTILUS Minerals, asserts the world's first deep sea mine to be developed in Papua New Guinea, says it will not be in breach of any international laws. The company was responding to recent reports published by the Catholic Professionals Society, which had claimed there would be breach to the freedom of navigation by international vessels, if the project gets off the ground. The Solwara-1 project, will be developed in the waters between New Ireland and East New Britain provinces. In a statement sent to the Post-Courier yesterday, the Canadian miner said: "Nautilus would like to clarify that its operations will not be in breach of international laws." "While there will be an exclusion zone around its operations, it is only 1.25-km in radius." "This was determined by placing a 500 meter buffer around all mining areas."

"This buffer area was approved by the National Maritime Safety Authority (NMSA) in September 2016, with the relevant information sent to the Australian Hydrographic Service for inclusion on the relevant charts," the miner said. Nautilus said the exclusion zone will ensure shipping does not interfere with mining operations, and will no way impede shipping passing through the St George passage (it doesn't interfere with the Right of Passage as guaranteed by UNCLOS). "This exclusion zone is no different to the exclusion zone around an oil and gas production platform, for which, there are thousands all around the world and they too are not in breach of international law." "Its position will be marked on maritime charts and will be noted by all vessels and vessel captains," the firm further stated. Questions were put to NMSA to comment but the state agency had yet to respond at the time this paper went to press.

### **Experts Warn that Seabed Mining Will Lead to 'Unavoidable' Loss of Biodiversity**

Daniel Oberhaus, Motherboard, June 27, 2017

Seabed mining companies are going to wipe out species we don't even know exist yet. An international group of 15 marine scientists and legal scholars published a letter on Monday warning of the dire effects that the nascent seabed mining industry could have on bottom dwelling marine life. The letter, published in *Nature Geoscience*, is the latest in a series of [increasingly desperate pleas](#) from marine scientists to pump the brakes on mining the seafloor until marine scientists are able to get a better idea of what the effects this industry will have on this woefully understudied area of the planet.

"Unlike on land, most of the biodiversity and ecosystem function in the deep sea is poorly understood," Cindy Dover, a professor of biological oceanography at Duke University and one of the signatories to the letter, told me via email. "We have learned that the deep sea is as exquisitely diverse as any bit of shallow marine or terrestrial environment. What we don't understand is how much we can degrade deep-sea ecosystems before we reach tipping points, where the loss of biodiversity and ecosystem function affects the health of the ecosystem beyond levels that are acceptable to society." As such, Van Dover and the other signatories on the letter call for the International Seabed Authority, the UN-sanctioned regulatory body for the ocean's floor, to recognize the risk posed by deep sea mining and communicate this risk to the public at large.

"We ask that biodiversity loss resulting from deep-sea mining be recognized and be part of the public discourse about mining," Van Dover said. "The scientific community has been invited by the

ISA to provide recommendations on responsible environmental practices for deep-sea mining. Our peer-reviewed letter responds to this invitation." Although the deep sea (defined as anything below a depth of about 650 feet) accounts for roughly two-thirds of the Earth's surface, we know remarkably little about what goes on down there. Dozens of new species are routinely discovered during forays to the bottom of the ocean and the deep sea ecosystem isn't well understood. Nevertheless, the deep sea has become the site of a new gold rush in recent years.

The discovery of a wealth of precious minerals such as nickel and cobalt, in addition to oil and potentially lifesaving molecules have incentivized seabed mining operations to begin exploratory missions to the bottom of the ocean to start staking claims. To get an idea of how this industry is developing, the authors of the recent letter point out that in 2001 there were only six contracts for deep sea mining operations. By the end of 2017, however, there will be 27 deep sea mining contracts. Of these, 17 will be in the Clarion-Clipperton Zone, a region of the Pacific Ocean between Hawaii and Central America. One of the proposed mining contracts alone covers 32,000 square miles, an area larger than the state of Maine.

Although some proponents of deep sea mining argue that the effects of this industry can be offset by taking more environmentally friendly measures elsewhere, such as building artificial reefs, the authors of the letter are calling BS. "The argument that you can compensate for the loss of biological diversity in the deep sea with gains in diversity elsewhere is so ambiguous as to be scientifically meaningless," Craig Smith, a professor of oceanography at the University of Hawaii, said in a statement. "This is like saving apple orchards to protect oranges," Van Dover added. For now, these contracts remain exploratory as the ISA struggles to establish a deep sea regulatory regime.

But as the letter's authors rightfully worry, it will be hard to establish effective seabed regulations since so little is known about the ocean floor. "The ISA has begun working on regional environmental protection plans that include identifying networks of Areas of Particular Environmental Interest (APEI) within regions of interest to contractors," Van Dover told me. "Mining and mining impacts would be excluded in these APEIs. Science-based recommendations for the design of these APEIs call for them to include representative habitats in the region."

Until these regulations are in place, however, the authors of the letter call for the ISA to acknowledge that deep sea mining will certainly be harmful to deep ocean biodiversity. According to the authors of the letter, this damage will likely be irrevocable. Even more frightening is that we'd likely never know the full extent of the damage because marine scientists won't have the opportunity to establish sufficient baseline measurements before the mining frenzy begins. "I do not know if responsible seabed mining is possible, given knowledge gaps in our understanding of deep-sea biodiversity and function, and the possibility that the cost of good, science-based environmental management and monitoring may be too high at present relative to the value of the product," Van Dover said. "There are ways to fill these knowledge gaps, but they require time and investment."

### ***Press Release***

#### **Deep sea mining threatens unique marine life, experts warn**

*Gland, Switzerland, 26 June 2017 (IUCN) – Mining the deep ocean floor would inevitably lead to the loss of biodiversity, which cannot be compensated for through biodiversity offsets, 15 marine scientists and legal scholars argue in a letter published today in the journal Nature Geoscience.*  
IUCN, 26 Jun 2017

The rules that will govern the emerging deep sea mining industry – including environmental protection measures – are currently being drafted by the International Seabed Authority (ISA), an inter-

governmental body. The letter's authors say the ISA must recognise the threat mining poses to marine life, and communicate it clearly to its member states and to the public. With the deep seabed environment still largely unexplored, mining may lead to the loss of undiscovered species, making biodiversity offsets impossible. Out-of-kind biodiversity offsets, which involve restoring or preserving very different marine habitats like tropical coral reefs, cannot compensate for the loss of unknown deep-sea species. "With interest in deep sea mining growing exponentially, now is the time to ensure that lasting damage to the unique ecosystems found in the ocean depths can be prevented. The new rules governing deep sea mining must take its full costs to society and the environment into account," says Kristina Gjerde, IUCN's Global Marine and Polar Programme senior advisor on High Seas issues and co-author of the letter.

"Improved scientific research is essential to better understand the deep sea environment and the potential impacts of mining. We also need to engage all levels of society to weigh the value of deep sea minerals against the unavoidable loss of living systems in the deep sea." Deep sea mining is still an experimental field that targets minerals such as copper, nickel and cobalt, used for the production of technologies like wind turbines and hybrid cars. Mining may destroy deep sea habitats, eradicate rare and unique species, and introduce sediment clouds, noise, toxic chemicals, vibration and other forms of pollution into pristine environments. Ecosystem and species recovery may take decades to centuries, if it occurs at all, according to the authors. Restoring ecosystems damaged by mining is not realistic in a deep-sea environment, the letter states. This is because of the high cost of working on the deep sea floor, the extremely slow recovery of deep sea species and the enormous spatial scales of deep-sea mining for some minerals. A single 30-year licence to mine metal-rich nodules will involve an area the size of Austria, for example.

Biodiversity loss can be reduced with techniques like patchwork extraction, where some sites are set aside, although this does not prevent harmful side-effects. For example, the dispersion of fine and potentially toxic particles in plumes can smother and kill marine species. According to the UN Convention on the Law of the Sea, the deep seabed and its mineral resources beyond national jurisdiction are the common heritage of mankind, and do not belong to any one country. Deep-sea scientists and legal experts who co-wrote the peer-reviewed correspondence with IUCN's Kristina Gjerde include C. L. Van Dover of Duke University, USA; J.A. Ardron and D. Jones of the University of Southampton; M. Gianni of the Deep-Sea Conservation Coalition; A. Jaeckel of Macquarie University; L.A. Levin of Scripps Institution of Oceanography; H. Niner of University College London; C.R. Smith and L. Watling of the University of Hawaii at Manoa; T. Thiele of the London School of Economics; P.J. Turner of Duke; and P.P.E. Weaver of Seascope Consultants.

### **Proposed sea bed mining project in PNG in breach of International laws**

NBC News via PNG Today, 24 June, 2017

The proposed sea bed mining project in Papua New Guinea will be in breach of International laws. Catholic Professionals Society of PNG Executive and Environmental Lawyer Camillus Narokobi highlighted this recently, saying that there will be a breach to the freedom of navigation by international vessels if the project becomes a reality. The project Solwara 1, to be developed by Canadian Company, Nautilus Minerals in the New Ireland and East New Britain seas is set to begin in 2018. "The area that is being targeted for sea bed mining falls within our jurisdiction, it is an area that falls under international law. The passage between Rabaul and New Ireland is called St George Passage. That is regarded as an International Strait, it is one of the seven international straits Papua New Guinea has, it is all within the Bismarck Archipelago. And so both the New Ireland and East New Britain Provincial Governments have a right to say what has to be done or what should not be done. And International rights include freedom of navigation, by ships and submarines that can come through those waters without giving prior notice.



## Plankton at risk from seafloor mining surveys

Cosmos, 23 June 2017



Zooplankton like these are vulnerable to the acoustic surveys used to search for oil and gas under the seabed.

The search for oil and gas deposits beneath the sea uses acoustic imaging techniques that are deadly to vital marine organisms, according to new research. Tim Wallace reports. Climate scientists are agreed that global warming will have significant long-term impacts on plankton, the creatures that underpin the health and productivity of global marine ecosystems and which play a critical role in the planetary carbon cycle, though they are less sure what exactly those impacts will be. But more immediate effects from human reliance on fossil fuels are now clearer, thanks to research that shows acoustic survey techniques used to explore the seafloor for oil and gas deposits is associated with the widespread death of plankton. The study by marine scientists from Curtin University, in Western Australia, and the University of Tasmania has been [published in \*Nature Ecology & Evolution\*](#). It concludes that “potential large-scale modification of plankton community structure and abundance due to seismic survey operations has enormous ramifications for larval recruitment processes, all higher order predators and ocean health in general” and flags the “urgent need to prioritise development and testing of alternative surveying techniques”.

These results add to the growing body of evidence of the deleterious influence on marine life from man-made underwater noise, such as the disruption of whale behaviour from naval sonar use. Oceanic exploration for petroleum resources is done through acoustic imaging, by firing intense, low-frequency sound impulses down into the seabed. Those impulse signals are produced by arrays of “air guns” that simultaneously shoot air at high pressure (13.8 MPa, or 2,000 psi) into the water. Acoustic echoes captured by strings of hydrophones enable sub-sea images to be generated. While details of the global extent of such survey activity are scarce, the authors provide some sense of scale with statistics from Australian waters: during 2014 and early 2015, an average of 15,848 km of petroleum-related marine seismic surveys were completed every three months.

To determine the impact of such activity, the research team conducted experiments off the south-east coast of Tasmania, measuring the effect of a single air gun on zooplankton, the small marine animals that typically graze on the plantlike phytoplankton found in abundance at depths to about 200 metres. Sonar surveys and net tows were used to measure both abundance and the ratio of dead to live zooplankton both before and after air gun use. The results: the average abundance of zoo-

plankton caught in nets fell by more than 60% in the hour immediately after the air gun was fired, compared to control areas, and two to three times more dead zooplankton were found at all range groups for all taxa.

This mortality rate was “more than two orders of magnitude higher” than what has been assumed by previous modelling studies. Although they did not directly study the zooplankton for cause of death, the researchers offer a hypothesis: many marine invertebrates, including zooplankton, use mechanoreceptors to detect vibrations. For most zooplankton, these mechanosensory systems may be extremely sensitive, responding to air-gun impulses signal by ‘shaking’ to the point where damage could accrue to sensory hairs or tissue. “Impacted animals might not die immediately after air gun exposure, but rather may be disabled in their sensory capacity with an accompanying loss of fitness and so increased predation risk through time,” the authors suggest.

## Seabed mining petition goes to select committee in New Zealand

Heta Gardiner, Maori Television, 22 June 2017



The issue to place a moratorium on seabed mining has once again made it to Parliament. Local Government and Environment Select Committee were presented with a message from KASM (Kiwis Against Seabed Mining) to put a halt on seabed mining in New Zealand waters until a better understanding of the risks and impacts are provided. Phil McCabe from KASM says, "There is a bunch of stuff out there that we have the opportunity to turn into money. And I get that, I see the attraction, I'm a business person myself. The question is whether we have the knowledge or the ability to do that, to extract that material in a safe and responsible way. We don't have that knowledge now to do that safely." In September last year, Mr. McCabe lead a petition calling for a moratorium on all seabed mining which was later presented to Parliament. McCabe also said to the Select Committee today,

“The financial benefits of seabed mining may not be as vast as speculated.” Rino Tirikatene from Labour was in Select Committee and agreed that a more cautious approach should be taken. "We just need to ‘taihoa’ and do some proper research, and not put all the pressure on the communities to fight against all these corporate interests," says Tirikatene. However, Nuk Korako of National says that a moratorium might not be the best solution. "Do we need a moratorium on this? Taking into account, there has been a really robust system in place, and when you look at all those applications, actually most of them have been turned down," says Korako. The Select Committee will be looking into Phil McCabe's submission over the next week.

## Shareholders vote in favour of resolutions: Nautilus

June 22, 2017, The National Business

NAUTILUS Minerals Inc says shareholders have voted in favour of all the resolutions brought before them during the annual general meeting on Tuesday in Vancouver, Canada. The company said 59.12 per cent of the issued shares were represented. Chairman Russell Debney said: “We have continued to make excellent progress in the past year resulting in the delivery of our completed seafloor production equipment. “Subsequently, we have started submerged trials of the seafloor production tools in Papua New Guinea this past quarter. “We have delivered the launch and recovery equipment to Mawei shipyard in China, while also progressing there with the building of our production support vessel. “We now look forward to seeing more of the equipment arrive for integration over the coming months at the shipyard as we gear up towards the launch of the PSV early in 2018. “Subject to financing, we continue to target the commencement of operations at the Solwara 1 project site in quarter one 2019.” The meeting also confirmed the:

- Re-election of Russell Debney, Dr Mohammed Al Barwani, Tariq Barwani and Mark Horn as directors of the company for the ensuing year;
- Re-appointment of PricewaterhouseCoopers as auditor of the company for the ensuing year. The directors were also authorised to fix their remuneration;
- Re-approval of option and share plans: The company’s stock option plan and share loan plan, and all entitlements thereunder, were re-approved by the shareholders in accordance with the requirements of the Toronto Stock Exchange.

Debney said shareholders’ passing the resolutions was a huge vote of confidence in Nautilus’ deepsea mining venture and spoke volumes of for their faith in the project. “It’s all go once everything is in place,” he said.

## MEDIA RELEASE, Deep Sea Mining Campaign 20 June 2017

### Nautilus to go under before reaching the ocean floor

Risk hindering finance, shares could well become stranded assets

VANCOUVER. Nautilus braces itself for yet another AGM of excuses and bad news for investors. The *wannabe* deep sea miner is still struggling to convince financiers that its Solwara 1 deep sea mine is more than a *sci fi* pipe dream.[1] The company is unable to complete the build of it support vessel and equipment. According to the Annual information forms it's lodged with Canadian Securities, the financial and environmental risks are significant and the operation entirely speculative.[2] "Even Nautilus doesn't want to waste money on the economic assessments, feasibility studies, cost studies and the assessments of ore grades considered normal in the mining industry. Mainstream financiers are not interested in experiments nor are individual investors.



This can be seen by the failure of share releases to raise funds for the company. Responsible shareholders weigh up the likely exposure to social and environmental risks and the value erosion that goes with that. In regards to Nautilus, they have voted with their wallets,” says Dr. Helen Rosenbaum of the Deep Sea Mining Campaign. Local communities are also not interested in Nautilus's experiment. In the past two weeks, two large forums against the Nautilus Solwara 1 deep sea mining project in the Bismarck sea have been held in New Ireland and East New Britain provinces of Papua New Guinea. Supported by the Catholic Bishops and Caritas Papua New Guinea , both forums called for the halt of Nautilus Solwara 1 project and a complete ban on seabed mining in PNG and The Pacific.

Patrick Kitaun, Caritas PNG Coordinator said, “The Bismarck Sea is not a Laboratory for the world to experiment with seabed mining. Our ocean is our life! We get all our basics from the ocean so we need to protect it. We will not allow experimental seabed mining in Papua New Guinea. It must be stopped and banned for good.” Jonathan Mesulam of the Alliance of Solwara Warriors stated, “Nautilus, we are not guinea pigs for your mining experiment! We in the Pacific are custodians of the world’s largest ocean. These oceans are important to us as sources of food and livelihoods. They are vital for our culture and our very identity. In New Ireland Province, we are only 25 km away from the Solwara 1 site. It is right in the middle of our traditional fishing grounds. We will stand up for our rights!”

Vicar General, Father Vincent Takin of the Diocese of Kavieng stated, “In order, for any development to take place, the people must be the object of development and not subject to it. The people have not been fully informed about the impacts of Solwara 1 on the social, cultural, physical and spiritual aspects of their lives. Therefore they cannot give their consent.”[3] Dr. Catherine Coumans of MiningWatch Canada says " Seabed mining is not only financially irresponsible, but also unconscionable given its unnecessary destruction of irreplaceable marine ecosystems. Our need for metals can be met in more creative and intelligent ways, in particular by the urban mining of electronic and other wastes, and the reduction of demand for virgin minerals through better product design, repairing and recycling.[4] “These options will provide win-win solutions for society, environment and the economy and gain a social licence that deep sea mining will never achieve. Shares in Nautilus's Solwara 1 will be stranded assets."

## NOTES

[1] If it proceeds the Solwara 1 mine will be located in the Bismarck Sea of Papua New Guinea, approximately 25 km from the coastline of New Ireland Province, about 35 km from Duke of York Islands and 60 km from Kokopo township in East New Britain.

[2] See sections on Risk factors in [Annual information forms](#) for financial years 2015 and 2016. For example:

"Our operations are speculative due to the high-risk nature of business related to the exploration and acquisition of rights to potential mineable deposits of metals. These risk factors could materially affect the Company’s future results and could cause actual events to differ materially from those described in forward-looking statements relating to our Company." (FY 2016, p 52)

"... Performance, availability, reliability, maintenance, wear and life of equipment are unknown. There can be no guarantee that sub-sea engineering and recovery systems can be developed or if developed, will be employable in a commercially-viable manner." (FY 2015, p54)

"... while Company studies have indicated a low likelihood of risk to the aquatic environment from mining activities, the actual impact of any SMS [seafloor massive sulphide] mining op-



erations on the environment has yet to be determined.” (FY 2015, p61)

"Nautilus has not completed and does not intend to complete a preliminary economic assessment, pre-feasibility study or feasibility study before completing the construction and first deployment of the Seafloor Production System at the Solwara 1 Project.”

"No independent Qualified Person has confirmed the amount of these costs or recommended that these costs be incurred. There is significant(FY 15, p52) risk with this approach and no assurance can be given that the Seafloor Production System, if fully funded and completed for deployment at the Solwara 1 Project, will successfully demonstrate that seafloor resource development is commercially viable."

[3] Statement by Vicar General, Father Vincent Takin, representing the Diocese of Kavieng and speaking on behalf of His Lordship, Bishop Ambrose Kiapseni MSC DD and all the Catholic faithful of the Diocese of Kavieng. View full statement here:

<http://www.deepseaminingoutofourdepth.org/statement-diocese-of-kavieng-vicar-general-fr-vincent-takin/>

[4] For example, [No Mining Required](#); [No more mining says Apple](#); and [Apple will stop relying on mining for minerals 'one day'](#); California based [Blue Oak Resources](#) estimates that every year mining companies spend roughly \$12 billion for virgin ore deposits. While tons of cell phones and other electronics are thrown out every year, each ton contains 70 times the amount of gold and silver found in virgin ore. For copper the number is even higher, with the equivalent of roughly one-third of global mining production thrown out in e-waste globally every year; ['Urban mining': UBC engineers say e-waste richer than ore pulled from the ground](#); [Can 'urban mining' solve the world's e-waste problem?](#) And

[http://www.savethehighseas.org/publicdocs/DSM-RE-Resource-Report\\_UTS\\_July2016.pdf](http://www.savethehighseas.org/publicdocs/DSM-RE-Resource-Report_UTS_July2016.pdf)



IMAGE: Participants at the Seabed Mining Forum in Namatanai, New Ireland Province, PNG calling for a Ban on Seabed Mining in PNG & The Pacific. June 8th, 2017.

## **New Zealand Seafloor mining decision deferred**

Simon Hartley, Otago Daily Times, 19 June, 2017

A decision on the controversial seabed mining application by Trans Tasman Resources has been extended several weeks by the Environmental Protection Authority (EPA).break. The body's decision-making committee advised last week it would be extending the deadline for delivering its decision to the EPA from June until July 27. The decision would be publicly released "as soon as practicable after that". In late April, anti-seabed mining groups Kiwis Against Seabed Mining (Kasm) and Greenpeace threatened the EPA they may yet seek a judicial review or court action over its handling



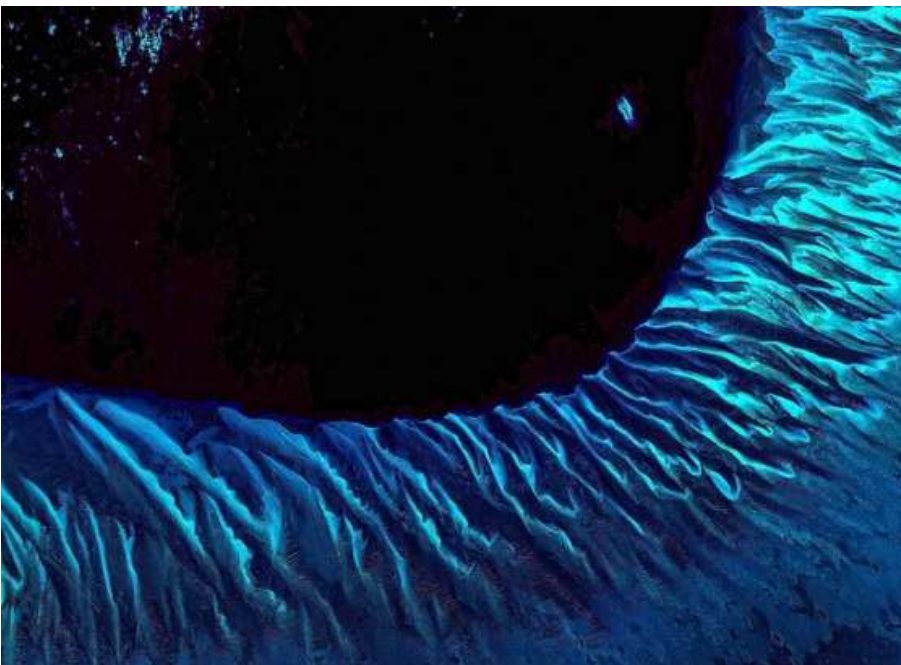
of Trans Tasman Resources' mining application. Trans Tasman's first seabed mining application was turned down in early 2014, but last August it reapplied to the EPA, seeking to mine five million tonnes of iron-rich sands offshore in the Taranaki Bight for export.

General manager of the EPA's EEZ applications team general manager Siobhan Quayle said time extension was made to allow preparation of a "fully reasoned decision" for all concerned parties. At issue for the environmentalists was the EPA having last September formally accepted Trans Tasman's application as "complete", but since then it had requested a wide range of new information for the application, which the groups claimed would leave it disadvantaged. The groups have said they rallied a record 17,000 submissions to the EPA against the application. Last November, Kasm and Greenpeace were successful in the Environment Court in overturning a decision by the EPA that would have allowed Trans Tasman to redact 190 pages of its application.

### **In the Depths of the Oceans, Human Activities Are Beginning to Take Their Toll**

Erik Vance, Truthout, June 13, 2017

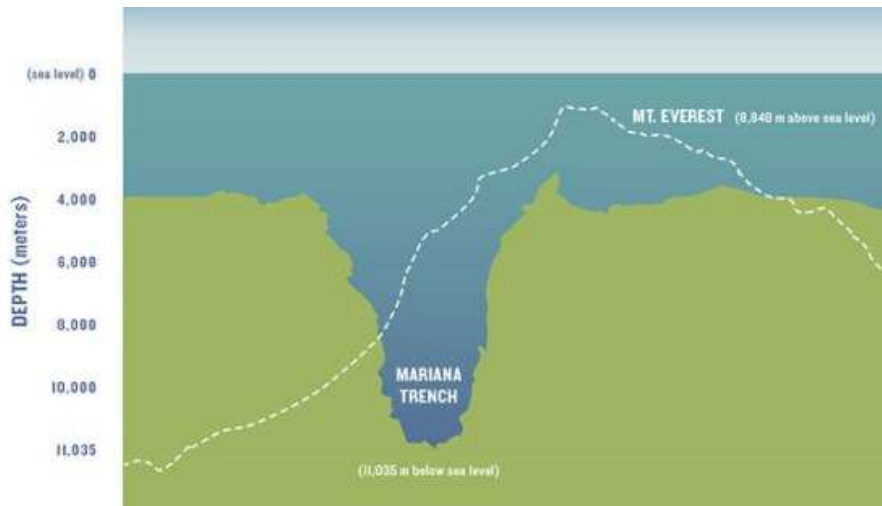
Imagine sinking into the deepest parts of the Central Pacific Ocean, somewhere between Mexico and Hawaii. Watch as the water turns from clear to blue to dark blue to black. And then continue on for another 15,000 feet (4,600 meters) to the seafloor -- roughly the distance from the peak of California's Mount Whitney to the bottom of nearby Death Valley. "As soon as you start to descend, all of the wave action and bouncing goes away and it's like you're just floating and then you sink really slowly and watch the light fade out through the windows and then you really are in another world," says Erik Cordes, a researcher at Temple University and frequent visitor to the deep ocean. Finally, you come to a stop 12,000 feet (3,700 meters) below the last bits of light from the surface. The water here is strangely viscous yet remarkably transparent, and the light from your flashlight extends for hundreds of yards.



Edited Landsat 8 image of one of the deep blue holes in the Caribbean Sea. Once seen as too remote to harm, the deep sea is facing new pressures from mining, pollution, overfishing and more. (Photo: Stuart Rankin / Flickr)

You are in the heart of the Clarion-Clipperton Fracture Zone, a region of the ocean seafloor roughly the size of the United States, populated by colorless invertebrates adapted in astounding ways to the sparse, crushing conditions found here. And all around you -- as far as the eye can't see -- are small,

spherical rocks. Varying from microscopic to the size of a volleyball, they look like something stolen from the set of "Gremlins" or maybe "Invasion of the Body Snatchers." And they're worth millions. Because inside these mysterious little eggs are untouched stores of copper, titanium, cobalt and especially manganese -- crucial for making anything from the steel in your car's frame to the circuitry that tells you how much gas is left in it. Some metals exist in larger quantities here than on all the continents of the world -- and you had better believe they have caught the eye of mining companies.



The deep ocean, which in some places extends farther below Earth's surface than Mt. Everest stands above, is facing threats from humans despite its remoteness. It's hard to draw a line exactly where the deep ocean starts. Starting at about 650 feet (200 meters), there's not enough light to support photosynthesis, and at around 3,000 feet (1,000 meters) there's no light at all. From there to the deepest spot, at the bottom of the 36,000-foot-deep (11,000-meter-deep) Mariana Trench between Japan and Papua New Guinea (deep enough to hold Mount Everest with New Hampshire's Mount Washington stuck on top of it) is loosely defined as the "deep sea." However it's defined, the deep sea today is a place of change. Human activities already are affecting it -- and are poised, as these mineral stores suggest -- to radically affect it even more in the decades to come. Attention we pay and decisions we make now could make all the difference in its fate.

### Mining the Depths

The mineral riches of this deep ocean are vast and nearly untouched for now. But that's changing as new technologies are allowing humans to access ever-deeper parts of the seafloor. Current mining strategies break down along two rough categories. First is nodule mining -- gathering up those bizarre seafloor billiard balls that have slowly collected minerals over the centuries as they trickled down like rain from above or seeped up from below and congregated around some central particle like rock candy around a string. There is no industry standard for sweeping up nodules so far below the surface -- about 4,000 to 6,000 meters (13,000 to 20,000 feet) -- though companies have proposed ideas as varied as deepwater vacuum cleaners and massive trawlers dragging across the seafloor. One 1985 study estimated 550 billion metric tons (610 billion tons) of nodules in the sea.

The second form of mining is targeted around sulfur vents and other types of seeps. These operations would be in shallower water -- 4,000 to 12,000 feet (1,200 to 3,700 meters) -- and look more like traditional mining operations scraping sulfur, phosphorus or precious metals from the sides of underwater ridges. So far, all of these projects are theoretical. Most of the permits currently granted for deep-sea mining are for nodules, but the first ones to actually break ground are likely to be around ocean vents. Nautilus Minerals, a Canadian company working off the coast of Papua New

Guinea, has begun implementing a project to mine gold and copper at a ridge about 5,000 feet (2,000 meters) below the surface and in April began receiving equipment.

Company executives have pointed out that they have passed environmental impact reviews and that their project is friendlier to the Earth than other mining operations because the ore is so rich they can get more of it by disturbing less of the soil. But scientists point out that [much remains unknown about what deep-water strip mining will do to the environment](#). In the case of ocean vents, there are some animals that may live only in that spot, and a single mine could wipe out entire species. In addition, both styles of mining would kick up potentially toxic plumes of ultra-fine sand that could travel hundreds of miles through a part of the ocean that has remained undisturbed for thousands of years. "They're going into new environments with a lot of environmental impacts," says Lisa Levin, an expert in the deep sea at Scripps Institute of Oceanography. "We are going to lose stuff before we ever discover it."

### **Climate Change and the Deep Ocean**

Because life in the deep ocean is more sensitive to change than in the shallows, the smallest shift in pH, oxygen or temperature can have huge effects. Thus, one of the most serious concerns about the deep ocean is climate change. According to Andrew Thurber, an assistant professor at Oregon State University, a quarter to a third of the CO<sub>2</sub> humans have released has gone to the deep ocean. Some of it gets absorbed into the water itself or turns to particulate, thus lowering the pH and oxygen levels, and some is buried and turned to stone, where it effectively neutralized and stored for millions of years. A quarter to a third of the CO<sub>2</sub> humans have released has gone to the deep ocean. Ironically, the deep ocean is one of the greatest mitigators of climate change as well, since it absorbs a massive portion of the Earth's heat and CO<sub>2</sub>. In fact, [one recent study](#) showed that the ocean is absorbing phenomenally more heat now than ever before -- about the same amount between 1997 and 2015 as it had in the previous 132 years. As a result, scientists are already seeing incremental temperature rise in the deep sea. Though less than at the surface, changes down there tend to represent more permanent ocean shifts.

### **Trickle Down Effects**

Then there is chemical pollution. While mining the deep sea might be new, polluting it is not. Recent studies have found toxic terrestrial chemicals like PCBs and PBDEs in the tissues of animals living in the deepest places on Earth. In fact, where once scientists assumed the deep ocean was rather isolated from the surface, new studies have shown that the two are closely connected and that material can pass quickly into the depths. The most spectacular example of this was the aftermath of the 2010 Deepwater Horizon oil spill on the Gulf of Mexico. It was assumed at the time that much of the millions of barrels of oil released by the faulty offshore drilling rig would float; they did not. It was assumed that the dispersant would neutralize the oil; in fact it was more toxic to deep sea corals than the oil itself. "The probability of an accident goes up with depth," and thus the potential for harming ocean life, Cordes says of deep-sea operations. "The deeper you go, the more stable the environment is; the more stable it is, the less those organisms can deal with changes."

Cordes studies all sorts of pollution effects beyond the reach of sunlight. He and colleagues published pioneering research looking at the first evidence of acidification in the deep ocean in the Gulf of Mexico and off the coast of Norway. He says it's easy to think of the deep sea as some kind of wasteland, while in fact it's brimming with life. "People don't realize that there are massive coral reefs all over the Gulf of Mexico, there's corals right off shore in California, there's corals up in New England," he says. To overload this system or tinker with it at all is to play with fire. "If we put something in the deep ocean, we pretty much can't clean it up," Thurber says. And we can't depend on the animals down there to adapt and clean up after us as they often do at the surface. Cordes says microbes at the surface can double their numbers in 12 hours; in the deep ocean it takes half a year. Because the generation time is so much slower, Thurber says, it takes decades for car-

bon-munching deep water microbes to battle, say, higher methane levels than the days or weeks it would take critters at the surface. Thus, our decisions around greenhouse gas emissions at the surface have now affected every ecosystem on Earth.

### **Permanent Decline**

And it's not just the microbes that grow slowly -- fish in the deep ocean also take their time. As a result, fishing is another threat to the deep ocean. With most normal, surface fishing practices, it's possible to manage a population such that what you take out is the same as what the population can replenish. But because fish found far from the surface grow slowly, some scientists have gone so far as to say that deep sea fishing is more analogous to mining than to fishing. The classic case of this is the common slimehead. The slimehead is a delicious, bulky, dark red fish found from 180 to 1,500 meters (590 to 4,920 feet) below the surface in many of the world's oceans. In the late 1970s, concerned that cod was on a permanent decline, seafood marketers in New Zealand began pushing slimehead under the more palatable name, orange roughy, because it turns orange after death.

Why this seemed like a good idea is a mystery. Slimehead spawn only 4 percent of the number of eggs as cod and take 20 to 30 years to reach maturity (rather than about two for cod). Within a couple decades the Australian government started reducing allowable harvest and then closing fisheries altogether as they tried to figure out catch limits that wouldn't decimate the creature. Some scientists now say there is no such number. One team estimated The New Zealand Ministry of Fisheries in 2009 estimated that a single 40-square-mile (100-square-kilometer) deep ocean fishery in the Pacific can only sustainably produce about 200 kilograms (400 pounds) of product per year. That's about 57 adult slimehead. But that particular fishery produces 8,000 metric tons (9,000 tons) of slimehead per year. A similar story is playing out in other slimehead fisheries across the world, as well as other deepwater creatures like grenadiers, sharks and toothfish (otherwise known as Chilean seabass).

### **Direct Connection**

In many ways, the deep sea truly is a new world waiting to be explored. But in our rush to exploit that new world, unless we think carefully about the impacts, we may find ourselves harming it before we even understand it -- with implications for ourselves. "[The deep oceans] are supporting these fish that we are depending on for food, they're helping to recycle nutrients that come back to shallow waters, fuel the productivity of the ocean, produce half of the oxygen we breathe," says Cordes. "We are directly connected to them."

## **Pacific Spotlights Sea Bed Mining at UN Ocean Conference**

PIANGO, SCOOP, 9 June 2017

Activists and representatives from prominent Pacific Island organisations, led by the Pacific Islands Association of Non-Governmental Organisations (PIANGO), are taking part in a high-profile side event at the United Nations (UN) Oceans Conference at UN Headquarters in New York today. PIANGO is the Pacific Organising Partner for the UN NGO Major Group at the Oceans Conference. The panel discussion, aptly themed "Voices from the Blue Frontier," focused on a more sustainable approach to the "Blue Economy" and shared community experiences from the world's first experimental deep sea mining project "Solwara One" in Papua New Guinea (PNG), highlighting environmental threats and rights violations of indigenous resource owners and local communities through deep sea mining. The panel is featuring prominent speakers such as the Secretary General of the Pacific Islands Development Forum (PIDF), Francois Martel; Executive Director of PIANGO, Emele Duituturaga; Human Rights Attorney, Julian Aguon; Sarah Thomas nededog, PNG Catholic Cardinal John Ribat and Fair Oceans Expert, Kai Kaschinski.

The side event is designed to provide a platform for engagement and knowledge sharing on the underlying science of seabed mining and to highlight the need for strong governance measures to ensure that appropriate social and environmental safeguards are in place to protect against projected adverse effects of seabed mining in the Pacific Ocean. “The United Nations Oceans Conference provides a further opportunity for multi-stakeholder participation and partnership building between governments, the private sector and civil society. This event is a demonstration of this inclusive approach and in particular, amplifies the voices of Pacific people, who have the greatest stake in the outcomes of the Oceans Conference,” Emele Duituturaga, Executive Director of PIANGO explained. “As Small Island Developing States, Pacific Island countries are particularly affected by these ocean developments. Our people rely largely on the ocean and marine resources for their livelihoods, while environmental pollution of oceans and climate change increasingly threaten existing economies.

“For many years, organisations of small-scale fishermen around the world have been fighting against ocean grabbing and the privatisation of fisheries resources. Deep sea mining is an example of such growth-oriented strategies and the unsustainable utilisation of marine resources. It disregards the rights of local communities and their livelihoods, and satisfies the resource needs of industrialised countries and emerging economies,” Ms Duituturaga said. “Deep sea mining is not a strategy for sustainable development of Pacific Island countries. Deep sea mining and the negative impacts of climate change are based on the same failed model of development. Both threaten the health of the marine environment that is of such vital importance for Pacific Small Island Developing States. We have repeatedly reiterated that we need to rethink prevailing development models and approaches and reshape the Pacific we want.” The Ocean Conference will result in a [Call for Action](#) that has been agreed to by countries, and which will be formally adopted at the conclusion of the Conference. Additional outcomes include the results of seven partnership dialogues that will focus on solutions, and the voluntary commitments to action.

### **This World Oceans Day, protect oceans from mining**

Payal Sampat, Earthworks, June 8, 2017

This week, delegates from around the world are meeting at the United Nations for the first UN Oceans Conference, to discuss the implementation of Sustainable Development Goal 14: the conservation of oceans, seas and marine resources. We are subjecting our oceans to a barrage of assaults, many of which we are all familiar with - rising temperatures, overfishing, acidification. Less well-known are the dual threats to oceans from mining: the ongoing pollution of marine ecosystems by mine waste and the irreversible harm to deep-sea ecosystems that would result from proposed deep-seabed mining.

### **Mining pollution**

Each year, mining companies dump more than 180 million tonnes of hazardous mine waste into oceans, rivers, and lakes worldwide. This is an out-of-sight, out-of-mind problem - mining corporations are using the cheapest solution to disposing of the massive amounts of waste generated at their mining operations. Earthworks has documented some of the egregious examples of marine mine waste disposal in a report, *Troubled Waters*. Mine waste dumping in oceans has led to reduced populations of fish and bottom-dwelling organisms in Indonesia and Papua New Guinea. In Norway, mine tailings are being dumped into designated national salmon fjords, which support huge fishing and tourism industries.





A girl in Papua New Guinea opposed to ocean mine waste dumping. Credit: Martin Wurt

### **Deep-sea mining**

Lurking around the corner is another serious threat to oceans from mining. Deep-sea mining is a high-risk, experimental industrial activity being proposed in one of the most fragile, unexplored areas of our planet. Companies from a number of countries – including the US, Canada, Australia, Japan, China -- are seeking to mine metals from cobalt crusts, manganese nodules, and hydrothermal vents on the seafloor. As yet, there are no viable deep-sea mining operations – but many companies and governments are actively lobbying for that to change.

A United Nations-established body, the International Seabed Authority, is charged with regulating and granting exploration permits for deep seabed mining in waters outside national jurisdictions. It is currently in the process of developing regulations for deep-sea mining - but to date, these have been far from protective, and quite insubstantial. Leading up to the UN Oceans Conference, ocean advocates from across the globe have joined to oppose deep-seabed mining given the threat it poses to vulnerable ocean ecosystems and species. A statement from Seas At Risk supported by 34 international organizations, including Earthworks, calls on the International Seabed Authority to halt the granting of contracts for deep-sea mining and to direct its energies to increased resource efficiency and sustainable consumption.

It's also time to protect our oceans by permanently banning the egregious and outdated practice of dumping mine waste into oceans. There are far more responsible ways to dispose of mine waste. Countries -- including Norway, Turkey, Papua New Guinea, and Indonesia -- must reject any new proposals that would dump mine waste into marine waters. And companies must publicly commit to taking this unsafe practice off the table once and for all.

### **Seabed mining threatens 'last frontier'**

PACNEWS/Pasifik, June 8, 2017

THE Solwara Em Laif Campaign has released a documentary as part of a series focusing on experimental seabed mining, an imminent venture in the Pacific. This documentary presents the situation

in Papua New Guinea. “Despite the experimental nature and a dearth of knowledge about hydro-thermal vents and deep sea ecosystems, Nautilus Minerals Inc. is already prospecting PNG’s Bismarck Sea with an aim to begin mining as early as 2019,” said a Pacific Network on Globalisation (PANG) spokesman. “This film highlights a general failure by authorities to incorporate sufficient environmental protections, as well as the norm of free, prior, and informed consent (FPIC) for indigenous peoples of the Bismarck Sea. “These are the voices of the guardians protecting the Last Frontier.” This documentary will also be featured to world leaders at the UN Ocean Conference currently under way in New York, at the Blue Frontier side-event.

### **‘Respect the ecosystem’**

June 6, 2017, The National Business

THE Lutheran Church of PNG opposes the proposed deep sea mining project in the country. Head Bishop Jack Urame said it was one of the church’s resolutions during the 2014 Karkar Synod in Madang. “The Lutheran Church is totally against the Government’s proposed seabed mining and we stand united with our sister Catholic Church in the country,” Urame said. “The creation of this universe is God’s free gift to humanity, we shouldn’t destroy the foundation of the ecological systems in the name of development and economy instead respect and manage the creation wisely.”

### **The role of transnational corporations and extractive industries in seabed mining, and the impacts on oceans health and food security**

PNG Mine Watch, 5 June 2017



The Reflection Group on the 2030 Agenda for Sustainable Development will launch its “Spotlight on Sustainable Development 2017” during this year’s High-Level Political Forum on Sustainable Development in July in New York. As an advance excerpt, the Group has published the Chapter on SDG 14 by Maureen Penjueli (Pacific Network on Globalization) on occasion of the Ocean Conference (June 5-9, 2017 at UNHQ, New York).

### **Introduction**

Despite the importance of a healthy Pacific Ocean, evidence is mounting that this unique ecosystem is in real danger from anthropogenic threats such as overfishing, habitat destruction, and pollution and probably the most severe threat of all, climate change and resulting sea level rise. The rush to mine the deep seas is representing the newest frontier of extractive industry and perhaps the biggest threat to the world’s oceans in the 21st century. There is a significant concern that seabed mining

has the potential to cause major environmental destruction to the entire Pacific Ocean and would seriously undermine the implementation of SDG 14, to conserve and sustainably use the oceans, seas and marine resources. The fact that the International Seabed Authority does not have an agreed policy on the sustainable management of seabed minerals yet, points to the significant global gap in oceans governance.

Link: [https://ramumine.files.wordpress.com/2017/06/spotlight\\_report\\_2017\\_-\\_ch14\\_-\\_advance\\_copy.pdf](https://ramumine.files.wordpress.com/2017/06/spotlight_report_2017_-_ch14_-_advance_copy.pdf)

**Seabed mining has no place in a future shaped by the 2030 Agenda for sustainable development.** Seas At Risk, Statement for the Ocean Conference United Nations, New York, 5-9 June 2017 via PNG Mine Watch, 1 June 2017



For more than a century we have ripped apart the land, exploiting it beyond its limits in our insatiable quest for gold, silver, copper, manganese, cobalt, nickel, rare earth elements and other minerals. Now the mining industry plans to move into the deep sea. With the risk for irreversible and significant environmental impacts, and socio-economic benefits that are uncertain and inevitably short term, deep-sea mining imposes a serious threat to global sustainability. Deep-sea mining has no place in the world's Agenda 2030 for sustainable development. The precautionary principle means we must prioritise sustainable alternatives and avoid locking our economy into this high risk technology. Alternatives to deep-sea mining are available, and can be found in the transition of economies towards more sustainable approaches. Reducing the demand for raw materials through better product design, sharing, re-use, repairing and recycling, the development of new materials, a transition to smart energy and mobility systems and structural changes in consumption patterns and lifestyles are key to the solution.

Up to 90% of the world's electronic waste is illegally traded or dumped. Every year in the EU, 100 million mobile phones go unused, less than 10% are recycled. This represents an enormous quantity of gold and other metals gone to waste. These figures indicate the huge potential of policies to increase resource efficiency world-wide, and the importance of focusing on e.g. urban mining instead of deep-sea mining. The Sustainable Development Goals (SDGs), and in particular SDG 12 "Ensure sustainable consumption and production patterns", and SDG 14 "Conserve and sustainably use the oceans, seas and marine resources" set the global frame for rethinking our economy. Unless we stop and think, we risk squandering one of our most precious ecosystems, which has a vital role to play in the health of our planet, for an obsolete dream of boundless growth. Seas At Risk, supported by the NGOs listed below, therefore calls:

- On the International Seabed Authority to end the granting of contracts for deep-sea mining exploration and to not issue contracts for exploitation;
- On the United Nations to make a strong link between SDG12 and SDG14 and to ensure the growth in demand for minerals is reduced through ambitious sustainable consumption and production policies worldwide;
- On the European Union to stop financing the development of deep-sea mining technology and invest instead in enhancing and implementing policies on the circular economy, resource efficiency and sustainable consumption; and
- On all countries to cease the sponsorship of exploration and exploitation licences in Areas Beyond National Jurisdiction and end the issuing of permits for deep-sea mining in their territorial waters.

## Background

The deep sea occupies 90% of the marine environment and functions as an important regulatory body of the biosphere. These habitats have distinct fauna with widely divergent ecological and life-history characteristics. Most species resident there have low productivity and are extremely vulnerable to human disturbance. The deep sea spans areas both within and beyond national jurisdictions, leading to complex governance frameworks. The unique features of this extreme, enormous, three-dimensional environment create the need for a specialised approach to its management. Juxtaposed against these reasons for caution, commercial interest in the potential for deep-seabed mining is growing rapidly. In the global quest for raw materials, the deep-seabed mining potential currently focuses on polymetallic sulphides, manganese nodules, cobalt-rich ferromanganese crusts, methane hydrates and phosphate.

There is however a widespread concern about the impact deep-sea mining will have on the ecosystems and habitats of the deep and how the practice can be managed. Sites of mining interest often include highly vulnerable marine ecosystems and biodiversity hotspots. Mining poses potentially significant risks both to the sites themselves and into the water column beyond, as indicated by the results of among others the EU funded MIDAS research project. These risks include irreversible ecosystem destruction, direct as well as indirect biodiversity loss from plumes and sedimentation, underwater noise and toxic pollution, to name but a few. Globally, some 1.2 million km<sup>2</sup> of seabed have already been licensed for exploration in the international portion of the seabed, potentially creating the largest mining operation the planet has ever seen and dwarfing anything comparable on land. The area is close to the size of Europe.

In Areas Beyond National Jurisdiction (the 'Area'), deep-seabed mining is governed by the International Seabed Authority, which was established under the 1982 UN Convention on the Law of the Sea (UNCLOS) to govern 'the Area', which is to be considered the Common Heritage of Mankind. In the Area, the ISA retains the right to issue exploration and exploitation licenses for mining. So far the International Seabed Authority has put in place 26 exploration contracts. Sponsoring states for International Seabed Authority exploration contracts are: Belgium, Brazil, Bulgaria, Czech Republic, China, Cook Islands, Cuba, France, Germany, India, Japan, Kiribati, Korea, Nauru, Poland, Russia, Singapore, Tonga, United Kingdom.

The International Seabed Authority has not yet issued any exploitation contracts. National governments have until now issued two deep-sea marine exploitation (or commercial mining) licenses: one by the government of Papua New Guinea (Solwara 1 project in the Bismarck Sea) and one by the governments of both Saudi Arabia and Sudan (Atlantis II project in the Red Sea). Mining has not yet started but plans for pilot mining are under way. A 2016 periodic review of the International Seabed Authority pointed to severe structural shortcomings in terms of its transparency and capacity, calling into question its ability to govern the Area effectively. As the global steward of the

world's ocean heritage the ISA must prioritise conservation of the deep sea, the rights of coastal communities and the rights of mankind as a whole.



## Ban deep sea mining: Church

June 1, 2017 The National Business

By LUKE KAMA

THE Catholic church is calling on the Government to ban deep sea mining in the country. President of the Federation of the Catholic Bishops Conferences of Oceania Cardinal Sir John Ribat and general secretary Father Victor Roche said such technology should not be tested in PNG waters. The 17 Catholic Bishops from PNG and one administrator from the Solomon Islands who attended their annual general meeting recently discussed the proposed seabed mining called Solwara One and Solwara Two close to the shores of PNG. “We were informed that the machines belonging to the company Nautilus have arrived already in Port Moresby and are ready to go ahead with the testings of technology for seabed mining in the waters of PNG,” Sir John said. “This will be the first of its kind for such technology to be tested in PNG and if successful, the actual seabed mining will be done in many parts of Pacific with the agreement of the different island countries and that is a great concern.”

He said responsible use of the environment and resources was a duty and task, for everyone. And the Catholic bishops support the coastal people and the groups who raised their voice to question the proposed seabed mining. “What kind of international agreement permits foreign companies to engage in practices and processes which in their own country are illegal? “The sea is a treasure for all and should never become a playground of exploitation. Seabed mining will cause direct physical destruction of the unique ecosystems and in terms of benefits, we have many mining operating on the land and the landowners, the people are still disadvantaged. “Now we are trying to dig from the sea and what guarantee of satisfaction and benefits will the people and the country reap to satisfy?”

## No to experimental seabed mining plans for Pacific, says PNG's Cardinal Ribat

Meredith Kuusa, TVWan News, Pacific Media Centre News Desk, 31 May 2017

Papua New Guinea's Catholic Church leader has given a resounding “no” to deep sea mining after returning from his visit to Germany. The Archbishop of Port Moresby Archdiocese, Cardinal John Ribat, was highly critical of the proposed plans of the Canadian mining company Nautilus for the Pacific. He spoke to a global conference as a representative for Oceania on the effects of climate



change in the Pacific. Cardinal Ribat was encouraged with the support he received when visiting the office of Chancellor Angela Merkel. He said the Catholic Church was against deep sea mining because it would cause destruction to the surrounding environment. He condemned the “shocking” robot machinery planned for the mining. He said it would also not contribute to coping with climate change.

### **Taranaki seabed mining would harm sea life, hearing told**

Eric Frykberg, Radio New Zealand, 25 May 2017



Busloads of people have been protesting outside the Environmental Protection Agency as the hearings have continued. Photo: RNZ / Robin Martin

Opponents of a proposal to mine millions of tonnes of iron sands from the Taranaki seabed have resumed their attacks in the final day of hearings on the project. Trans-Tasman Resources wants to dig five million tonnes of iron ore from the seabed every year for the next 35 years. Two lobby groups, Greenpeace and Kiwis Against Seabed Mining (KASM), want the scheme blocked by the Environmental Protection Agency. KASM representative Ruby Haazen told the EPA hearing this morning a plume of mined sediment would harm the sea and sea life. "Marine mammals is the most egregious example but the most fundamental example is the plume," she said. "The applicant knew how central it was, yet this hearing was delayed and thrown out of kilter by the need to re-run a worst case scenario, which for reasons we have canvassed was not worst case." Ms Haazen said the worst case did not stack up economically either. The company will make its final statement this afternoon.

### **NZ EPA must again refuse experimental seabed mining application**

KASM, Scoop, 25 May 2017

Trans Tasman Resources (TTR) had failed to provide the information on the impacts of seabed mining that the EPA used as a basis for refusing the company's first application in 2014, so there was no choice but to again refuse consent, Kiwis Against Seabed Mining and Greenpeace told the hearing today. After a four-month EPA hearing into TTR's application to mine 50 million tonnes of the South Taranaki Bight seabed every year for 35 years, KASM and Greenpeace gave their closing arguments to the EPA today. In 2014, the EPA gave clear directives as to the information that should be gathered before submitting a new application, the groups told the hearing. TTR did some new modelling on the sediment "plume" and economics, but that was all. "The other key areas for

work such as marine mammals, benthic and seabird studies had not been undertaken. It just wasn't done," KASM and Greenpeace lawyer Ruby Haazen told the hearing.

"The South Taranaki Bight is an area that has not been the subject of any in -depth scientific or environmental research. What we know has always been limited. [TTR] has attempted to convince us that there is in fact a lack of environmental activity in the area. "This thinking underpins the philosophy of the applicant in approaching this application and sums up how things have gone so wrong. She noted that this application was - and still is - the first of its kind, not just in New Zealand but internationally; its effects are new and unique, and the scale of the proposed application is large and unlike any carried out in New Zealand before. "The South Taranaki Bight is an environment that hosts an array of marine life, supporting some of the most threatened and rare species in the world and a feeding ground for seabirds, fish, marine mammals and a breeding ground for blue whales. This is only what we have found out so far."

"The evidence presented has demonstrated that from what we do know, this area may be much more significant than anyone previously thought," she said. The company had modelled the spread of the "plume" of sediment around the STB, but had withheld key data. There were not enough samples for any expert to be able to verify the company's claims that "flocculation" would reduce the effect of the plume. The so-called "worst case scenario" modelling that the EPA sent the company back to carry out was nothing like the "worst case" – and cannot be verified. "Enormous uncertainties remain, not only on the worst case plume model but on the effects of the model presented as worst case, on primary productivity, the benthos, marine mammals and seabirds."

Despite what the EPA said in its 2014 decision, TTR hadn't done any further marine mammal surveys for this second application, and even then those surveys were only between the mine site and the shoreline. This contrasted with evidence given by blue whale expert Dr Leigh Torres, who confirmed to the hearing that many blue whales had been seen in the South Taranaki Bight, and that her research confirmed that the Bight may be host to New Zealand's own population of blue whales. Nobody really knew what the effect of noise from the mining would have on marine mammals, including the whales. "The underwater noise predictions are inadequate and insufficient as a basis for a biological risk assessment. Insufficient information is available at this time to estimate the noise levels that would be experienced by marine mammals in the area." The EPA decision is due around the end of June.

## CEO explains undersea mining

May 25, 2017, The National Business



CEO Mike Johnston



- First project: Solwara 1
- Bismarck Sea
- 1600 m depth
- 30 km from nearest coast
- Small extraction area: 0.11 km<sup>2</sup>

A map of the area where the Solwara 1 Project will take place.– Metal News pic



The Production Supply Vessel being built in China for the Solwara 1 project.  
–Picture supplied by Nautilus Minerals

*THE first undersea mining in the country will take place in New Ireland and operated by Nautilus Minerals. Chief executive officer MIKE JOHNSTON explained to The National's Business Editor SHIRLEY MAULUDU the nature of the project. He also discussed environmental aspects of the project.*

**MAULUDU:** Tell us briefly about the company Nautilus Minerals.

**JOHNSTON:** Nautilus is listed on the Toronto Stock Exchange and is the first public company to explore the deep ocean floor the world's future mineral resources. Nautilus was granted the world's first exploration licence for deep sea mineral resources in 1997. Our first mining lease and environment permit were granted in 2009 and 2010 respectively.

**MAULUDU:** Tell us about the Solwara 1 project in New Ireland.

**JOHNSTON:** The Solwara 1 project is located in the Bismarck Sea, Papua New Guinea, 30 kms from the coast of New Ireland and 1600 meters below the surface. The project uses technologies from the offshore oil and gas industry, and terrestrial underground mining to produce high grade copper and gold. The planned extractions area is very small at 0.1 km<sup>2</sup>. Additional benefits include that no tailings are produced, no landowners are required to be moved, and there is no impact from mining above 1300m water depth. The project is being developed in partnership with the PNG Government. It is fully permitted and has strong local and national support.

**MAULUDU:** Which communities, wards or the district in New Ireland will be directly impacted by the project?

**JOHNSTON:** As Solwara 1 is located at 1,600m water depth in the ocean, 30km from land, no one is directly impacted by the project. There is also no requirement to clear land, and no impact on tuna or coastal fisheries. An area known as the "Coastal Area of Benefit" (CAB) has been established by the provincial and national governments, where communication and community benefit programmes are focussed. The CAB comprises seven wards on the west coast of New Ireland. Only last week, Nautilus, in partnership with the NIPG, and with the assistance of Abt Associates and the New Ireland Provincial Health Authority, completed a health patrol and data collection programme (began in Oct 2016). The team estimated during this programme that they saw 7000-plus patients, out of a population of around 8500. These programmes will be ongoing.

**MAULUDU:** What sort of tools will be used to carry out the mining?

**JOHNSTON:** The production system uses existing technology from the offshore oil and gas sector, combined with rock cutting and materials handling technologies used in land-based operations.

The three main components of the Seafloor Production System are:

- 1 Seafloor Production Tools comprising auxiliary cutter, bulk cutter and collecting machine;
- 1 riser and Lifting System; and,
- 1 Production Support Vessel.

The mining tools cut the rock material, which is then transferred to the Production Support Vessel as a "sloppy slurry" via a very large pump and steel pipe (riser) system. On board the vessel the high grade rock is separated from the water by gravity methods. The resulting rock is stored in the ship's hull, to be later transfer to a bulk cargo vessel, then shipped directly to China.

**MAULUDU:** How will the minerals be mined from under the sea?

**JOHNSTON:** Rock is cut on the seafloor by the AC and the BC, and then pumped to an adjacent stockpile area. The third machine, CM, then collects the cut material, sucking it up and transferring it as seawater slurry to the main pump, situated at the bottom of the steel riser system. The riser system comprises a rigid steel riser pipe supported from the vessel which delivers the slurry to the surface. The large subsea pump is situated at the bottom of the riser pump, just off the sea floor. The entire riser and pump system is suspended directly beneath the support vessel. On the deck of the Production Support Vessel, the slurry is dewatered using gravity. The solid material is stored temporarily in the PSV's hull, and then discharged to a transportation vessel moored alongside. Filtered seawater is pumped back to the seafloor through the riser pipes and provides hydraulic power to operate the RALS pump. Discharge of the return water at the seafloor from where it came eliminates mixing of the water column, and minimises the environmental impact of the operation.

**MAULUDU:** What minerals in particular will Nautilus be mining for?

**JOHNSTON:** Copper and gold.

**MAULUDU:** Environmental issues have been raised by individuals, groups, regarding the Solwara 1 project. How will Nautilus avoid causing any impact on the environment within which it will operate?

**JOHNSTON:** There are many significant environmental benefits to mining in the deep sea. And our systems try to use these benefits as much as possible. These include effectively no mine tailings, minimal pre-stripping of sediment, low fresh water needs, no vegetation stripping or fresh water catchment issues, minimal rehabilitation costs with no permanent on-site infrastructure such as roads, power lines, buildings and so on. At Solwara 1 we were able for example to design our riser system as a fully enclosed pump and pipe system to extract the mineralised material from the seafloor. There is no mixing of the water column and there is no impact from mining shallower than 1300m water depth at Solwara 1 (more than 1000 meters below where most tuna, whales etc live)

**MAULUDU:** How is Nautilus doing with its awareness programme in educating the impact communities on the nature of the project?

**JOHNSTON:** Nautilus has always and continues to ensure that the communities located closest to its Solwara 1 Project (and the wider community in PNG) are fully informed about the Solwara 1 Project. During the development of the Solwara 1 Environmental Impact Statement (EIS), we visited a number of villages and towns in PNG to ensure the views and concerns of local communities were heard. The specific villages and towns were determined in consultation with PNG national and provincial governments. Our commitment to the community does not end with the completion of the EIS or granting of the Environment Permit. Community engagements have continued to take place since the Environment Permit was granted by the then Department of Environment and Conservation (DEC) in December 2009. Representatives from the national and provincial governments accompany Nautilus Minerals during these community engagement campaigns. To date, Nautilus Minerals has recorded the attendance of around 30,000 people at engagements/awareness campaigns held in 46 locations within PNG. Both numbers are still growing. We plan to continue with our community engagement campaigns in New Ireland and East New Britain as we move into the operations phase of the project. We have and will continue to focus our engagement programme on the villages located nearest to the Solwara 1 Project site, the CAB. This area covers the communities who have the greatest interest in understanding the project and this will be where many of our CSR programs will be implemented.

**MAULUDU:** Give an update on the progress of the Solwara 1 project.

**JOHNSTON:** Nautilus has taken delivery of the Seafloor Production Tools (SPTs). They are currently undergoing submerged trials in PNG. The Riser and Ancillary equipment is completed and currently in storage. The Subsea Slurry and Lift Pump is completed and Nautilus will take delivery of it later this year. The Production Support Vessel is currently being built in China and is progressing to schedule.

### **Methanhydrat: China zapft neuartige Energiequelle am Meeresgrund an**

*Methanhydrat gilt als möglicher Energieträger der Zukunft. Das brennbare Eis schlummert massenhaft in den Ozeanen. Nun melden China und Japan fast zeitgleich einen Durchbruch.*

Von Christoph Behrens, Süddeutsche Zeitung, 21. Mai 2017

China und Japan ist es nach eigenen Angaben gelungen, Methanhydrat am Meeresgrund abzubauen - eine fossile Ressource, die in rauen Mengen in den Ozeanen und Eiskappen des Planeten gebunden ist und als Energieträger der Zukunft gehandelt wird. Von einer Bohrinself im südchinesischen Meer aus sei der Rohstoff in einer Tiefe von 1266 Metern gefördert worden, gab die Nachrichtenagentur Xinhua diese Woche bekannt. Es sei das erste Mal, das China die Ressource sammeln konnte. Japan meldete vor zwei Wochen einen ähnlichen Durchbruch beim Anzapfen von Methanhydrat vor der eigenen Küste.

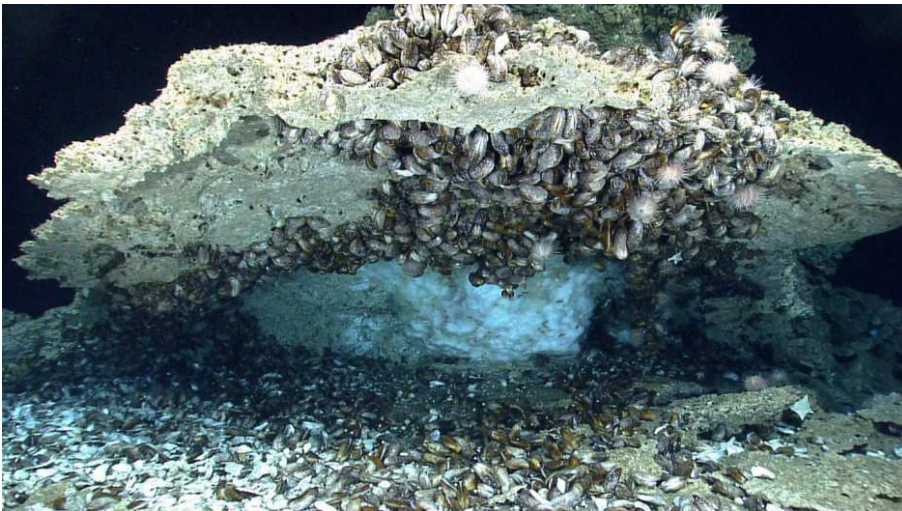


Damit rückt die Erschließung eines Rohstoffs näher, dessen Vorräte die von konventionellem Öl und Gas deutlich übersteigen. Methanhydrat wird auch "brennbares Eis" genannt, weil sich die schneeartigen Klumpen bei Raumtemperatur anzünden lassen. Der Stoff ist eine Mischung aus Wasser und Methan, dem Hauptbestandteil von Erdgas. In Form von Methanhydrat bilden die Wassermoleküle eine Art Gerüst und umschließen das energiereiche Methan. Nur bei hohem Druck und tiefen Temperaturen ist der Stoff stabil, er findet sich daher vor allem im Sediment des Meeresbodens oder im Permafrost der Arktis. Auch im gefrorenen Boden des tibetischen Plateaus werden große Mengen Methanhydrat vermutet.

### **Bis zu 28 Milliarden Kubikmeter Methan sind im Eis komprimiert**

Für China ist die Erschließung der Ressource von hoher strategischer Bedeutung. Das Land verfügt kaum über eigenes Erdöl; Schiefergas mithilfe von Fracking zu gewinnen, ist aufgrund der komplexen geologischen Verhältnisse schwierig. Die Methanhydrat-Bohrungen südöstlich von Hong Kong nannte der Minister für Ressourcen Jiang Daming nun "einen großen Durchbruch, der zu einer weltweiten Energierevolution führen könnte". Insgesamt fördern die Chinesen laut Xinhua bei den derzeitigen Probebohrungen täglich etwa 16 000 Kubikmeter Gas vom Meeresgrund.

Verglichen mit den japanischen Bohrungen "haben die chinesischen Wissenschaftler sehr viel mehr Gas bei ihren Anstrengungen gewonnen", sagte der Chemieingenieur Praveen Linga von der nationalen Universität Singapur der BBC. Dies sei "ein großer Schritt" bei der Entwicklung der Technologie. Die USA, Japan, Indien, Südkorea und Kanada verfolgen ebenfalls Forschungsprogramme, um die Ressource abzubauen. Das US-Energieministerium schätzt, dass weltweit zwischen 2800 Billionen und 28 000 Billionen Kubikmeter Methan zusammengepresst im Eis schlummern. Zum Vergleich: 2015 wurden weltweit etwa 3,5 Milliarden Kubikmeter Erdgas produziert, also weniger als ein Tausendstel der Methanhydrat-Vorräte.



Gashydrat-Vorkommen in 1000 Meter Tiefe im Golf von Mexiko unter einem mit Muscheln bewachsenen Felsen: Viele der Vorkommen liegen in ökologisch empfindlichen Regionen. (Foto: United States Geological Survey (USGS))

Allerdings widersetzt sich die neuartige Ressource bislang einer kommerziellen Gewinnung, die Bohrungen bewegen sich noch auf der Ebene der Grundlagenforschung. Nur ein kleiner Teil des brennbaren Eises liegt in einfach erreichbaren Schichten am Meeresgrund oder in arktischem Sandgestein. Das meiste ist dagegen zu flüchtig, niedrig konzentriert oder tief gelegen, um technisch interessant zu sein. Auch wissen Geologen bislang nur sehr wenig darüber, wie sich Methanhydrat verhält. Bei Störungen reagiert der Stoff jedenfalls äußerst sensibel. Wird die Gitterstruktur zerstört, so kann das enthaltene Methan leicht verloren gehen.



Dieser Mechanismus birgt vermutlich auch neue Risiken. So führen Geologen einen zerstörerischen Erdbeben vor 8000 Jahren auf Methanhydrate zurück. Vor der Küste Norwegens bildete sich damals eine bis zu sechs Meter hohe Flutwelle. Forscher vermuten, dass eine explosive Freisetzung von Methangas am Erdboden die prähistorische Naturkatastrophe auslöste. Im Fachjournal *Nature Communications* berichteten Materialwissenschaftler kürzlich, dass eine menschengemachte Störung der Eiskristalle wohl ähnliche Kräfte freisetzen könnte. Dazu kommen Risiken für die Umwelt: Wie die Tiefseebohrungen die Ökosysteme am Meeresgrund beeinflussen ist bislang unbekannt. Klimaforscher fürchten zudem, dass eine Erwärmung der Ozeane auch das Methan-Eis zum Schmelzen bringen könnte und das entweichende Gas die Erderwärmung noch anheizen könnte. Zumindest diese Gefahr ist laut einer aktuellen Analyse der US-amerikanischen Akademie der Wissenschaften aber gering: Das gashaltige Eis schmelze zwar an einigen Orten, doch das Methan verteile sich hauptsächlich im Ozean, statt die Atmosphäre zu erreichen.

### **Shifting sands: Why seabed-mining dredges up such opposition**

By Rebecca Howard, New Zealand Listener, 20 May, 2017



The South Taranaki Bight at Kaupokonui. Photo/Alamy

A second application for what would be the first seabed-mining permit in New Zealand is meeting heavyweight opposition from iwi, environmentalists and oil and gas interests. The battle lines are again being drawn in the black ironsand of the South Taranaki Bight as Trans-Tasman Resources (TTR) makes a second bid for permission to mine a remote piece of seabed off the west coast of the North Island. TTR, which describes the ironsand deposit as “world-class, with enormous, and currently untapped, economic benefit for New Zealand”, gained early government agency backing when it first began talking up the project in the late 2000s. Those opposed argue that the venture will do irreparable damage to the local environment and any benefits do not outweigh that cost.

In 2007, the company began investigating the deposits, most of which lie more than 20km west of Patea, within the 200km Exclusive Economic Zone (EEZ). Its aim is to excavate 50 million tonnes of seabed material a year and process it for export into up to five million tonnes of iron ore annually for 35 years. It is a seabed-mining version of the Taharoa ironsands export business, which has operated since the 1970s and was sold to Maori interests last month. The material is mined using a slow-moving crawler, which creeps along the seafloor “vacuuming” up sand and seawater and pumping it to a vessel. The iron ore is magnetically separated and the residue sand, about 90% of the total, is immediately redeposited.

“It’s not sucked up, held on a ship for days and then put back. This is a continuous dredging operation where it’s coming in the front and going out the back while we’re mining,” TTR chairman Alan Eggers told the committee hearing TTR’s second application for a seabed-mining consent. No chemicals are added and the iron ore never comes ashore; it is pumped straight to purpose-built vessels. TTR says this method of extracting ore is much cheaper than land-based mining. That insulates the venture from fluctuations in global ore prices, which tanked two years ago but have recovered somewhat lately. The project, which the company estimates could make about \$400 million in annual iron-ore sales, will cost US\$550-600 million (\$790-860 million) to develop. The company says the vast majority of the redeposited sand will settle back on the seabed, filling areas already dredged. However, the process will form a “plume” in the water column, which will drift depending on tides, ocean currents and general weather conditions in an often turbulent part of the Tasman Sea.

The potential environmental impact of this plume was the reason TTR failed at its first attempt to be granted what would have been the first seabed-mining permit in New Zealand. In 2014, a committee appointed by the Environmental Protection Authority ruled that the effects of the proposal were too difficult to gauge on the evidence available. Under the terms of new and previously untested law governing the EEZ, that was grounds for rejection. TTR, which has so far invested more than \$70 million, decided not to appeal the original decision but rather submit a new application, which required a new committee. That second hearing has been under way since mid-February. Opponents, including environmentalists, local iwi, Maori organisations, parts of the fishing industry and the Australian owner of the Kupe oil and gas field, Origin Energy, say TTR has failed to provide enough new evidence in the latest bid and there are still too many unknowns.

“TTR’s most recent application is simply the same old car with a new lick of paint,” said Robert Makgill, a lawyer for the fisheries submitters. In a joint submission, Greenpeace and Kiwis Against Seabed Mining (Kasm) said the application “in no way overcomes the reasons the first application was denied”. According to TTR, however, it has undertaken “significant new work to substantially improve knowledge of both the existing environment and the extent of the potential effects arising from the sand-dredging operations”. This evidence demonstrates that the effects of the proposal on both the marine environment and existing interests are “generally very small to negligible”, the company said. However, expert witnesses for the project’s opponents take issue with the way the results of TTR’s modelling were interpreted, and the new committee asked TTR to provide more worst-case scenarios.

### **Danger to marine life**

Ironsands support little marine life, but a plethora of opposition experts say the area covered by the application is home to creatures ranging from tiny organisms living in the bottom sediments to blue whales and the critically endangered Maui’s dolphin. Experts for TTR claim there is a low likelihood of marine mammals being present in the proposed mining area. There was “nothing to suggest that the mining area is of any significance to any marine mammal species”, said scientist Simon Childerhouse of Blue Planet Marine New Zealand. His view was disputed by zoology professor Liz Slooten, who blasted TTR for “poor information”, including an incomplete species list and a lack of data about the effect of noise. “There is no way that we can estimate the number of individuals of each species that might be affected by noise, through physical injury or behavioural disturbance, or that might be impacted by other effects from the mining operation,” she said. Debbie Ngarewa-Packer of Te Runanga o Ngati Ruanui Trust told the committee that “there is too much uncertainty”.

Origin, concerned with the potential impact on its own offshore operation, hasn’t seen “sufficient difference” in TTR’s new evidence to justify a different result for this application and worries particularly about the potential for a collision at sea. Origin and TTR have agreed conditions if consent

is granted, but “we would prefer not to have TTR operating in our area”, said Origin’s Martin Aylward. The committee, headed by former Wellington deputy mayor Alick Shaw, has extended its deadline from the original April 13 to May 31, citing “a number of evidential matters still to be addressed”. Even that decision was fraught with controversy: submitters argued that the company had failed to dispel any of the uncertainties and should not be given more time to do so. Greenpeace and Kasm argued the committee should have “returned the application as incomplete” and said it is crucial that the next closing submissions be final. Fisheries and iwi submitters say they will not bear the additional cost and effort “to address information gaps in TTR’s application during this hearing”. Greenpeace and Kasm may apply for a judicial review of the TTR bid, arguing the process is flawed. The critical question for TTR may be whether scientific uncertainty can ever be sufficiently dispelled for a new activity in a little-understood ocean environment. If the answer is no, it won’t be dredging any time soon. **This article was first published in the May 13, 2017 issue of the New Zealand Listener.**

### **New Zealand seafood companies, iwi slam EPA over seabed mining application**

Undercurrent News, May 16, 2017

Seafood companies have slammed the New Zealand Environmental Protection Authority’s (EPA) handling of the application to mine for 35 years 50 million metric tons of iron sand from the ocean floor off the coast of Taranaki. The application by Trans-Tasman Resources (TTR) is opposed by Fisheries Inshore New Zealand, the New Zealand Federation of Commercial Fishermen, Talley’s Group, Southern Inshore Fisheries Management, and Cloudy Bay Clams. A range of environmental groups have also submitted opposition to the bid. TTR’s first application was refused in June 2014 after a decision-making committee appointed by the EPA found the application was premature and more time should have been taken to understand the proposed operation, its effects on the receiving environment and existing interests. “TTR’s latest application is almost identical to the first, and does not address the EPA’s key reasons for refusing TTR consent in 2014,” Fisheries Inshore New Zealand’s chief executive, Jeremy Helson, said.

“TTR’s 2014 application was refused due to inadequate information, and adverse effects on the environment and existing economic activity. It is hard to understand why the EPA allowed TTR to resubmit a largely unchanged application,” Helson added. TTR’s latest application, lodged with the EPA in August 2016, has been dogged with controversy from the start, as the TTR sought to withhold information on the effects of the sediment plume from the public for reasons of commercial sensitivity, said the release. The EPA’s decision to approve this withholding of information was overturned by the Environment Court, on the application of the seafood industry, iwi and environmental groups.

TTR has a responsibility to provide robust information to support its application. Its failure to do so has seen the EPA directing those opposing the application to fill in the gaps, said the complainants. “The extension of the process and continued re-submission of evidence has resulted in submitters incurring unreasonable costs to address the deficiencies in TTR’s application.” The hearing began in February and was initially to have ended on April 12. Instead the EPA extended the hearing to May 31 to address further questions concerning the information provided by TTR in support of its application.

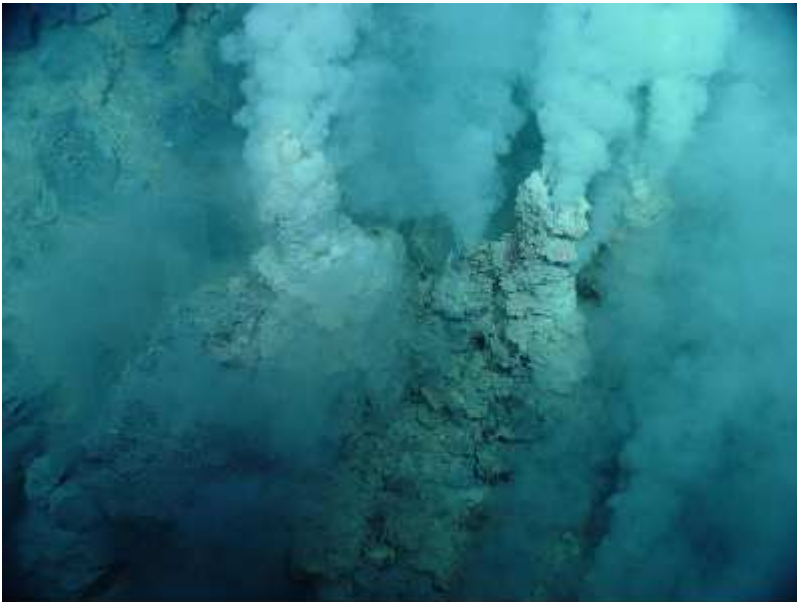
## Cook Islands Earns More Than \$62,000 From Deep Sea Minerals Agreement

*American company pays \$8,000/month to reserve first right to apply for exploration licence*

By Rashneel Kumar

RAROTONGA, Cook Islands (Cook Islands News, May 15, 2017) – Cook Islands have already earned more than \$90,000 [US\$62,000] from one deep sea minerals agreement signed in 2016 with an American company to give them reserved rights in certain deep seabed areas within the country's Exclusive Economic Zone. In September last year, the Cook Islands led by Natural Resources and Minerals minister Mark Brown signed an agreement with Ocean Minerals (OML) to have the first option to explore and prospect for rare earth elements (REE) in certain high-value deep sea mineral areas. The draft agreement was approved by Cabinet before it was signed. In the agreement, the Houston-based company now has a five year right to one reserved block of 11,000km<sup>2</sup> in the Cook Islands EEZ to one day explore for the elements that are now known to be found in the sediments of our deep ocean floor. No actual seabed licence has been issued to OML at this stage.

In return for this reserved right, the company agreed in the signed agreement, approved by Cabinet, to pay the Cook Islands the sum of US\$8000 (\$11,681.86) per month for five years or until they apply for an exploration licence over that reserve block from the Seabed Minerals Authority. Also under the contract, the company has to provide internships and training opportunities to suitable Cook Islanders and contribute to an awareness programme to inform the community about their project. According to the Seabed Minerals Authority Commissioner Paul Lynch, the company is now seeking to attract the large capital investment needed to apply for the exploration licence. Therefore, he said under the agreement, the Ocean Minerals has a “holding right” and while it gets organised for exploration, it is required to pay the agreed amount every month to the Cook Islands Government, via its commercial entity, the Cook Islands Investment Corporation.



**Photo: Pacific Ring of Fire 2004 Expedition.  
NOAA Office of Ocean Exploration;  
Dr. Bob Embley, NOAA PMEL, Chief Scientist**

“The time is ticking on them. They have got to apply for exploration licence within five years and have it all completed within seven years. So until then that US\$8000 keeps coming in,” Lynch said. “And if they are unable to make an application right to their maximum seven years, without even giving the licence away, we will get about a million dollars just under the existing agreement. “The Government is already receiving this seabed revenue even without granting any licence. So this is quite a positive progress for our seabed minerals sector. It is separate from the nodules resource and

is focused on exploring for valuable REE in our deep sea sediments.” China controls about 90 per cent of global REE, which is used in many devices that people use every day such as computers, rechargeable batteries, cell phones, catalytic converters, magnets, fluorescent lighting and much more.

It is also used in the security forces for night-vision goggles, precision-guided weapons, communications equipment, GPS equipment, batteries, and other defense electronics. REE are also key ingredients for making the very hard alloys used in armoured vehicles and projectiles that shatter upon impact.

China’s control over the REE through land mining in Mongolia has disadvantaged other nations who are looking at other avenues to extract these rare earth elements. Lynch said the country’s deep sea minerals resource may be a viable addition to the global REE market, from which the Cook Islands can benefit. He said the United States Department of Defence has granted almost a million dollars to Ocean Minerals to investigate the recovery of the REE from other sources apart from China’s resources. “We were able to initiate the proposal between the Government and Ocean Minerals during an overseas seabed minerals conference in 2015,” Lynch said. “They visited and were referred to the relevant authorities in our country. Ultimately the draft agreement was approved by Cabinet after vetting by MFEM, Crown Law, Foreign Affairs and the Seabed Minerals Authority. “We were not even really looking at or set up then for sediments or REE. Our regulatory framework that finished in 2015 was really set up for the manganese nodules then. But a 2015 amendment to the 2009 Seabed Minerals Act granted a new power to the Minister to reserve Blocks for special national strategic purposes. And CIIC were the legal government entity to execute the agreement on our nation’s behalf.

“Currently as a nation, we are focused on the exploration phase of our deep sea minerals sector for the next say 3-5 years. One of the reviews that will take place before any possible extraction could happen is that we are going to ensure that we get the benefit if any extraction might happen. Not just from the nodules but also of the sediments under the nodules for REE. “We have got to have the full suite of regulations in place so that nothing gets taken without us benefiting.” Lynch said OMI chose the area based on Scripps’ and SPC report done in the 1970-80s which showed an abundance of REE in a specific area in the Cook Islands waters. “They also realised there were few other areas of interest. So the Cook Islands Government said ‘you can’t have all of them but you have the first right for these other blocks. But if another applicant comes and wants that block for nodules, then you will have to decide where you will have your one reserve block’. “They will only occupy one block at any time until an exploration application is made under the SBM Act.”

Lynch said Ocean Minerals was already teaming up with expert New Zealand companies to carry out a Resource Assessment to validate the earlier reports produced on REE in the Cook Islands EEZ. Cook Islander Thomas Whiddon, a young marine geologist, has been contracted to assist on that work in New Zealand. He said the company can then use that report to attract potential investors to carry out exploration and possibly extraction in the future. “We will only be able to make the decision on the extraction once they finish the exploration work. Then we can see whether there is anything economically worthwhile to sustainably harvest from our deep seabed. “And during OML’s anticipated five year exploration programme, they have to take suitably qualified Cook Islanders on the vessels and also share the data with us so we can see the potential impacts of it to our seabed.”

Lynch said usually in the minerals sector globally, in the exploration phase, the resource owner does not receive much revenue. But he said they would most likely earn some “real money”, employment, training and benefits, when the extraction phase begins, which is expected in the next 8-10 years. He said the Cook Islands has a rigorous licencing process for seabed minerals. This includes a multi-stakeholder consultation process, and Environmental Impact Assessment process and



report, among other things, before they would consider allowing companies to extract resources from the deep seabed mineral zones, north east of Aitutaki. “One economic challenge for the Cook Islands is, we don’t have enough economic opportunities. We have a growing tourism sector, but we need to diversify our income sources.

“The reason our various government’s have progressed seabed minerals is that this new sector can be an alternative revenue source because the tourism industry can be very fickle. “There is a big risk for any nation in putting all its economic interests into one basket. So for us, seabed minerals sector revenue is a possible addition to our national budget in the future, from our own resources. So we must manage this opportunity well as every opportunity carries its own risks and challenges. “So what we are doing now is setting up a possible viable industry here for the future. But at least even now we are already getting some significant national revenue from our seabed minerals sector, before even issuing any exploration licences.”

### **Company confident PNG seabed mining project on track**

*A Canadian mining company says it is confident that a controversial seabed mine will be operational off Papua New Guinea in 2019, as planned.*

Radio New Zealand, 15 May 2017



Mining for copper under the sea Photo: Nautilus Minerals

There have been ongoing concerns about what the impact the Solwara 1 project off the coast of New Ireland Province will have on the environment and local communities. Nautilus Minerals was granted an environmental permit in 2009 to develop the mine, but it is still yet to be built. Nautilus chief executive Michael Johnston said the company has conducted robust consultations with a range of groups about the impact of the mine, and he says these had been factored into their planning process. He said the company had run various hearings and workshops in New Ireland, Kokopo, Rabaul and Port Moresby and any issues that were raised at the meetings were recorded and, where appropriate, were attached as conditions to the company's licences. "I know NGOs around countries like Australia and New Zealand jump up and down about free and prior informed consent, but you actually have a system in PNG where it's actually obtained."

There had been concerns raised about the process mixing the water column and the potential for it to cause plumes, but Mr Johnston said that the mining process had been designed so that this wouldn't be an issue. "We designed our system taking that on board and have a system where we take the water up on to the vessel, separate the ore-bearing material. It then goes through a de-watering plant

which is basically a series of screens, cyclones and eventually filters to remove the ore material and we filter it to 8 microns and then the filtered water is then returned in pipes." He said that the technology the company would use, was not new, and been used the the oil and gas industry for years. "Deep water is anything over about 2000-25000 m. The machines that we are deploying are basically a modification of oil and gas of an oil and gas trenching machine." The company is confident the project will be on track to start extracting ore in the first quarter of 2019, he said. "So that's the budgeted first ore date and we're tracking to that schedule at the moment so I don't see any reason why it won't achieve it."

### **Nautilus completes US\$2 Million Private Placement**

TORONTO, ONTARIO--(Marketwired - May 11, 2017) - Nautilus Minerals Inc. (the "Company" or "Nautilus") announces that it has closed its previously announced private placement pursuant to its financing notice dated April 19, 2017, delivered under the Company's subscription agreement with Mawarid Offshore Mining Ltd. and Metalloinvest Holding (Cyprus) Limited (together, the "Investors") dated August 21, 2016, as amended. At the closing, the Company issued an aggregate of 11,197,488 common shares to the Investors at an issue price of C\$0.239 per share for aggregate proceeds to the Company of US\$2,000,000. The private placement was allocated equally between the two Investors. The private placement forms part of the up to US\$20 million financing approved by the Company's shareholders at the extraordinary general meeting of the Company held on October 26, 2016.

### **Nautilus Minerals announces financial results for Q1 2017**

TORONTO, ONTARIO--(Marketwired - May 10, 2017) - Nautilus Minerals Inc. (the "Company" or "Nautilus") announces the release of its unaudited consolidated Financial Statements for the first quarter ended March 31, 2017, together with Management's Discussion and Analysis.

#### 2017 Significant Events to date

- Received US\$4 million through the US\$20 million bridge financing facility provided by the Company's two largest shareholders.
- Announced the arrival of the Seafloor Production Tools (SPTs) in PNG.
- Announced the arrival of the LARS and ancillary equipment to the Mawei shipyard in China.
- US\$19.5 million in cash and cash equivalents as at March 31, 2017.

Mike Johnston, Nautilus' CEO, commented, "It was very pleasing to see the SPTs arrive in PNG where they will undergo submerged trials in the coming months. We now remain focused on the build of the Production Support Vessel and the integration of the rest of the equipment on it. Subject to further financing, we remain on schedule to develop the world's first commercial high grade seafloor copper-gold mine at the Solwara 1 project site in Q1 2019."

### **Resource-Hungry India to Invest \$1.5 Billion in Seabed Mining**

*India is set to step up efforts to harness mineral wealth from the seabed of the Indian Ocean with the government soon to launch a \$1.5-billion deep ocean mission. The proposed mission aims to rein in energy, food, medicine and other natural resources that surround the Indian peninsula.*

ARUN SANKAR, Sputnik, 9 May 2017

New Delhi (Sputnik) — The major components of the project have been said to be deep ocean energy, desalination plant along the Chennai coast, deep sea science and fisheries, minerals and polymetallic nodules. India needs vital minerals such as copper, cobalt, nickel and manganese for future generation manufacturing including the production of hybrid cars, and smartphones. Currently, China has a monopoly over such minerals. Indian scientists estimate 380 million tons of polymetallic nodules in the retained Indian Pioneer area. India's National Institute of Ocean Technology has been working on a mining concept where a crawler-based mining machine collects, crushes and pumps nodules to the mother ship using a positive displacement pump through a flexible riser system.

"A deep-sea research center is coming up. We are going to launch an inter-disciplinary and inter-ministerial Deep Ocean Mission. The Ministry of Earth Sciences is preparing a proposal that will be put before the Cabinet for approval," Madhavan Nair Rajeevan, Secretary of India's Ministry of Earth Sciences, said. Last year, India signed a 15-year contract with the International Seabed Authority (ISA) for exploration of Poly-Metallic Sulphides in the Indian Ocean. It is expected that basic exploration activities would require no more than \$100 million. India has a 7,500-km coastline and 2.4 million square kilometers of Exclusive Economic Zone.

### **Robot explorers glean marine data for Cook Islands**

Dateline Pacific, Radio New Zealand, 4 May 2017

Darting luminous dots, waving fronds and crawling sea creatures loom into sharp focus. Scientists are huddled around a big screen at NIWA's offices in Wellington, New Zealand, watching as a remotely operated vehicle or ROV, glides and hovers over fragile corals, honing in on life in the ocean depths just north of the Cook Islands. The scientific agency is working with scientists on the US research ship Okeanos Explorer which is using robots to explore unknown parts of the Pacific. Scientists from around the world are also tuning in and today they include several from Russia, Japan and Canada.



NIWA scientists in Wellington tune into a live feed from the ocean floor north of the Cook Islands as part of an exploratory mission by the NOAA ship Okeanos Explorer, May 2017 Photo: RNZI/Sally Round

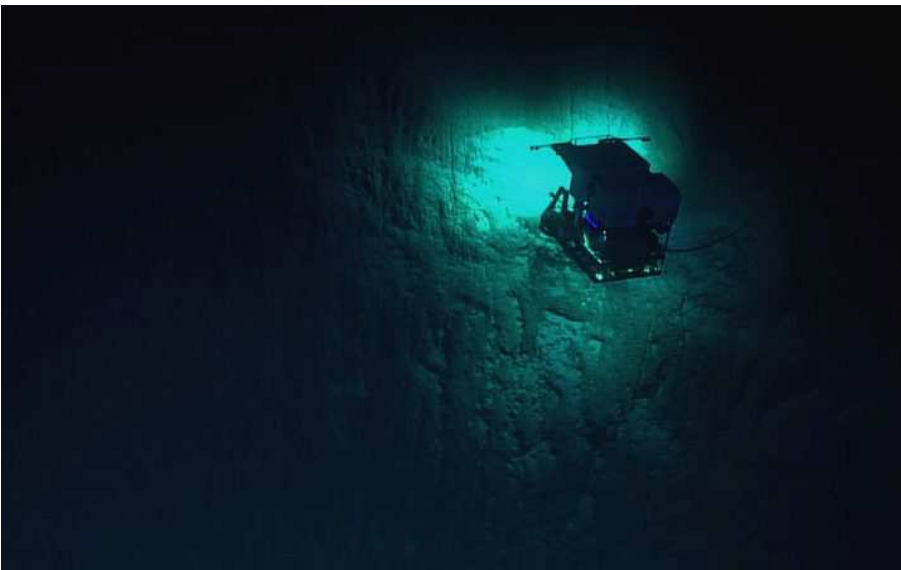
NIWA principal scientist Malcolm Clark said Wednesday's dive, 260 kilometres north of the Cook Islands, revealed dense forests of coral. He said the exploration was valuable for future management of the Cook Island's marine park, Marae Moana. "Getting information like this enables us to put the biodiversity in a much more regional context, to find out what is unique, what's quite common, where boundaries occur, where species can't cross from one area to another." The scientists were

able to direct the team on board the Okeanos Explorer to collect samples using the robotic claw of one of the remotely operated vehicles.



A manganese-crusted rock sample being grabbed from the Te Tukunga o Fakahotu dive site, just north of the Manihiki Plateau, near the Cook Islands. Photo: NOAA Office of Ocean Exploration and Research, Mountains in the Deep: Exploring the Central Pacific Basin.

Dr Clark said the data and samples would be sent back to the islands' authorities and would help with sustainability around fishing and seabed mining. "The sort of information we're collecting with these dives gives us a good indication of what is down there at the depths they might be interested in but it gives us a good idea of what the wider environmental impacts could be of any human disturbance, any mining activity on the deep sea floor," said Dr Clark.



One of the Remote Operated Vehicles (ROV) exploring deep seas of the Pacific Ocean during the NOAA ship Okeanos Explorer's 2017 mission. Photo: NOAA Office of Ocean Exploration and Research, Mountains in the Deep: Exploring the Central Pacific Basin.

Dr Clark said the scientists were amazed at the dense coral forests near the Cooks compared to some of the relatively barren areas they'd seen on other dives. He said it was the first time NIWA had been involved in such exploration right from the initial proposal, through to the dive planning, decisions on what to collect and joint supervision of the dive in real time. "It is amazing sitting at your desk, asking a ship 4000 miles north of New Zealand off the Cook Islands to pick up a rock, or pick up a coral or a sponge," he said. The Okeanos Explorer is on its way north to its next dive site near Jarvis Island.





Del Bohnenstiehl (L) and Kasey Cantwell (R) talk to scientists in Wellington during a Pacific mission of the NOAA ship Okeanos Explorer Photo: RNZI/Sally Round

### **Apple’s Commitment to a No-Mining Future Makes Experimental Seabed Mining Unnecessary.** Via PNG Mine Watch, 3 May 2017

Scientists and civil society organisations from around the world welcome Apple’s 2017 Environment Responsibility Report announcing the communication technology giant’s goal to “stop mining the earth altogether”[1]. They call on other companies to match this commitment. Apple’s goal is at odds with the excitement generated in some circles over proposals to mine the deep sea, and in particular by the world’s first deep sea mine (DSM) to be granted an operating licence in Papua New Guinea[2]. The announcement by Apple recognises the strong groundswell building for a circular economy that has eco-design, re-use, repairing, and recycling at its core. This will require other companies to also develop innovative business models and in particular mining companies to move beyond the current crude approach to sourcing minerals.

Professor Richard Steiner of Oasis Earth stated: “One of the default arguments of DSM proponents is that the world economy will need the Rare Earth Elements and other minerals from the deep ocean for a growing demand for communications technologies. Apple’s announcement shows this is will not be the case. The days of digging holes for raw materials, using them once or twice, discarding them into landfills, and then digging more holes for more raw materials to waste – are clearly numbered!”



Christina Tony, from the Bismarck Ramu Group in Papua New Guinea said: “Our coastal communities in the Bismarck Sea are subject to the world’s first deep sea mining experiment – driven by



Nautilus Inc. and investors such as Anglo American. Why are these companies happy to sacrifice our people's health, livelihoods, culture, and marine environment. This primitive and violent approach to mining belongs with the dinosaurs. Apple is showing us a sophisticated vision of a sustainable future." Dr. Helen Rosenbaum, Deep Sea Mining campaign stated: "Deep Sea Mining is risky business as both the environmental impacts and the returns are complete unknowns. Nautilus' Annual Information Form, lodged with Canadian securities, emphasizes the experimental nature of the Solwara 1 project.

In addition, report after report[3] demonstrates the world's oceans are already on the brink of peril. With our Pacific partners we call for a complete ban on Deep Sea Mining and for mining companies and electronics manufacturers to instead turn their mind to developing closed loop economies." Dr. Catherine Coumans of MiningWatch Canada says: "Some mining for virgin minerals on land may still be required in the short term to meet demand not satisfied by recycling, urban mining and reducing consumption[4]. But these alternatives provide win-win solutions for society, the environment and the economy. The right choice is really a "no-brainer" and we welcome Apple's foresight in leading the way. There is absolutely no need for deep sea mining [5]."

## NOTES

[1] [No Mining Required](#); [No more mining says Apple](#); and [Apple will stop relying on mining for minerals 'one day'](#).

[2] See reports: Out of our Depth: Mining the Ocean Floor in Papua New Guinea (November 2011) <http://www.deepseaminingoutofourdepth.org/wp-content/uploads/Out-Of-Our-Depth-low-res.pdf> ; Physical Oceanographic Assessment of the Nautilus Environmental Impact Statement for the Solwara 1 Project – An Independent Review (November 2012)

<http://www.deepseaminingoutofourdepth.org/wp-content/uploads/EIS-Review-FINAL-low-res.pdf> ; Accountability Zero: A Critique of Nautilus Minerals Environmental and Social Benchmarking Analysis of the Solwara 1 project (September 2015)

[http://www.deepseaminingoutofourdepth.org/wp-content/uploads/accountabilityZERO\\_web.pdf](http://www.deepseaminingoutofourdepth.org/wp-content/uploads/accountabilityZERO_web.pdf)

[3] Reports include: World Wildlife Fund (WWF) [Reviving the Ocean Economy](#) (2015) ; [The Living Planet](#) (2016); International Union for Conservation of Nature (IUCN) [State of the Ocean](#) (2013) ; [Explaining Ocean Warming](#) (2016); and the [United Nation's World Ocean Assessment 2016 which is a global inventory of the state of the marine environment and problems threatening to degrade the oceans](#). Recent research from the [MIDAS consortium](#) indicates a concrete risk that deep sea mining would lead to serious irreversible harm.

[4] For example, California based [Blue Oak Resources](#) estimates that every year mining companies spend roughly \$12 billion for virgin ore deposits. While tons of cell phones and other electronics are thrown out every year, each ton contains 70 times the amount of gold and silver found in virgin ore. For copper the number is even higher, with the equivalent of roughly one-third of global mining production thrown out in e-waste globally every year; ['Urban mining': UBC engineers say e-waste richer than ore pulled from the ground](#); [Can 'urban mining' solve the world's e-waste problem?](#)

[5] For example, [http://www.savethehighseas.org/publicdocs/DSM-RE-Resource-Report\\_UTS\\_July2016.pdf](http://www.savethehighseas.org/publicdocs/DSM-RE-Resource-Report_UTS_July2016.pdf)

## Police condemn activist's report

May 3, 2017, The National

POLICE have called anti-deep-sea mining campaigner Helen Rosenbaum's attack on Nautilus Minerals' Solwara 1 project as irresponsible and an attempt to incite violence. Speaking on Radio New Zealand this week, New Zealand-based Rosenbaum, of Deep Sea Mining Campaign, said the people of New Ireland and Duke of York Islands were prepared to take up arms if the seabed mining pro-

ject went ahead. Canadian company Nautilus Minerals was given an environmental permit by the Papua New Guinea government in 2009 to develop the Solwara 1 project but work is still yet to begin. Rosenbaum said people in New Ireland and the Duke of York Islands were feeling so desperate. “They know they can get access to explosives, it’s incredibly easy to get access to arms in a country like Papua New Guinea through the police, through the army,” she said.

“Local people are feeling so desperate they are saying that they would even take up arms against the project. Many of them work at mining companies, or have worked at mining companies in the past. “They have access to explosives and they know it’s incredibly easy and it’s only a matter of money to get arms in a country like PNG through the police or the army. “They have the experience of Bougainville, many of them worked at the Bougainville mine prior to the civil war in Bougainville what was caused by impacts of the civil war – for them making this threat is no idle threat. “Many people in the Duke of York Islands and the New Ireland have married into Bougainville. “They understand what it means to have conflict and they are not saying this loosely.”

Acting executive officer to Police Commissioner Chief Superintendent Dominic Kakas said in a statement that while the efforts of activists such as Rosenbaum are appreciated, grandstanding and making wild and reckless allegations do not help her cause. “In fact it does more damage to her cause and to the credibility of the country, the Royal Papua New Guinea Constabulary and the PNG Defence Force,” he said. He said despite what Rosenbaum thinks, it is not “incredibly easy” to access arms in PNG either through the police or the Defence Force. And instead of taking up arms, people in PNG are prepared to talk things over rather than resorting to violence. “So instead of making such wild and unfounded allegations and inciting violence, Rosenbaum should promote her cause more responsibly.”

### **Locals threaten armed campaign against PNG seabed mine**

Radio New Zealand, 1 May 2017



Credit: Alliance of Solwara Warriors

Locals are prepared to take up arms if a seabed mining project in Papua New Guinea goes ahead, according to a anti-deep sea mining campaigner. A campaigner against deep sea mining says locals have threatened to take up arms if a seabed mining project in Papua New Guinea goes ahead. Canadian company Nautilus Minerals was given an Environmental Permit by the PNG government in 2009, to develop the the Solwara 1 Project, but work is still to begin. Helen Rosenbaum from the Deep Sea Mining Campaign said locals in New Ireland province and the Duke of York Islands were feeling so desperate that they would consider taking up arms against the project. "They know they can get access to explosives, it's incredibly easy to get access to arms in a country like Papua New

Guinea through the police, through the army," she said. Ms Rosenbaum said the mining project would be the first of its kind and would set a dangerous precedent in the Pacific.

HELEN ROSEBAUM: Well there's quite different layers of risk. There's of course environmental which is well documented by our own reports which are direct risks to the hydro-thermal vents that are being mined and the unique eco systems that are there. There's also the risks that will result from the mining process and the plumes that are generated that are likely to contain metals and other toxics and the risk of those things getting into the food chain - the marine food web effecting marine species and of course effecting the communities that rely on those marine species for their substance and their quite thriving local economy. There's also economic financial risk to the company which we've been outlining to Anglo American and other investors, their economic returns for Soera 1 are totally unknown and Nautilus are clear about this in documentation that this is a huge experiment from all perspectives. They're clear they don't know what the environmental impacts are going to be.

Last year I visited the Duke of York islands, New Ireland province and communities and provincial government in East New Britain as well. People are very concerned about the impacts. They're already facing impacts from climate change, they're already losing land on their islands due to sea level rise. They're facing increasing frequency of storm event so their already feeling quite threatened, so this is the last straw for them. On top of all of that they were saying now we have to deal with this, they were already facing a very uncertain future and because of losing land to sea level rises they're feeling like their future is going to depend more on the marine environment for their nutrition and their livelihoods and they're wondering how they're going to exist and how are their children going to exist.

TG: What ways have they told you they might respond?

HR: Well, they are working with local groups over there to support them, to use political power means. It is PNG elections time in June and July this year. We're looking at how they can hold candidates accountable for their policy platforms and ask them that hard questions about their positions on Sowera 1 project, but a lot of people are feeling quite desperate and because of the high level of corruption and not feeling that in PNG that a candidate says something that that sounds good to them on Nautilus they won't change their minds later on. And one can see this happening all the time with Sir Julius Chan who is the governor of New Ireland province and he just flip-flops. Sowera 1 is in the water of New Ireland and last year he was voicing serious concerns about the Sowera 1 project and wondering whether it should go ahead, but this week a press release came out saying he has resigned to the Sowera 1 and he's going to make the most of it. Goodness knows what's going on behind the scenes in terms of money changing hands. Local people are feeling so desperate they are saying that they would even take up arms against the project. Many of them work at mining companies, or have worked at mining companies in the past. They have access to explosives and they know it's incredibly easy and it's only a matter of money to get arms in a country like PNG through the police or through the army. And they have the experience of Bougainville, many of them worked at the Bougainville mine prior to the civil war in Bougainville what was caused by impacts of the civil war - for them making this threat is no idle threat. Many people in the Duke of York Islands and the New Ireland province have married into Bougainville. They understand what it means to have conflict, and they not saying this loosely.

### **Seabed Mining Could Form Plumes: Dust Clouds Formed Within Sea**

Piyali Roy, Science Times, 30 April 2017

Treasure troves of raw materials are laying on the sea floor and the abundance of these raw materials is driving the rise of deep sea mining, and hurling worries about the ecological effect. The sea covers 66 percent of our planet and offers significantly more potential in discovering profitable raw materials than the land. According to HiTech Days, deep sea mining will also leave a mark on the

planet Earth like any other type of mining. As per a statement from the managing director of Seascope Consultants, the biggest problem for the marine environment is the plumes. Plumes can destroy a part of underwater ecosystems or habitat to any type of marine creature. What are plumes? How are they formed? Plumes are the dust clouds which are formed within the sea and are hung suspended in the water. The dust particles in the plumes can cause harm to the marine environment as they may also contain some kind of toxic chemicals in it.



Mainly, deep sea mining can cause plumes to be formed, that is the main issue arising. After deep sea mining, plumes can spread over a bigger area of seabed causing harmful effects on the marine ecosystems. Phys.org reported that there can be other issues arising up after sea mining other than plume formation, such as loss of habitat over large areas. In light of this, the EU-financed MIDAS look into venture united industry and NGOs to analyze how best to deal with the impacts of deep sea mining. The impacts of deep sea mining were evaluated by carrying out a plume modeling by the MIDAS. Their research affirmed the significance of compelling plumes to avoid critical harm to ecological systems. It's a responsibility for the scientists to find a sustainable technological solution for effective deep sea mining which will have less negative impacts on the marine underwater ecosystems.

### **Nautilus awareness program**

Post-Courier, April 28, 2017

A SENIOR executive with Nautilus Minerals says it has an ongoing awareness program in place. The executive was responding to question raised on the awareness program in light of concerns relating to the Solwara One project which the firm will be developing off the west coast of Namatanai district, New Ireland province. PNG community and social responsibility and security manager Stanley Komunt said the program was initiated some years back and basically targets the people from the area. Mr Komunt said it covers wards two, three, four, five and six in Namtanai Rural local level government (LLG) and Wards 15 and 16 Central New Ireland Rural LLG. “We normally run biannual community project updates for the CAB. This program can take up to a week and is done ward by ward. “This is an ongoing program and has been going on for years in the past,” Mr Komunt said.

He said the awareness is headed by Nautilus’s vice president PNG operations- Adam Wright who while based in Australia continues to make time to personally conduct this program. “During this program we talk about the project timeline, mining equipment built status and more importantly on the environment operations and management. The communities do ask a lot of questions and we always provide answers. “We have Provincial Government officers and officers from Mineral Resources Authority (MRA) and Conservation and Environment Protection Authority (CEPA) accompanying us most times as well ensuring the villagers are well informed,” he said. Mr Komunt said these exercises are also carried out in East New Britain more specifically Watom and Duke of York Island adding that the same briefing is also provided to the provincial governments, national government agencies around the same time to ensure everyone is given the same information.

## **Locals told sea resources not theirs**

April 27, 2017, The National Business

MINING Minister and Namatanai MP Byron Chan has told his people in the district that they are not owners of whatever is in or under the sea. Chan spoke on Monday during an event at West Coast Namatanai. The district will play host to the first seabed mining project, Solwara 1. “People of West Coast and Namatanai, those of you who are here now, the machines will start operations in the seas you said you own. But I would like to tell you that you are not the real landowners. You are not the landowners,” Chan said. “You are now hearing this directly from the minister for mining who is also your local member of parliament. “I’m sorry to say this but Papua New Guinea’s law is in place which says that the person who owns the sea is the Government of Papua New Guinea – which is the State. “It only recognises the local level government and the province. “Under the law, you are not the landowner. You will not have shares in this.”

However, he highlighted that the West Coast area of Namatanai now has an agreement in place for the project. “For the past five years, you may have been seeing Nautilus and Mineral Resources Authority and the Department of Mineral Policy and Geo-hazards Management who have been paying visits to this area – I’ve been sending them. “Memorandum of agreement (MoA) for the seabed mining for the West Coast is ready. “But the only problem is, I can sign this MoA today but advice from experts in the industry is that if I sign this MoA now, I will be signing up to the current commodity price which is very low. “So I have to wait till when the price is up again. “However, if we gain autonomy, whatever that is on land and in the seas, you will own them. I would like to stress that autonomy is the way forward for us, the people of New Ireland.”

## **Deep sea mining approved by the government**

Post-Courier, April 27, 2017

MINING Minister Byron Chan says the deep sea mining prospect, proposed for development in New Ireland province, has already been approved by government. Mr Chan said as such he has no powers to revoke the license that has already been issued to the developer-Candian mining firm Nautilus Minerals. Mr Chan was speaking at the opening of the Pubanom bridge early this week which had been funded by Nautilus Minerals Inc at a cost of K3.1 million. Mr Chan said while a lot of concerns had been raised over the Solwara-1 project, which will be developed in Namatanai’s west coast area, however as minister responsible his hands are tied. “Lots of concerns have been raised on the project but as minister I cannot revoke the license because the government had already issued this and for another reason Nautilus has not done anything wrong.

“I cannot remove Nautilus so I have to work with them. I have told the governor (Sir Julius Chan) and we have agreed that in the absence of government funded projects, this is the way to go to deliver benefits to our people. “The company has also come in a big way delivering projects, one of them is this bridge for which we are here to open.” “In saying this I must emphasis that this infrastructure is not a national government initiated project. This bridge is a result of the agreement that the Nautilus has signed with the New Ireland Provincial Government. “We (people of Namatanai’s west coast) have the company and the provincial government to thank for this project others that have and continue to deliver including the water and sanitation project and roads.” In saying this he had thanked Nautilus in particular the firm’s PNG Corporate Social Responsibility and Security Manager Stanley Komunt who has been the face of the company on the ground delivering these projects



## **Chan raises concern over deep sea mining**

Post-Courier, April 27, 2017

THE New Ireland provincial government has expressed some reservations about the impact that the world's first ever deep sea mine will have on the future of the people and the province. However, it acknowledges that this is a national government project. It is now opting to take a neutral stance on this project and in doing so to work with the project developer and Canadian miner to ensure there are benefits for those who will be impacted and the province at large. These sentiments were expressed by New Ireland governor Sir Julius Chan during the opening of the Pubanom Bridge project opening at Rabehan village, West Coast Namatanai, early this week. Sir Julius told guests and the villagers of the west coast and Central New Ireland who had attended this event that he had from the start not agreed to this project.

He said this is for the simple reason that the sea remained the mainstay for the people of island province. He said given that this project was the first of its kind not just for PNG but the world and he feared the sea which he termed as 'the people's garden' may be destroyed by the mining activities. However, he said as the leader of the province he was faced with a dilemma. "As the head of the province the question that hangs in the balance is? What if this project is good for the future generation and for the province and in taking the hardline on the project I stop this and close the door on it. "In retrospect what if the project is bad and in saying yes I kill the future of our young generation and our province? I am at a crossroad as the head of this province.

"The future is unpredictable and we cannot predict it so I am strongly urging the developer that it must help me and my people and in doing so we must work together to ensure that if this project goes ahead that we do not destroy the future of this province," the governor said. Sir Julius had acknowledged the concerns by Cardinal John Ribat on the project however, at the same time had acknowledged also that there was new technology, science and know how also available and this could not stop the project from going ahead. "I have chosen to be neutral so if they can convince us that it is good then let us be the first but there with the agreement signed and because we will be the first of other similar projects we must ensure some benefits come back to the province," Sir Julius said.

## **Seabed Mining Company Nautilus Minerals Unveils New Bridge In PNG's New Ireland**

*Miner yet to begin seabed mining in the Bismarck Sea off New Ireland coast*

By Rosalyn Albaniel

PORT MORESBY, Papua New Guinea (PNG Post-Courier, April 27, 2017) – Canadian miner-Nautilus Minerals, this week delivered to the people of West Coast of New Ireland province, an all weather bridge worth K3.1million [US\$953,000]. The Pubanom bridge spans 30 metres and has the capacity to take up to 40 tonnes at any one time. This vital link, situated in ward six along the west coast of Namatanai at Rabehen village, was officially opened by Mining Minister and Namatanai Open MP Byron Chan on Monday. Those also set to benefit from this bridge are the people of Central New Ireland as well. Among the dignitaries that had attended this event were New Ireland Governor Sir Julius Chan, Nautilus Minerals PNG Social and Corporate Responsibility and Security Manager Stanley Komunt, acting Provincial Works Manager Solomon Pela, the managing director Aloga #42, Geraldine Gee, Ward six member Raphael Los. Mr Komunt had stood in for the chief executive officer Mike Johnston at this event. He had from the outset conveyed Mr Johnston's apologies for not being able to attend this important event.



Photo: Kelisi at the English language Wikipedia  
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He said the CEO was in England attending a board meeting relating to financing matters pertaining to the Solwara 1 project. He said this event was an important one for the company and had come about as a result of an agreement which Mr Johnston and Sir Julius had signed off back in July 2013. Mr Komunt said under the agreement, the parties had agreed that the first bridge would be delivered immediately after the signing while a further two after the company had begun production. He had on behalf of the company, apologised that this had not happened and that this project was now being delivered four years on. Nevertheless he said he was happy that this project had been completed on time and on budget and would be long lasting long lasting. Both the New Ireland governor and mining minister had thanked Nautilus for this and the other projects the company has delivered especially at a time when the company had not yet commenced its operations in the province and is yet to make a return.

**MEDIA RELEASE** Deep Sea Mining Campaign 24<sup>th</sup> April 2017

### Anglo American should divest from high risk deep sea mining



Multinational mining company Anglo American will be held accountable today at its annual shareholder meeting. The company's investment in the experimental Nautilus Minerals Solwara 1 deep sea mining project, is deeply opposed by local communities, churches and wider civil society in Papua New Guinea. These stakeholders ask Anglo American to divest from Nautilus Inc. Anglo American is proud of its international commitments to sustainability, human rights, and environmental stewardship, but will they inform shareholders that their investment in Nautilus does not respect people's culture and heritage?

"Anglo American, we are not guinea pigs for your experimental project!" stated Jonathan Mesulam from the Alliance of Solwara Warriors. "We in the Pacific are custodians of the world's largest

ocean. These oceans are important to us as sources of food and livelihoods. They are vital for our culture and our very identity. Solwara 1 is in the middle of our traditional fishing grounds. You are threatening our home and our existence with experimental seabed mining.”

Christina Tony, from the Bismarck Ramu Group in PNG, said, “Anglo American, Solwara 1 does not respect local communities’ livelihoods, health, food security and culture all of which are strongly linked to the sea. Our people have not provided their informed consent for this project. The Solwara 1 Environmental Impact Statement contains many gaps and errors - we can’t even obtain all the environmental research reports. By investing in this industry, Anglo American is complicit in trampling on our human rights.”

Dr. Helen Rosenbaum, Deep Sea Mining campaign stated, “Deep Sea Mining is risky business as both the environmental impacts and the returns are complete unknowns. Nautilus’ Annual Information Form, lodged with Canadian securities, emphasises the experimental nature of the Solwara 1 project. In addition, report after report[1] demonstrates the world’s oceans are already on the brink of peril. Recent research from the MIDAS consortium indicates a concrete risk that deep sea mining would lead to serious irreversible harm. With our Pacific partners, we call for a complete ban on Deep Sea Mining and for Anglo American to dissociate itself and its shareholders from this unjust experiment.”

Andy Whitmore, London Mining Network says "We welcome Anglo American's desire to look for more sustainable forms of mining[2][3] to meet society's needs. However, deep sea mining is not the answer. Instead, the solution should prioritise environmental protection and resource conservation while maintaining economic benefits. We ask Anglo American to divest from seabed mining and instead get behind alternatives to traditional mining developments and truly cutting edge approaches hold the promise of win-win solutions for society and the environment.

## NOTES

[1] Reports include: World Wildlife Fund (WWF) [Reviving the Ocean Economy](#) (2015) ; [The Living Planet](#) (2016); International Union for Conservation of Nature (IUCN) [State of the Ocean](#) (2013) ; [Explaining Ocean Warming](#) (2016); and the [United Nation’s World Ocean Assessment](#) 2016 which is a global inventory of the state of the marine environment and problems threatening to degrade the oceans.

[2] For example, California based [Blue Oak Resources](#) estimates that every year mining companies spend roughly \$12 billion for virgin ore deposits. While tons of cell phones and other electronics are thrown out every year, each ton contains 70 times the amount of gold and silver found in virgin ore. For copper the number is even higher, with the equivalent of roughly one-third of global mining production thrown out in e-waste globally every year; ['Urban mining': UBC engineers say e-waste richer than ore pulled from the ground](#); [Can ‘urban mining’ solve the world’s e-waste problem?](#)

[3] In [Apple’s 2017 Environment Responsibility Report](#) released last Wednesday 19<sup>th</sup> April, the company has announced a new, unprecedented goal for the tech industry to “stop mining the earth altogether”. Read more: [No Mining Required](#); [No more mining says Apple](#); and [Apple will stop relying on mining for minerals ‘one day’](#)

## Experimental seabed mining!?! Leave my down below alone!

Seas at Risk (Brussels), April 21, 2017



Mr Smashing makes a comeback with an experimental seabed mining disco love song. Destroying the deep sea to get metals for our throw-away mobile phones and other e-devices? Seas At Risk thinks it is better to step up efforts on the circular economy – make devices repairable, re-usable, recyclable. Use mineral resources more efficiently and keep them in the economy loop instead of wasting them. Link: <https://www.youtube.com/watch?v=JsA0emd2FNw>

### UN against seabed mine

*THE United Nations is against the world's first seabed mining operation which is set to start in two years time in the Bismarck Sea, off the coast of New Ireland Province.*

BY MEROLYN TEN, Post-Courier, 20 April 2017

THE United Nations is against the world's first seabed mining operation which is set to start in two years time in the Bismarck Sea, off the coast of New Ireland Province. Copper and gold deposits will be mined from the seafloor at a depth of 1600 metres. The UN says this will cause major environmental destruction not only to the communities in New Ireland but the entire Pacific Ocean, and is against the 14 Sustainable Development Goals of the UN. "There is a high likelihood that mining will disrupt life under the sea and potentially cause mass devastation for biodiversity," UN resident co-coordinator Ray Trivedy said. The 14 SDG states the importance of conservation and the sustainable use of the ocean, seas and marine resource.

Oceans, especially the Pacific Ocean which PNG is in, contain nearly 200,000 identified species, but actual numbers may lie in the millions. UN main targets were to prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans as stated in the UN Convention Law of Sea. "I am against sea bed mining because despite what some companies say, I am not convinced that it will lead to sustainable development," Mr Trivedy said.

## Panda says risks of experimental seabed mining outweigh the limited benefits

PNG Mine Watch, 11 April 2017



International NGO group WWF says proposed experimental seabed mining will provide little benefit in Pacific island countries, while the risks and costs could be significant. This is the conclusion in a new economic report [**published in June 2016; R.S.**] commissioned by the Panda from policy and research consultancy firm MainStream Economics, titled *Counting the Potential Cost of Deep Sea-bed Mining to Fiji*. Key findings from the study include:

Direct benefits to Fiji from experimental seabed mining are likely to be relatively small. While the major benefits will be from additional royalty and tax revenues, the major value adding will occur outside the Fijian economy.

- There are a number of potential costs to tourism, commercial fishing, and other ecosystem services. These are poorly understood due to the current lack of information and data available on the risks to the marine environment, the relationships between those risks and key sectors, and the economic value of affected sectors.
- Tourism is a key sector that is potentially at risk, particularly loss of Fiji's reputation as a world-class marine tourism destination. Even relatively small reductions in overseas visitors can have significant economic consequences for tourism. Just a 5% decline in dive tourist visits would reduce Fiji's Gross Domestic Product (GDP) by around FJD 14 million, and could result in the loss of more than 400 jobs.
- Commercial fisheries, particularly tuna could also be impacted from plumes and water column discharges causing disruptions to marine food webs. Even small reductions in catch rates can have large economic impacts. Just a 5% reduction in catch rates would result in a 15% fall in value added and a 21% reduction in operating surplus/profit for the fishing industry. There would also be negative flow-on impacts in the processing sector.
- Experimental seabed mining will also have an impact on other ecosystem services such as carbon abatement and the existence value of biodiversity.
- In addition local residents derive cultural and subsistence benefits from the sustainable management and use of the marine environment. Little is known about the actual risks to those values in the Fiji context.

Download the report: [Counting the potential cost of Deep Sea-bed Mining to Fiji](#)



## Ban seabed mining, says Cardinal

Naomi Wise, National, 11 April 2017



CARDINAL Sir John Ribat is calling on the governments of PNG and the Pacific to ban seabed mining in their countries. Sir John, who has just returned from Suva, Fiji where he attended a workshop on seabed mining at the Pacific Theological College, said this in support of people living in coastal areas and islands in the Pacific. "The ocean is home to people living around coastal areas and islands," Sir John said. He said they realised the impact the seabed mining will have on the ocean. "And that is why it is vital we highlight the importance of our lives in association with the sea," Ribat said. "My fear is, if this happens, our people will go into the deep ocean to fish. "We also don't know how long it will take for the ocean to heal itself after the destruction the seabed mining will cause," he said. "Do you want to see our people suffer?"

## New Zealand seabed mining plan is madness

*'Companies involved in these boom-and-bust industries are known for rushing ahead with great gusto, only to suddenly scale back production, laying off workers as jobs disappear and, in fact, often disappearing altogether, leaving behind damaged ecosystems and pollution for the community to clean up'* Graham Pearson, New Zealand Herald, April 10, 2017



Black gold: Taranaki's seabed could be mined. Photo/file

NEW Zealand resources have been ravaged through history by boom-and-bust industries that have extracted timber, gum, gold, coal, oil and gas. Now there is a crazy proposal to mine at sea our West Coast black sand, using untried and untested processes, with its suggested economics based on yet another old-fashioned boom-and-bust industry. Just a few minutes' Google search revealed the crazy price fluctuations of iron and steel. From a maximum price of US\$191 (\$275) in February 2011,

iron crashed to US\$37 in December 2015, while steel has an even bigger range: US\$1265 in June 2008 to just US\$90 March 2016. Companies involved in these boom-and-bust industries are known for rushing ahead with great gusto, only to suddenly scale back production, laying off workers as jobs disappear and, in fact, often disappearing altogether, leaving behind damaged ecosystems and pollution for the community to clean up.

Recently spending two days attending the EPA's Decision Making Committee (DMC) hearing in New Plymouth, I was heartened to hear many, many organisations, iwi and members of the local communities speaking out for most of those two days against yet another extraction industry. Members of the fishing and dive clubs provided amazing footage of the undersea world just off the Taranaki coast, giving all of us present an idea of the wonderful environment that is at stake. Others spoke for the mammals that live in or travel through this section of the Taranaki bight. Others spoke with passion of their connections with the sea through their lifestyle and heritage, which they see as threatened with the TTR's proposal.

Some objectors, with experience of sea-based industries, were able to give us valuable perspectives of this huge ocean-based proposal, with its weather-related risks and disruption to the ocean floor. A locally based economist pointed out to the DMC how the trickle-down idea for economic value has not worked in the Taranaki oil and gas industries. These extraction industries are known for "fly-in" workers taking the skilled, high-paying jobs, leaving only lower level and support industry jobs for the locals. He also pointed out that while New Plymouth and close environs might gain support for Womad and other local community activities, South Taranaki remains an economically depressed area with low incomes, job shortages and a high level of child poverty.

We even know, from Minister Judith Collins' recent statement, that the oil and gas industry needs multimillion-dollar handouts to close down its end-of-life wells. In contrast to this valuable evaluation of the proposal, our "guardian" organisations, DOC and councils, took a neutral stance. The Government's Ministry of Business, Innovation and Employment has supported the proposal and seems to think it's wonderful -- despite TTR's previous application being declined, and the company seeming to need a Callaghan Innovation Fund grant of \$15 million to keep it afloat while preparing to submit its second application. The DMC has extended the hearing deadline to the end of May, against some community opposition, to further examine the sand plume issue and consider possible mitigation options. So we wait until June to see if the decision is again a sensible decline or if we get yet another extraction industry.

### **Pacific churches call for a ban on experimental seabed mining in Papua New Guinea and the Pacific.** Lice Movono, The Fiji Times, April 9, 2017

CHURCH leaders from the Pacific have called on governments and people of the Pacific to unite to preserve the region with regards to seabed mining. In an acknowledgement of industry action in seabed mining the churches acknowledges that developments were taking place in some governments but they singled out the government of Papua New Guinea for having issued mining licenses. "We also acknowledge the campaigns against Seabed Mining by local communities in PNG. We are aware of the destruction by Seabed Mining," the church statement said. "Therefore, we call on the PNG Government and other Pacific countries to put a stop to testing of Seabed technology on PNG Land or Seas."

The churches who were joined at the workshop by representatives of civil society organisations called on the rest of the non government community to unite stand with the churches and the Alliance of Solwara Warriors "to say NO" to any development regarding Seabed Mining in their area. "We call on the Governments and the people of the Pacific to stand together to preserve our com-

mon home for the unborn and the future generations." "We call on all the people and the governments of the Pacific to stand together in solidarity to Ban Seabed Mining in PNG and the Pacific."

### **Seabed mining law boost**

Lice Movono, The Fiji Times, April 5, 2017



Dr Pierre-Jean Bordahandy and Dr Lili Song.

PACIFIC governments may soon have answers to major concerns about seabed mining which can be useful in the formulation of laws which govern the issue. This follows a boost to the University of the South Pacific's ability to provide research based analysis and advise when it won a research grant recently. According to a statement from the University of the South Pacific (USP), two academics from its School of Law won the grant worth AUD 7000 from the Guangdong Institute for International Strategies. The USP says the grant will fund a research project which examines the development of legal framework for deep-sea mining in South Pacific Island States. The two academics, senior lecturer, Dr Pierre-Jean Bordahandy and lecturer Dr Lili Song, are based based at USP's Emalus Campus in Vanuatu where they will will conduct the research. The USP says Dr Bordahandy and Dr Song's research will evaluate selected national deep-sea mining legal frameworks developed by Pacific Island governments states which consider the United Nations Convention on the Law of the Sea and COP 21 and COP 22 agendas.

Major questions the two's research will address include:

Whether there is any major discrepancy or imbalance between the international and national regimes that will lead to the shift of deep-sea mining operations from high sea areas to areas within national jurisdiction, or vice versa?

What is the role of the principle of precaution in relation to deep-sea mining?

Is there any major gap in the way deep-sea mining risks are framed in the various national regimes considered?

"According to Dr Bordahandy, the vast ocean floor of the Deep South Pacific is generally said to boast great potential of valuable mineral resources, however, its exploitation poses technical, environmental, economic challenges both to coastal states and to the international community," the USP said. Dr. Song said their analysis may help Pacific governments to make informed decisions as they legislate deep-sea mining "and to better address the various challenges presented by deep-sea mining operations." The project which started in December 2016 ends in November 2017.

## Seafloor production machines arrive

April 5, 2017, The National Business



NAUTILUS Minerals says the company's seafloor production tools have arrived and will shortly commence submerged trials. Vice-president PNG operations Adam Wright said the trials would be carried out in the next four months in an existing facility on Motukea Island near Port Moresby. "This is a significant step forward in the development of the project," he said. "The trial is when we take the mining equipment submerged 10 metres deep and operate the equipment," Wright said. "There are four things that we really are validating at the trials – the stability of the equipment, the cutting efficiency (how it cuts the rock), the collection efficiency (how it can pick up the rock that's been cut) and the visualisation technology (how the machine can see under water, how the operator can see what he is doing underwater)," he said, Nautilus chief executive Mike Johnston, said: "We are delighted to be given the opportunity to complete these trials in PNG rather than overseas.

"Not only will it result in putting over K6 million into the PNG economy and employing Papua New Guineans, it will also ensure that our partner Kumul Mineral Holdings, officers from the MRA (Mineral Resources Authority), CEPA (Conservation and Environment Protection Authority), and both New Ireland and East New Britain provincial governments can participate in the trials. "It is important to note that the machines will not be deployed into the ocean. So there will be no impact on the seafloor around Motukea Island. "Instead, the machines will operate in an existing fully enclosed excavation on the island." According to Nautilus, the machines use established technology from deep sea trenching and coal mining industries and the trials will demonstrate that capability. As part of the trials, Nautilus will be training Papua New Guineans to operate the equipment.

## Nautilus to test seafloor production tools in PNG submerged trials

Henry Lazenby, Mining Weekly, 4 April 2017

Marine mining hopeful Nautilus Minerals will shortly start submerged testing of its fleet of seafloor production tools, following the equipment's arrival in Papua New Guinea (PNG). "We are delighted to be undertaking submerged trials in PNG. The trials will result in money and investment going into the PNG economy, and the employment of Papua New Guineans in 'state of the art' technology, which are some of the key benefits of seafloor production. The trials also allow us to work closely with our partner Petromin, government officers from the various government agencies, as well as representatives from Provincial Governments of New Ireland and East New Britain," CEO



Mike Johnston stated Monday. The submerged trials will happen in an existing facility on Motukea Island, near Port Moresby in PNG. The company last month stated that it remains on track to achieve production from the Solwara 1 project, offshore PNG in the Bismark Sea, in the first quarter of 2019. The company's objective is to develop the world's first commercial high-grade seafloor copper/gold mine and launch the seafloor resource production industry.



Nautilus formed a joint venture company with PNG's nominee, Eda Kopa (Solwara), in December 2014 to mine high-grade polymetallic seafloor massive sulphide deposits. Nautilus has an 85% shareholding and Eda Kopa 15%. Nautilus announced in September a revised work programme, pending the company successfully raising the required capital by June. It entails a more staged approach, moving the Nautilus equipment integration phase of vessel construction out until after the vessel has been delivered by Fujian Mawei Shipyard and Marine Assets Corporate in the fourth quarter of 2018, resulting in a 12-month delay to the original schedule.

### **Nautilus submersible trials will start soon**

BY ROSALYN ALBANI, Post-Courier, April 4, 2017

THE Seafloor Production Tools (SPTs) developed by Canadian Miner Nautilus Minerals for the World's first ever deep sea mining have arrived in the country and will shortly commence submerged trials. Nautilus vice president Adam Wright, who flew in from Brisbane where he is based said the equipment was shipped mid-March from a ship yard where they had been stored, arriving in Port Moresby on Monday. Mr Wright told the Post-Courier the equipment would undergo a series of trials over a four to five month period at Motukea island. He said the four things that the Canadian miner will be testing are the stability of the machine, how efficiently they can cut rock, how efficiently they can collect rock and how well the operator can control and monitor submergible using visualization technology.

“This really puts the spot light on PNG in taking the lead role in developing deep sea mining and this is a joint initiative between Nautilus and PNG through Kumul Mineral Holdings Limited. Nautilus chief executive officer Mike Johnston in commenting on the arrival of the machine said “We are delighted to be given the opportunity to complete these trials in PNG rather than overseas. Not only will it result in the addition of over K6million into the PNG economy and employing of thousands of Papua New Guineans. “It will also ensure that our partner Kumul Mineral Holdings, government officials from the Mineral Resources Authority (MRA), Conservation and Environment Protection Authority (CEPA) as well as from New Ireland and East New Britain provincial governments can fully participate in the trials.



“The machines will not be deployed into the ocean so there will be no impact on the seafloor around Motukea Island. Instead the machines will operate in an existing fully enclosed excavation on the island,” the CEO said. Meanwhile, Mr Wright said after the trials have been concluded the equipment will be shipped back to China to be integrated onto Nautilus’ production support vessel which he added is currently being built in a shipyard in there. “Once the ship completed and completed its sea trials then that vessel will come back to PNG,” Mr Wright said. He said the firm remains confident that the commissioning of the mining operation will fall in the early part of 2019.

## **NZ Maori blasts EPA decision to extend seabed mining hearing**

The New Zealand Herald, 28 March 2017



Te Runanga o Ngati Ruanui Trust has blasted a decision to extend the hearing into Trans Tasman Resources’ plan to mine ironsands from the seabed off South Taranaki. The Environmental Protection Authority (EPA) hearing was due to finish on March 20 but has been extended until May 31. It then has 20 days to make a decision. The EPA delayed the completion date after more investigation was needed into sediment plume modelling, and working out worst case scenarios. Te Runanga o Ngati Ruanui kairataki Debbie Ngarewa-Packer said the trust along with the several fisheries organisations, including Talley’s Group Limited and Fisheries Inshore New Zealand, opposed the extension because it “unreasonably added cost, time and effort to an application that was already seen as inadequate”.

She said there had been “a clear one-sided advantage throughout the whole process”. Ngarewa-Packer said there was an allowance under law to extend the hearing but the scales were tipped in the wrong direction. “Trans Tasman Resources are set up to focus on one thing, while the hundreds who oppose this can only draw on a finite amount time and money. “As it stands, TTR have failed to dispel any of the uncertainties brought up during the hearings to date. “So why give them more time to address the numerous gaps in their own information? “If it doesn’t stack up now the project should be rejected outright.” She said the delay was another “questionable act by the EPA” which had previously “refused to hold the hearings in the area that would be affected most”. It had also wrongly redacted information, she said. Te Runanga o Ngati Ruanui chairman Haimona Maruera Jnr said it “appeared the authority was doing everything it could to get the project over the line”. “Moving the goal posts to suit one side is shameful and highlights the unfortunate trend of playing games with our community’s future.” He called the process “shambolic and often confusing”. “....we have lost all faith in the EPA and doubt it can uphold the fairness the authority should stand for.

“Our people have fought hard and fairly, yet the burden is again placed on us to exhaust further time, money and effort to protect our rights,” Maruera said. In announcing the extension, EPA chair Alick Shaw said its Decision Making Committee (DMC) had taken into account the interests of the parties to the hearing, including the additional time and costs. “However the DMC is conscious of

its obligation [under law] to base its decision on the best available information and consider that the extension serves the interests of the community in ensuring that the DMC is able to achieve an adequate assessment of the application.” He said the DMC “thanked all parties for their contributions to the hearing up to this point. “The DMC have received a considerable amount of information and heard a wide range of views from a large number of submitters and expert witnesses. “Much time, effort and thought has gone into the evidence and representations that have been heard,” Shaw said.

## World’s First Experimental-Sea Mining Venture Set to Launch in 2019

Greg Walters, Seeker, 24 March 2017



Remote-controlled robots will journey to the bottom of the ocean in search of copper, nickel, cobalt, gold, and platinum as global demand for minerals surges.

The world’s first deep-sea mining operation will [may] kick off in early 2019 when a Canadian firm, Nautilus Minerals Inc., lowers a trio of massive remote-controlled mining robots to the floor of the Bismarck Sea off the coast of Papua New Guinea in pursuit of rich copper and gold reserves. The machines, each the size of a small house, are equipped with rock-crushing teeth resembling the large incisors of a dinosaur. The robots will lumber across the ocean floor on mammoth treads, grinding and chewing the encrusted seabed, sending plumes of sediment into the surrounding waters and killing marine life that gets in their way. The smallest of the robots weighs 200 tons.

“A lot of people don’t realize that there are more mineral resources on the seafloor than on land,” said Michael Johnston, CEO of Nautilus, by phone from the company’s field office in Brisbane, Australia. “Technology has allowed us to go there.” If Nautilus succeeds, an undersea gold rush could be at hand. Over two-dozen contracts have already been granted to explore hundreds of thousands of square miles of ocean floor by a United Nations body called the International Seabed Authority (ISA), which regulates areas of the seafloor that lie outside of any national jurisdiction. “In the seabed, resources are incredibly rich,” said Michael Lodge, Secretary-General of the ISA. “These are virgin resources. They’re extremely high-grade. And they are super-abundant.”

Analysts warn that population growth and a transition to low-carbon economies will test global supply constraints for minerals. Indeed, current levels of mining exploration are not keeping pace with future demand, according to a peer-reviewed paper published in March by a team of researchers led by the University of Delaware’s Saleem Ali. The prospect of mineral demand outstripping supply has led an increasing number of firms to consider operations at the bottom of the ocean, where reserves of copper, nickel, and cobalt are thought to be plentiful, along with lesser amounts of gold and platinum. “It’s no exaggeration to say that there are thousands of years’ supply of minerals in the seabed,” Secretary-General Lodge said. “There is just absolutely no shortage.”

Nautilus says early tests show their Bismark Sea site, called Solwara-1, is over 10-times as rich in copper as comparable land-based mines, with a copper grade above 7 percent versus an average 0.6 percent grade on land. The site also boasts over 20 grams per ton of gold, versus an average grade of 6 grams per ton on land. Many of the world's best options for surface mining have long since been explored and developed, according to Thomas Graedel, an industrial ecologist at Yale University. "The planet has been extensively explored on land," he said by phone from New Haven. "I think industry will continue to want to explore for new potential deposits of minerals." Indeed, mining the ocean floor has been under consideration for decades, but seen as a remote possibility.



An Auxiliary Cutter goes along the sea floor first, removing rough terrain and creating benches for the other machines to work on. It has a boom-mounted cutting head for flexibility



The Collecting Machine gathers cut material by drawing it in as seawater slurry with internal pumps and pushing it through a flexible pipe to the riser and lifting system

In one famous case in 1974, the CIA used a fake ocean floor mining expedition, ostensibly backed by the eccentric billionaire Howard Hughes, as cover for an attempt to hoist a sunken Soviet submarine off the coast of Hawaii. But now, the practice is shifting from fantasy to reality — a fact that is causing alarm among environmental groups who argue that not enough research has been done to prove seabed mining is ecologically sound. "There are too many unknowns for this industry to go ahead," said Natalie Lowrey of the Australia-based Deep Sea Mining Campaign, which is calling for the practice to be banned. "We've already desecrated a lot of our lands. We don't need to be doing that in the deep sea." Lowrey worries that the plume of seafloor sediment stirred up by the mining robots could travel with sea currents, disturbing ocean ecosystems. Sediment clouds could



prove harmful to filter-feeders, environmentalists argue, undercutting the lower rungs of the food chain and potentially causing knock-on effects for other creatures.

“There’s a serious concern that the toxicity from disturbing the deep sea can move up the food chain to the local communities,” who live along the coast of Papua New Guinea, she said. Johnston of Nautilus said his company is taking the sediment plume issue seriously, and that the company’s machines are designed to minimize the undersea cloud through the collection procedure itself. “When we’re cutting, we have suction turned on,” he said. “It’s not like we’re blowing stuff all over the place. We’re actually sucking it up. So the plume gets minimized through the mining process.” Johnston added, “We go to great efforts to minimize the impact of the plumes. We’re quite confident that the impact from these activities will be significantly less than some of these people claim.” At Solwara-1, Nautilus is going after a type of deposit known as Seafloor Massive Sulfides (SMS), which form next to subsea hydrothermal vents at the margins of tectonic plates. The deposits, which include copper, gold, and potentially other valuable minerals, collect after cold water seeps into the earth and becomes geothermally heated, dissolving metals and sulfides from the surrounding rocks before being spewed back out of the vent at temperatures up to 400 degrees Celsius and collecting on the sea floor — along with the minerals brought up from below.

The mining robots have been designed to operate in near-freezing temperatures, under pressure 150 times greater than at sea level. The first robot, the auxiliary cutter, carves a level path to make way for the second machine, the bulk cutter, which is equipped with a wide, powerful cutting drum. The third robot, called the collecting machine, follows behind them, slurping up the seawater slurry with a consistency like wet cement through internal pumps before sending the material to the ship at the surface via a riser system. On the ship, the water is filtered, and solids larger than eight microns are removed, before being returned back into the ocean. The cargo is then transferred to a transport vessel and sent directly to customers in China. Now, as Nautilus prepares for its maiden voyage, many will be watching from the sidelines — and if it succeeds, imitators will likely try to follow. “If Nautilus goes ahead, it’s going to open the gateway for this industry,” Lowrey said.

### **The Sinking Titanic: German Government facilitating Deep Sea Mining**

PNG Mine Watch, 23 March 2017



NGOs and civil society from Papua New Guinea, Australia, Germany and around the world are calling for a ban on seabed mining. They challenge the development of regulations[1] by the International Sea Bed Authority (ISA) and the German Government’s push to strengthen these regulations this week at a meeting in Berlin[2]. “Enough is enough!” stated Pastor Matei from the [Alliance of Solwara Warriors](#), Papua New Guinea (PNG). The Solwara 1 Project is risky business as it is an experiment and people do not want to be used as guinea pigs. The Bismarck Sea is not a science laboratory for Nautilus Minerals Inc. “People from the Pacific are custodians of the world’s largest oceans and it is these oceans that connect everyone in the Pacific. The oceans are as important as land. They are sources of food and livelihoods and they are of strong cultural and spiritual importance. Experimental seabed mining threatens this.”

“The demand for a ban on deep sea mining reflects the views of communities in PNG and across the Pacific. Our opposition is [strong and growing](#)[3].” Natalie Lowrey, Deep Sea Mining campaign stated, “The demand by Pacific communities for a ban on this frontier industry is joined by the Deep Sea Mining campaign and leading [NGOs in Germany](#). The development of regulations for deep sea mining is akin to loading more passengers onto a sinking Titanic. Report after report[4] demonstrate that the world’s oceans are already on the brink of peril.” “Recent research from the MIDAS consortium indicates a concrete risk that deep sea mining would lead to serious irreversible harm. The ISA and the German Government are paving the way for yet another assault upon our oceans – an unprecedented and unnecessary assault.”

“The demand for a ban highlights the need to debate whether we should open up our oceans seabed to mining when alternatives are available. Germany and the EU should promote sustainable sources of minerals. such as urban mining. Christina Tony, from the Bismarck Ramu Group in PNG said, “In Papua New Guinea and across the Pacific we do not see experimental seabed mining as meeting any of our communities’ needs, nor does it provide a benefit for humankind as a whole. In PNG, and across the world, we already have plenty of land-based mines and they have plenty of problems.” “Imposing this industry on us is another form of colonisation. By promoting experimental seabed mining, Germany and the EU are complicit in continuing the ‘empire’ tradition in which it believes it should be free to rape and pillage the Pacific for its own profit.”

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## NOTES

[1] See submissions by the Deep Sea Mining Campaign:

<http://www.deepseaminingoutofourdepth.org/wp-content/uploads/Deep-Sea-Mining-Campaign-submission-to-the-ISA-Nov-2016.pdf> and Seas At Risk:

<https://www.isa.org.jm/files/documents/EN/Regs/DraftExpl/Comments/SAR.pdf>

[2] Organised by the German Federal Institute for Geosciences and Natural Resources the ‘Towards an ISA Environmental Management Strategy’ workshop is being held in Berlin this week 19-14 March. The meeting aims to progress an ISA Environmental Management Strategy for deep sea mining.

[3] [Lutherans Walk 9 days Across Highlands Region Campaigning Against Deep Sea Mining in Papua New Guinea](#), EMTV; VIDEO: [Lutherans Campaign Against Deep Sea Mining in PNG](#), EMTV online and [Caritas PNG Forum call for ban on Sea bed mining](#)

[4] Reports include: World Wildlife Fund (WWF) [Reviving the Ocean Economy](#) (2015) and [The Living Planet](#) (2016); International Union for Conservation of Nature (IUCN) [State of the Ocean](#) (2013) and [Explaining Ocean Warming](#) (2016); and the [United Nation’s World Ocean Assessment 2016](#) which is a global inventory of the state of the marine environment and problems threatening to degrade the oceans.

## Awareness on deep sea tailings

Post-Courier, March 22, 2017

THE people of Matugar village in Madang Province have been assured that the deep sea tailings placement (DSTP) system at the Basamuk refinery operated by nickel-cobalt mine developer, RamuNiCo (MCC) is safe. The locals were also told that the system is adequately appropriate and avoids causing significant changes to the mine ecosystem. The information was part of the Sumkar district leg of the DSTP awareness conducted last Wednesday. The awareness was conducted by RamuNiCo and the Madang provincial government mines coordinator, John Bivi and the State team from the Mineral Resources Authority (MRA) and Conservation and Environment Protection Authority (CEPA). The DSTP awareness is a requisite environment obligation observed by MCC.



This is to educate locals within and near the project impacted areas to thoroughly know and understand the DSTP operations and its disposal locality, marine ecology and implications. Health, safety and environment officers including Jay Jerry, Shiela Danga and Steve Opur, did the awareness using educational charts and graphs to simplify the process of disposal to the villagers on how RamuNiCo uses the DSTP system and its six major components to neutralise waste before it is discharged into the deep sea at Basamuk bay. The awareness at Matugar was also attended by the chief executive officer of Sumkar, Ben Parando along with the LLG president of Sumgilbar LLG and the local non-governmental organisation chairman, Michael Badui.

Meanwhile a number of issues regarding the rising sea level which is affecting the shorelines in Matugar were also raised by the community wanting to know if it was associated with the dumping of tailings into the ocean. Officers clarified to the villagers that Climate Change was a global issue affecting many coastal and low lying island communities in PNG and the world. There were a number of critics in the village who blamed companies dumping their waste into the ocean thus causing the rising sea level in the area. However, the awareness team refuted these claims and clarified that DSTP was not responsible for the rising sea level current faced by the villagers at Matugar.

### **We must protect our seas**

Editorial , The National, March 20, 2017



These giant seabed mining machines will do enormous damage

PRIME Minister Peter O’Neill has conveyed another powerful message about the imminent threats of pollution, illegal fishing and climate change to Pacific Island nations, including Papua New Guinea. And he has called on island nations around the world to come together for global action to protect their communities from marine damage. O’Neill told leaders attending the Pacific Regional Preparatory High-Level Meeting for the United Nations Conference on Oceans in Suva, Fiji, that they had valid marine resources concerns that must be taken up by the global community. “Pollution, illegal fishing and climate change destroys ecosystems in island nation maritime areas. We did not cause these problems but these problems cause damage to our communities today and into the future.” The meeting in Suva on Thursday and Friday focused on building consensus and establishing a way forward to seek the global community’s support and assistance in preventing the destruction of marine resources in the island nations. This is the third occasion that O’Neill has raised concern about the imminent dangers that the Pacific Island community faces.

In 2015, he warned to global leaders attending the COP21 UN climate change conference in Paris to find a workable solution to save lives and protect island communities. And last year, he warned

leaders attending the Pacific Island Forum (PIF) meeting in Pohnpei, Federated States of Micronesia, that the threat posed by illegal fishing on their economic survival was growing. As chairman of the PIF, O'Neill is spearheading the Pacific Island community's cause for greater attention by the global community on these pertinent issues. This is part of his address to leaders at the Suva meeting: "Our ocean and its vast resources, not only provide nourishment for us, it also provides 20 per cent of the world's protein and economic returns for our countries from fisheries. Our ocean is a highway for significant shipping and trade generating significant economic value but with minimal returns to us. But, we are seeing alarming statistics about the health of our ocean; of the poor state of our coral reefs caused by coral bleaching and pollution, of the negative consequences for our marine biodiversity and of the levels of Illegal Unreported and Unregulated fisheries.

So we need to not only make declarations but to accelerate and step up our actions and demand the same of others to restore our ocean's health, through embracing integrated ocean management approaches and sustainably managing and conserving our coastal, inshore and ocean resources." Insofar as Papua New Guinea is concerned, the effects of climate change are already evident in the Carterets Islands, islands in Manus and the outer atolls in coastal provinces that have experienced the rise in the sea level. While climate change needs a global approach and solution, illegal fishing remains a sticky point for individual island nations. The PIF meeting last September resolved for greater action in dealing with illegal fishing and related activities. The increase in illegal fishing and human trafficking, especially by fishermen and companies of Asian origin, in our region is a growing concern.

These illegal activities seriously affect the economic survival of the small island nations, especially when large importers like the European Union and the United States raise questions and threaten to impose trade restrictions. Efforts by the fisheries authorities of the various, mostly ill-equipped island countries and their collective voice, the Forum Fisheries Agency, have been largely unsuccessful in effectively curbing illegal fishing. In a way, the PNG National Fisheries Authority (NFA) is far better placed to monitor and report on illegal fishing. The NFA has, over the years, drawn on the assistance of the maritime element of the PNG Defence Force and the Australian Navy to patrol our waters. For the smaller island nations, a lot is left to goodwill and hope that sovereign territorial rights will be respected by our neighbours. Still, we may never get to know the full extent of what is happening on the high seas. Ongoing incursions into territorial waters are indicative of blatant disrespect for sovereignty. And such a practice does nothing to help mutual relations between countries. Repercussions of illegal fishing are not only about economic losses for small island nations but there are also greater environmental concerns involving the maintenance of marine species.

### **'No harm in Experimental Seabed mining' says Minister**

Merolyn Ten, Post Courier, March 10, 2017

THE world-first seabed mining project in Papua New Guinea due to start in 2019 will not be harmful to the environment, says Mining Vice-Minister Wera Mori. Mr Mori is confident that the Solwara 1 project that will mine copper and gold deposits from the seafloor at a depth of 1600 metres in the Bismarck Sea, off New Ireland Province, does not pose a major environmental hazard. "The seabed mining offers an alternative that could be less environmentally destructive than land-based mining. The copper deposit on the sea floor are about 10 times more concentrated than a typical land-based copper mine, so less material needs to be extracted to achieve a similar production rate," he said. Mr Mori said the deposits were at the surface, so large amounts of material did not need to be removed. Unlike land-based mining, seabed mining occurs where people do not live and requires little production infrastructure, and increased worker safety with the operations being conducted remotely. He said that the metals will be mined into the subsea slurry lift pump (SSLP) and trans-

ported through the riser and lifting system (RALS) pipe straight onto the mining ship or the production support vessel (PSV).

“The mined copper and gold deposits will be then taken straight to demanding countries including Japan, China, Korea and India.” Nautilus Minerals is the Canadian company in charge of the Solwara 1 Project, being developed in a joint venture with State entity Kumul Minerals Holdings. However, according to the Deep Sea Mining Campaign, a project of the Ocean Foundation, Solwara 1 Project would represent “the first large scale, human-induced, site-specific disturbance to the deep ocean basin anywhere in the world, hence it must be considered with exceptional deliberation and caution”. A call has been made to the Government to place a ban on the experimental seabed mining. This call was made by the Caritas Co-ordinators of the 19 Catholic dioceses in solidarity with Alliance of Solwara Warriors, Bismarck Ramu Group, and concerned organisations that resolved to speak out on behalf of the silent majority affected by the proposed “experimental seabed mining” of Nautilus Minerals Limited.

### **Caritas coordinators call for ban on seabed mining**

March 8, 2017, The National Business

CARITAS coordinators of the 19 Catholic dioceses of PNG are calling on the Government to order an immediate ban on seabed mining after discussing its negative impact on coastal provinces. The coordinators, who are part of the Catholic network for social and ecological justice and integral human development in rural communities, made this call following their 2017 annual Caritas Papua New Guinea forum 2017 in Madang last month. According to a statement, the potential impacts of the proposed first “experimental seabed mining” in PNG waters was among agendas discussed. The coordinators discovered that negative impacts greatly outweighed the anticipated benefits. “We foresee that the coastal and island people whose daily lives are wholesomely dependent on the marine resources will be seriously deprived if the project goes ahead,” the coordinators stated. “Therefore, in solidarity with Alliance of Solwara Warriors, Bismarck Ramu Group and other concerned organisations, we are compelled to speak out on behalf of the affected silent majority in the rural coastal and island communities. They urged Prime Minister Peter O’Neill and Mining Minister Byron Chan to order an immediate ban and for the MPs of coastal provinces to also support their call.

### **Poland may start deep-sea mining in the Pacific**

Radio Poland, 24.02.2017

Few Poles actually know that their country has a sort of submarine plot located 500 miles southeast of Hawaii toward Mexico. It has an area of 75,000 km<sup>2</sup>, which roughly equates to one quarter of Poland’s surface. A Polish-based consortium has received permits from the International Seabed Authority to explore the zone. Will the country be able to start tapping into a vast well of underwater resources in the near future? Michał Owczarek investigates. “I think [technically] we could be quite optimistic here. Perhaps the deep-sea mining project for polymetallic nodules might be a reality within just a couple of years,” said Tomasz Abramowski Director General of Interoceanmetal

### **Massive blue whale population found in NZ proposed seabed mining area**

Jeremy Wilkinson, Stuff NZ, February 22, 2017

Blue whales - the world's largest animal - have been found in abundant numbers in a proposed seabed mining area in Taranaki. Marine mammal expert Leigh Torres made a presentation to the Envi-

ronmental Protection Authority (EPA) in Wellington on Wednesday on the results of a recent survey in the South Taranaki Bight, which found a blue whale population of at least 68. The EPA is meeting to hear arguments for and against an application from miner Trans Tasman Resources (TTR) to mine millions of tonnes of iron sands off the coast of Patea. TTRs first application was rejected in 2014. Torres, a professor from Oregon State University professor who has carried out research in Taranaki waters in collaboration with the Department of Conservation, said seabed mining will have a severe impact on the whale population in the area. "The likely impacts of seabed mining are increased noise in the area, which could seriously affect the whales and their primary prey which is krill," she said.

"The mining will be noisy and whales' hearing is crucial to them, they rely more on it than they do eyesight. "But it's the sediment created from uplifting the sand that could affect the krill which would in turn affect the whales feeding." Torres and her team observed 68 individual whales over 32 sightings during nine days this year, more than twice the number of whales they observed last year when they captured world-first footage of a calf feeding from its mother. Torres said that whales are generally seen by the scientific community as being migratory animals, but her study so far indicates that the population they've been following have made South Taranaki their home. "All we really know for certain at this stage is that the South Taranaki Bight is very important to this population," she said. "We've observed them surface-feeding but we also hear them through hydrophones calling to each other almost daily. So we know they're there a lot of the time."

Torres said the team had identified mating calls from males which indicated the whales were staying around to breed. Although TTR has offered certain mitigation strategies to protect the whales, such as deploying its own hydrophones to monitor the population, Torres said it wasn't enough. "The evidence I've presented at the hearing supports the argument of the opposition to the mining," she said. "But my own personal opinion is that the mining is not worth the risk to the whales." Oil and gas activities have operated with the Taranaki region for decades as New Zealand's only oilproducing basin, but Torres feared the effects of adding mining to the mix could do cumulative damage. This is Trans Tasman Resource's second application to the EPA to mine more than 50 million tonnes of iron-laden sand per year from a 66 square kilometre area off the coast of Patea. The company's application was rejected in 2014 amid concerns of a lack of knowledge as to the environmental effects of their proposal. When they applied last year the EPA saw a record number of submissions flood in against the proposal - more than 17,000 - in an effort spearheaded by New Zealand anti-mining group Kiwis Against Seabed Mining.

### **Panel to discuss experimental seabed mining at AAAS Meeting**

Woods Hole Oceanographic Institution, EurekAlert, 17 February 2017

WHOI deep-sea biologist Stace Beaulieu will address potential environmental impacts from experimental seabed mining on different types of ecosystems. These bamboo coral, located at a seamount in the Pacific Remote Islands Marine National Monument, are an example of hardbottomed ecosystems found at ferromanganese-encrusted seamounts. Home to an immense diversity of marine life, the deep ocean also contains valuable minerals with metals such as nickel, copper, cobalt, manganese, zinc, and gold, and rare-earth elements used in electronic technology like smart phones and medical imaging machines. As demand for these resources increases and supplies on land decrease, commercial mining operators are looking to the deep ocean as the next frontier for mining. What are the risks and environmental impacts of deepsea mining on fragile marine ecosystems? Would seafloor mineral resources be enough to keep up with the evolving demands of modern society? A panel of scholars including Stace Beaulieu, a deep-sea biologist at Woods Hole Oceanographic Institution (WHOI), will discuss these and other questions during the symposium, "Should We Mine the Seafloor?" scheduled on Saturday, February 18, at the AAAS meeting in Boston, MA.

A news briefing for science journalists will be held at 4 p.m. on Friday, February 17, in room 103 of the Hynes Convention Center.

The speakers will examine the pros and cons of seafloor mining, its engineering feasibility, and its legal and societal implications with the goal of providing the best available, objective, scientific evidence to inform ongoing policy efforts on this important and timely topic. "Our panel is unique in that we bring together knowledge of the demand for critical metals and the potential supply from known and yet-to-be-discovered seafloor mineral resources, and an understanding of deep-sea ecosystems, including a new perspective on ecosystem services that contribute to human well-being," Beaulieu says. Currently, there's no mining occurring in the ocean deeper than the continental shelves, but the industry is moving forward quickly. Many of the engineering challenges associated with working in the deep sea have already been addressed by the offshore oil and gas industry. Different types of machines for mining have been built and the components for mining systems are currently being tested in deep-sea deployments.

About 27 countries have already signed contracts to explore for deep-sea resources with the International Seabed Authority (ISA), the organization that controls mineral exploration and exploitation in the area beyond national jurisdiction. And the first deep-sea mining project --Solwara 1 within the jurisdiction of Papua New Guinea--is scheduled to begin in 2019 by Nautilus Minerals. Beaulieu's talk will address potential environmental impacts from deep-sea mining and highlight new research on the vulnerability and resilience of deep-sea ecosystems. She's also been working with social scientists to address the question of economic impacts from lost and degraded ecosystem services, such as the potential for new medicines from deep-sea, biological resources. The symposium will also feature talks by experts Thomas Graedel, an industrial ecologist at Yale University, and Mark Hannington, a geologist at GEOMAR-Helmholtz Center for Ocean Research. Graedel will examine how the demand for metals might evolve in the next few decades. Hannington's talk will focus on estimates of the abundance of seafloor deposits targeted for mining. The symposium will be moderated by Mindy Todd, a radio producer and journalist at WCAI - The Cape & Islands NPR Station.

### **New Zealand Forest & Bird warns of seabed mining risks to marine mammals**

Scoop New Zealand, 16 February 2017

Forest & Bird is warning that the destructive practice of seabed mining would cause significant damage to the marine environment if allowed to proceed in the South Taranaki Bight. The environmental organisation will be appearing at Environmental Protection Authority (EPA) hearings starting today, opposing the latest plans to mine for iron ore sand. Trans Tasman Resources Limited (TTRL) has applied to undertake iron sand seabed mining in the region between South Taranaki and Golden Bay. The application area covers 65 km<sup>2</sup> of seabed, more than three times the size of Kapiti Island. In their submission, Forest & Bird describe the significant damage that mining would cause to the seafloor, and to seabirds, fish and marine mammals.

"We know that the mining will have a significant impact on the seafloor and associated marine life, not just in the vast mine footprint, but on a much wider area due to suspended sediment plumes," says Forest & Bird Chief Executive Kevin Hague. "But what is equally important is what we don't know about the long term and cumulative impacts on the habitat of threatened and at risk species." Thirteen whales and dolphin species are known to use the South Taranaki Bight, and whale stranding records show that impacts on a much larger number of species should be considered. TTRL has also failed to provide a thorough description of noise from their proposed operations, making it impossible to assess the impacts on whales and dolphins in the region.



“The South Taranaki Bight has been recognised as an important blue whale foraging ground, possibly one of only five known in the Southern Hemisphere outside of Antarctica,” says Mr Hague. The blue whale is listed by the International Union for Conservation of Nature (IUCN) as internationally endangered. “This is a terrible proposal, not just in terms of environmental impacts, but also due to the potential damage to the New Zealand’s ‘clean green’ reputation and tourist industry,” says Mr Hague. A total of 13,733 submissions were received on this application, the highest number of submissions the EPA has received on any application since it was established in 2011. “There is a huge amount of community feeling against this destructive practice,” says Mr Hague. “We are urging the EPA to decline the application.”

### **Strong opposition to NZ seabed mining proposal at EPA hearings**

Kiwis Against Seabed Mining, Scoop NZ, February 15, 2017

When seabed mining hearings open in Wellington today, the strength of opposition will be apparent to the Environmental Protection Authority, said Kiwis Against Seabed Mining (KASM) today. The EPA is hearing a renewed application by mining company Trans-Tasman Resources to dig up 50 million tonnes of the seabed a year in a 66 sq. km section of the South Taranaki Bight – for 35 years. The EPA refused the company a consent in 2014. They have now re-applied. “It is clear from the hearing schedule and the more than 13,500 individual submissions that there is little support for this proposal,” said Phil McCabe, KASM Chairperson. “While the EPA has not released its analysis of the submissions as it did last time yet, it is clear that the vast majority of those who spoke out are against this destructive practice.” There are three times as many submitters as for the first application.

Members of the public opposed to the application will gather outside the venue at the Westpac Stadium in Wellington, when the hearings open. Inside, the first day will see opening statements in opposition from KASM, whose lawyers will also represent Greenpeace, from almost the whole of the country’s fishing industry, including fishing giants Talley’s and the Maori Fisheries company Te Ohu Kaimoana, and from the Royal Forest & Bird Society and Origin Energy. The strength of Maori opposition will be evident at the hearings in New Plymouth, the only venue outside Wellington, on 6 March. “All the local Iwi are opposing this proposal. KASM has supported calls by the Iwi for hearings in the communities that would be most affected by the seabed mining.” The process has been marked by extensive procedural wrangling KASM late last year applied to the Environment Court to force release of crucial environmental information that had been withheld by the EPA. The Environment Court agreed, ordering release of the material.

“KASM will continue to fight for public participation,” said McCabe. “Most recently we objected strongly to the decision of the committee not to allow cross examination. If anything, in light of the fact that the EPA has turned down two applications, there should be more scrutiny than ever on this proposal.” McCabe also slammed the Department of Conservation for refusing to make a submission, when, in the first application by Trans Tasman Resources in 2013, DOC made extensive submissions, particularly on the conditions for any consent, which was ultimately refused. “DOC has ditched its responsibility to protect the world’s most endangered dolphin, the Maui dolphin, despite the mine site being in its southern habitat. DOC’s lack of engagement in this process is shocking,” he said. KASM experts will be giving evidence next week. These include:

- Blue whale expert Dr Leigh Torres (Tuesday February 21), who has been studying the presence and behaviour of blue whales in the South Taranaki Bight. Dr Torres is out in the Bight right now, on another research expedition where she is looking for confirmation of her theory that the Bight is not only a feeding ground for the blue whales, but could also be a breeding ground for a New Zealand-specific population. See her evidence [here](#).

- Dr John Cockrem of Massey University (Wednesday February 22), one of the country's leading experts in the little penguin – Korora, or Blue Penguin – whose populations are in decline. The plume from the seabed mining could affect the food and feeding grounds of these birds, and others. See his evidence [here](#).
- Economist Jim Binney (Thursday 23 February) has challenged the methodology Trans-Tasman Resources has used to extrapolate its economic benefits and job creation from the proposal. He argues they should have used the Treasury's recommended cost benefit analysis methodology and that they should have valued environmental and social costs. See [his evidence here](#).

### **Study: Seabed mining causes long-lasting ecological damage**

Brooks Hays, UPI, February 10, 2017

Analysis by scientists at the National Oceanography Center in England suggest deep-sea mining operations will have long-lasting ecological consequences. Researchers reviewed the available scientific literature on small-scale sea-floor disturbances and found clear and measurable impacts to marine ecosystems lasting decades. As metals become scarce on land, the mining industry has turned its attention to the deep sea floor, where vast expanses of nodules rest. Nodules are potato-sized rocks featuring significant amounts of high-quality metals like copper, manganese and nickel. No commercial deep-sea mining operations are yet underway, but the International Seabed Authority has issued several exploratory mining licenses to companies from multiple countries.

Scientists have been conducting sea-floor disturbance experiments since the 1970s. The predictive value of a single experiment is limiting, but by surveying a variety of these experiments, scientists at NOC were able to identify broader patterns. All of the experiments analyzed by NOC researchers were much smaller than an actual mining operation. These studies will underestimate the impacts of mining," researcher wrote in their paper, published in the journal PLOS ONE. "Many would not even represent one month's work for a full-scale commercial operation, which might last for twenty years." The longest experiment included in the survey lasted 26 years. Though the disturbed site showed some evidence of recovery, biodiversity and abundance remained diminished. Because the deep sea floor is still poorly understood by scientists, researchers say environmental officials must be extra vigilant in regulating deep-sea mining operations.

### **Meeresbergbau rückt näher an die Küste**

*Meeresbergbau in der Tiefsee ist technisch sehr aufwändig und ist wirtschaftlich gegenwärtig kaum rentabel. Küstennahe Lagerstätten auf dem flachen, zugänglicheren Festlandssockel könnten aber in Zukunft beitragen, die steigende Nachfrage nach mineralischen Rohstoffen zu befriedigen. Zu diesem Schluss kommt eine Gruppe von Forschenden vom GEOMAR Helmholtz-Zentrum für Ozeanforschung Kiel in einem Beitrag im internationalen Fachmagazin Nature Geoscience.*

GEOMAR Helmholtz-Zentrum für Ozeanforschung, 09.02.2017

Die Nachfrage nach Rohstoffen steigt weiter und zwingt die Bergbauunternehmen, Erze mit geringeren Wertstoffgehalten und in immer größeren Tiefen zu nutzen. Dies könnte in den nächsten Jahrzehnten zu einem Rückgang der Bergbauproduktion führen. Ferner hängen die Volkswirtschaften vieler Industrienationen oft von Einfuhren von Metallen für ihre High-Tech-Industrien ab. Einige dieser Metalle kommen in Erzlagerstätten vor, die nur in wenigen Ländern zu finden sind. Um eine Versorgung mit diesen sogenannten kritischen Metallen zu gewährleisten wird seit geraumer Zeit auch die Tiefsee als alternative Rohstoffquelle angesehen. Trotz aller Bedenken hinsichtlich der Empfindlichkeit der Meeresumwelt und der Ökosysteme rückt ein möglicher Tiefseebergbau schnell näher. So wurden die ersten Explorationslizenzen für Manganknollen im zentralen Pazifik bereits 2001 von der Internationalen Meeresbodenbehörde vergeben. Diese Lizenzen laufen derzeit

aus und öffnen die Tür für den Abbau. In anderen Teilen der Weltmeere werden erzhaltige Massivsulfide an ehemals heißen mineralhaltigen Quellen (sogen. Schwarze Raucher) und kobaltreiche Eisen-Mangankrusten auf dem felsigen Meeresboden auf ihre Eignung als zukünftiger Rohstoff untersucht.

Aber auch der küstennahe Kontinentalschelf, auf dem bislang vorwiegend nach Öl- und Gasvorkommen gesucht wurde, könnte in den Fokus rücken. In einem Beitrag in *Nature Geoscience* betrachtet eine Gruppe Kieler Meeresforscher mögliche Chancen eines untermeerischen Bergbaus an den Ozeanrändern. „Die Zeiträume von der Entdeckung bis zur Erschließung von Erzvorkommen werden generell immer länger“, erläutert Prof. Dr. Mark Hannington, Leiter der Gruppe für Marine Mineralische Rohstoffe am GEOMAR Helmholtz-Zentrum für Ozeanforschung Kiel. „Hinzu kommt, das von allen bekannten Tiefseevorkommen nur eine Handvoll jemals für eine kommerzielle Nutzung in Frage kommt“, so Hannington weiter. Eine Nutzung von Vorkommen im Bereich der kontinentalen Festlandssockel hält der Kieler Forscher hingegen für bedeutend aussichtsreicher. Nicht nur, weil die technologischen Herausforderungen dort nicht so hoch sind, sondern auch weil die geologischen Gegebenheiten die Chance bieten, kommerziell interessante Vorkommen zu entdecken, die in der Tiefsee nicht auftreten.

Von Meerwasser bedeckte kontinentale Gesteine, die von der Fläche etwa ein Drittel der globalen Landmasse ausmachen liegen vor den Küsten. Von der Struktur und Zusammensetzung sind diese Gebiete den Kontinenten sehr ähnlich und lassen Vorkommen, die an Land abgebaut werden, auch hier vermuten. Dies wird auch durch die Tatsache unterstützt, dass es sehr viele Ressourcen im unmittelbaren Küstensaum gibt. Ein eindrucksvolles Beispiel dafür ist die Entdeckung einer riesigen Goldlagerstätte unter dem Gelben Meer in der Nähe der größten langgestützten Goldlagerstätten Chinas im Jahr 2015. „Fast alle Metallarten, die heute gefragt sind, gibt es in küstennahen Gebieten, wobei mehr als 1.700 Erzvorkommen bekannt sind, die weniger als 50 km von der Küste entfernt sind“, erläutert Co-Autor Dr. Sven Petersen vom GEOMAR. Die Kieler Geologen prognostizieren große Lagerstätten unterhalb des Meeresbodens in verschiedenen Schelfregionen der Welt. Dazu könnten Goldvorkommen vor der Küste West Afrikas, Nickelvorkommen im arktischen Ozean, und Blei-Zink-Vorkommen im Golf von Mexiko oder im Mittelmeer gehören. „Die Liste der möglichen Vorkommen ist lang und könnte unsere Sicht auf die weltweiten Offshore-Bodenschätze verändern“, meint Mark Hannington.

Ein weiterer Vorteil der küstennahen Lagerstätten unterhalb des Meeresbodens, so die Kieler Forscher, seien zum einen weniger rechtliche Dispute, da diese in den ausschließlichen Wirtschaftszonen der Anrainerstaaten lägen, zum anderen könne der Abbau auch über Tunnel von Land aus, durch künstliche Inseln oder Plattformen umweltverträglicher gestaltet werden. „Küstennahe Ressourcen unterhalb des Meeresbodens könnten eine vergleichsweise risikoarme Option sein, um unsere weltweit steigenden Anforderungen an metallische und mineralische Rohstoffe zu erfüllen“, so Prof. Hannington abschließend. Originalarbeit: Hannington, M., S. Petersen, and A. Krätschell, 2017: Subsea mining moves closer to shore. *Nature Geoscience* (2017), <http://dx.doi.org/10.1038/ngeo2897> Quelle: <http://www.fona.de/de/meeresbergbau-rueckt-naeher-an-die-kueste-21860.html>

### **China's deep-sea crewed submersible heads for Indian Ocean mining mission**

GBTIMES, 7 February 2017

China's deep-sea manned Jiaolong submersible has embarked on a journey to conduct the country's 38th oceanic scientific mission in preparation for potential mining of the sea bed. Carried by the advanced expedition ship Xiangyanghong 09, the craft departed from the port city of Qingdao in

east Shandong Province on Monday morning. Jiaolong will be used to explore the polymetallic sulphides in a deep-sea rift in northwest Indian Ocean, with the mission anticipated to pave the way for China's upcoming application to the International Seabed Authority for mining rights in that area of the seabed.

China is pursuing the ability to mine the seabed due to a scarcity of natural resources at home and increasing mineral prices on the international market. Underwater mining operations would not be uncontroversial however, as they would impinge upon delicate ecologies. Such activities will also present exacting technological challenges. During the next few months the submersible will also conduct scientific explorations in the South China Sea, Yap Trench and Mariana Trench. More than 150 scientists and researchers from 20-plus scientific institutions joined the planned 124-day voyage, according to state media.

### **Sea dragon reincarnate**

Jiaolong was named after a mythological sea dragon and is the world's first manned submersible designed to reach the depth of 7,000 metres below sea level, according to chief designer of the submersible Xu Qinan. In July last year Jiaolong carried out the China's first scientific expedition to the Yap Trench and Mariana Trench in the west Pacific Ocean, reaching a maximum depth of 6,796 metres and acquiring substantial geological, biological, and deepwater samples.

### **Scientists Fear Deepsea Mining**

By MarEx, The Mritime Executive, 2017-02-05

Scientists fear that even before one of the last frontiers of exploration, the ocean deep, has been properly studied it will already have been exploited and damaged by commercial deepsea mining looking for rare metal and minerals on the ocean floor. Around 70 percent of the world's surface is covered by ocean and more than half of that is designated as international waters. Currently less than 0.05 percent of the ocean floor has been mapped at a level of detail where objects a few meters in size can be discerned. Marine biologists estimate that there are around 750,000 marine species yet to be identified, many of them likely to be found in the deep sea. The mining industry has been developing technologies to extract metals and minerals at depths of over 500 meters, and it's expected that commercial mining will start for the first time in 2018 off Papua New Guinea with the Solwara 1 project.

One mining method is to use a conveyor belt system of buckets to bring soil containing metal and mineral deposits from sites on the sea floor up to a mining ship for processing. A second method is to use pipes to hydraulically suck up soil from sites on the sea floor, also to a mining ship for processing. But before that happens the MIDAS project, which is made up of scientists, industry figures, NGOs and legal experts from 32 organizations across Europe, gathered data to gain a good picture of what damage might be done by mining and so inform regulators of what needs to be put in place to protect the deep sea environment. MIDAS scientists have released a summary of findings late last year and plan to release more technical papers in 2017. They found that new environmental issues need to be considered, such as the large surface areas affected by nodule mining, the potential risk of submarine landslides through sediment destabilization in gas hydrate extraction or the release of toxic elements through oxidation of minerals during mining.

There is a risk that the mining process will release metal ions into the water column, either in the benthic plume created by mining vehicles or, following dewatering on the surface vessel, in a mid-water plume. Such plumes can potentially travel hundreds of kilometers, carrying potential toxicants with them. Mid-water plumes may impact photosynthetic microalgae or animals within the water column. Despite considerable sampling and study of the deep sea over the past century,

knowledge of species distribution across most spatial and temporal scales is still very poor, say the scientists. Hence, current levels of biogeographic knowledge are not sufficient to make accurate predictions of the consequences of mining. Currently the U.N. Convention on the Law of the Sea (UNCLOS) governs activity on the seabed. UNCLOS states that international waters are the "common heritage of mankind" and that the International Seabed Authority (ISA), based in Jamaica is the body responsible for administering it. The ISA has signed a number of mining deals and is in the process of drawing up a mining code to govern deep-sea mining before 2018.

The MIDAS summary report is available here:

[https://www.eumidas.net/sites/default/files/downloads/MIDAS\\_research\\_highlights\\_low\\_res.pdf](https://www.eumidas.net/sites/default/files/downloads/MIDAS_research_highlights_low_res.pdf)

## **Outrage over limited hearing locations for NZ seabed mining decision**

Jeremy Wilkinson, Stuff NZ, January 25, 2017

Hearings which will decide whether a company can mine the seabed off the coast of Taranaki will only be held in two locations - to the outrage of opposition groups. Trans Tasman Resources has applied for the second time in as many years to mine ore from sand 36 kilometres off the coast of Patea. A previous, similar application was denied in 2014. The Environmental Protection Authority will host hearings in New Plymouth and Wellington in mid-February, but Kiwis Against Seabed Mining (Kasm) is arguing that opposition to the mining is far more widespread and hearing locations should be tailored to reflect that.

"When the authority held their hearings last time around there were hearings in Hamilton and Whanganui so people all over the country could at least make one," Kasm's secretary Cindy Baxter said. Baxter said of the more than 4000 people that submitted through Kasm, 118 were in Raglan, 65 in Auckland, 38 in Whanganui and 26 in New Plymouth. "Where they're holding hearings doesn't reflect where the majority of submissions are coming from," she said. "They've said people can Skype in to the hearings, but that's not really the same thing." As for why people from all over the country have submitted against TTR and want to be heard at the hearings, Baxter said it was the precedent the proposed mining activity would set.

"It's the black sand that links us," she said. "People are very protective of it. That's how I got involved with Kasm, because I live at a black sand beach in Piha and I was worried once they were done with Taranaki they would move north." Kasm estimated that more than 17,000 people had submitted against TTR's latest application, a number later confirmed by the Environmental Protection Authority as 13,733 total submissions - with those for and against yet to be confirmed. This was the highest number of submissions the EPA has ever received on any application since it was established in 2011. The second highest being 4850 submissions on TTR's similar application in 2014. It's not just Kasm that is unhappy with the decision. Nga Rauru Kitahi - one of the iwi which TTR's proposed mining activities will affect - has said the decision to not hold hearings within the territory of tangata whenua was "appalling".

"It's a serious insult to not hold hearings on one of Ngati Ruanui or Nga Rauru Kitahi marae or at an absolute minimum, within one of our rohe (territory)," Nga Rauru Kitahi's general manager Anne-Marie Broughton said. She compared the the decision to "behaviour deployed on Maori in the 1800s when the Native Land Court convened sittings regarding Maori land in distant locations creating barriers of time and cost to owners". "Consequently, many Maori owners were unable to attend court hearings, resulting in the loss of their lands." Broughton said it was appalling that this behavior was continuing in 2017. The hearing will begin in the Member's Lounge in Westpac Stadium, Wellington, at 9am on February 16. Dates and times for the New Plymouth hearings have yet to be confirmed.



## Die rauchenden Schätze der Tiefsee

*Sydney. Der Bergbau will tief in Ozeane vordringen, um wertvolle Erze zu fördern. Umweltschützer warnen vor einem maritimen Raubbau.*

Von Rainer Kurlmann, RP Online (Rheinische Post), 18. Januar 2017

Die großen Maschinen stehen schon bereit. Im nächsten Jahr sollen sie 1800 Meter tief bis zum Meeresgrund abgelassen werden. Die kanadische Bergbaufirma "Nautilus Minerals" plant vor der Küste von Papua-Neuguinea eine technische Meisterleistung. Ein gewaltiger Bagger und eine Fräse sollen auf dem Boden des Pazifischen Ozeans wertvolle Erze abbauen. Der Meeresboden entstand durch die Tätigkeit von Vulkanen. Seine Kruste enthält große Mengen wertvoller Metalle: Kupfer, Gold, Silber, Kobalt und andere seltene Erze, die für Hightech-Legierungen in Windkraftanlagen, Computer und Handys benötigt werden. Die Kanadier sind mit den Vorbereitungen für den Beginn des Tiefseebergbaus weit fortgeschritten. Auch das Letzte der ferngesteuerten Geräte, ein schraubenförmiger Aufzug, der das Gestein an Bord eines Schiffes hieven soll, absolviert den Praxistest.

Nach Firmen-Angaben ist der Metallgehalt der Steine bis zu tausendfach größer als bei den gewöhnlichen Minen auf dem Land. "Nautilus Minerals" rechnet angesichts der hohen Nachfrage damit, dass sich die teure Investition für die Entwicklung der Maschinen bald rechnen wird. Experten schätzen allein den Wert der Kupfervorkommen im Abbaugbiet vor Papua-Neuguinea auf 350 Millionen Euro. Und die geologische Struktur unter der Bismarcksee vor den Pazifikinseln ist keineswegs selten. "Wir erwarten weltweit mehr als 5000 mögliche Abbaugebiete", sagt Mike Johnston, Geschäftsführer von Nautilus.

Die technischen Probleme scheinen beherrschbar. Der neue Goldrausch hat längst begonnen. Eine japanische Firmengruppe kündigte 2016 ein erstes Bergbauxperiment vor der Küste Tokios an. Die internationale Meeresbodenbehörde (ISA) hat inzwischen 27 Lizenzen für Tiefseebergbau vergeben, drei Viertel davon erst in den letzten fünf Jahren. Auch Deutschland gehört zu den Lizenznehmern. Die 1994 gegründete ISA soll die Bodenschätze der Tiefsee als "gemeinsames Erbe der Menschheit" verwalten und Richtlinien für den Abbau formulieren. Mike Johnston und sein Team müssen diese Dokumente aber nicht abwarten. Ihr Schürfgebiet in der Bismarcksee liegt innerhalb der 200-Meilen-Zone von Papua-Neuguinea, der Pazifikstaat kann über die Nutzung des Gebiets allein entscheiden.

Offiziell sucht "Nautilus Minerals" den Schulterschluss mit der Bevölkerung. Doch für das Miteinander von Tourismus, Fischfang und Tiefseebergbau ist keine Lösung in Sicht. Das arme Land hofft auf hohe Einnahmen durch die wertvollen Erze. Doch ob dieser Ertrag die möglichen Folgen für die Umwelt rechtfertigt, vermag derzeit kaum jemand abzuschätzen. "Die Vielfalt und Verteilung des Lebens in der Tiefsee sind noch weitgehend unbekannt", erklärt Antje Boetius. Nicht einmal ein Prozent des Meeresbodens sei bisher erforscht, so die Meeresbiologin an der Uni Bremen. "Wir wissen noch nicht einmal, welche Lebewesen dort existieren und welche Belastung sie tolerieren", beklagt Matthias Haeckel von Geomar Helmholtz-Zentrum in Kiel. Die Forscher wünschen sich eine Bestandsaufnahme, bevor Bagger ihre Arbeit aufnehmen. Doch für eine Diskussion über die Größe der Abbaugebiete, über die Ausweisung von Schutzzonen und Ausgleichsflächen oder Rekultivierung lässt der ehrgeizige Zeitplan keine Luft.

"Die Regierung und Nautilus verwenden die Bismarcksee als Experimentierplatz für den Tiefseebergbau", bilanzierte Christina Tony, die enttäuschte Chefin einer lokalen Umweltschutzgruppe zum Jahreswechsel. Die Folgen des Bergbaus sollen erst untersucht werden, wenn die Arbeiten schon begonnen haben. Mehrere Pazifikstaaten, mit denen "Nautilus Minerals" bereits Vorverträge abgeschlossen hat, warten den Start der neuen Technologie ab. Das geringe Wissen, das Forscher über die Auswirkungen des Tiefseebergbaus gesammelt haben, stammt von deutschen Wissenschaftlern. Im Auftrag des Bundeswirtschaftsministeriums haben sie im Jahr 1989 eine elf Quadrat-

kilometer große Fläche in 4500 Meter Tiefe durchpflügt und mit einer Art Fangkorb die dort auf dem Boden liegenden Manganknollen geerntet.

Die Folgen dieser Aktion im Osten des Pazifiks finden die Forscher auch 26 Jahre später noch. Auf den Videos des Tiefsee-U-Boots der Geomar sind die Spuren des Pflugs noch sichtbar. Auch die Biologie hatte sich noch nicht erholt. "Das Entfernen der Manganknollen hat die Verteilung der Organismen in diesem Gebiet dauerhaft verändert", berichtet Antje Boetius, "denn ohne Knollen kommen einige Arten nicht wieder". Der Bergbau in der Bismarcksee könnte größere Auswirkungen haben. Denn dort wird nicht nur loses Material gesammelt, sondern der Meeresboden aufgebrochen. "Durch den Abbau wird eine große Wolke von Sedimenten und giftigen Metallen entstehen", beschreibt Haeckel. Während die größeren Stücke binnen weniger Stunden wieder zu Boden sinken, treiben die feineren Partikel nach seiner Einschätzung über mehrere Wochen durch das Meer. "Wir wissen nicht, wie das Ökosystem, wie Fische und Fischlarven auf diesen feinen Staub reagieren. Die Organismen, die Wasser filtern, können dieser Belastung kaum entkommen", sagt der Meeresbiologe.

### **13,700 have a say on NZ seabed mining application**

Wanganui Chronicle, 17 January 2017

Environmental Protection Authority staff have finished counting all the submissions made on Trans-Tasman Resources' applications to mine the South Taranaki seabed for ironsand. There are 13,733 submissions, now listed alphabetically on the authority's website, but not yet analysed. A note from the authority says the Te Runanga o Ngati Ruanui submission included a petition. Its signatories were not counted as individual submitters. It also says some submitters did not include all the information required on the authority's online submission form. In some cases the need for that information has been waived, and those submissions will be considered.

### **Seabed mining project advances, Papua New Guinea locals consider lawsuit**

Free Speech Radio News, January 12, 2017

The deep seas are some of the most uncharted ecosystems in the world. Scientists say we know more about the surface of the moon than the deep seas. Yet the world's first commercial deep sea mining operation for gold, copper and silver in the Bismarck Sea could be underway in just a year. But, as Georgia Clark reports, Papua New Guinea locals are considering a lawsuit, calling for greater transparency and fearing the project could cause irreversible damage to one of the world's few pristine frontiers. In the next hundred years, humankind is set to face ever more pressing environmental challenges. With climate change already taking hold, scientists say conservation is crucial. But economies with growing populations continue to depend on finite resources, like fossil fuels and minerals, pushing exploration for deposits into new frontiers. And that quest for resources has come to an underwater biosphere off the coast of Papua New Guinea's New Ireland Province.

"These deep sea hydrothermal vents are some of the most remarkable biological communities ever discovered and they were only very recently discovered in the 1970s," says marine biologist, professor Richard Steiner, who has been studying the area and the life it sustains. "The rarity of this ecosystem is extraordinary, it could be the most rare ecosystem type in the biosphere of this planet." Canadian mining company, Nautilus Minerals, has been developing a plan to extract high-grade deposits of copper, gold, zinc and silver on the seabed near the mineral-rich underwater Hydrothermal Vent Systems. According to their Environmental Impact Statement, remote-controlled seafloor mining devices would collect ore that will be sent to the surface for processing. Known as the Solwara 1 project, the 25-acre underwater site is slated to become the world's first commercial seabed

mine. But the project has been under fire, with critics arguing that the environmental risks are too high and, more recently, calling on Nautilus to be more transparent.

“For the past four years the deep sea mining campaign and also communities in Papua New Guinea have been calling on the government and Nautilus to release documents around this project,” explains Natalie Lowrey, media coordinator at the Deep Sea Mining campaign. “If they don’t there could be a situation where communities there look at a legal challenge.” Some Papua New Guinea locals have raised concerns about the government’s 15 percent stake in the project. “The PNG government is so corrupt that it’s very difficult to monitor and regulate projects like this. Given the situation, it’s a stakeholder and therefore there is a conflict of interest and we don’t think it will carry out the responsibility of regulating and monitoring this project effectively,” says John Chitoo, a coordinator with Bismark Ramu, an NGO that represents Papuans opposed to the project. “To make matters worse, the conservation minister was formerly the mining minister; he was the one who licensed Nautilus.”

Chitoo says Indigenous communities in PNG also worry about how mining operations could disrupt longstanding cultural practices closely linked to the local environment: “The sea is their welfare, their livelihood – it’s the source of food. The people in New Island also use the sea for bathing, cooking. In the past people used to use sea as graveyard as well. In the west coast of New Island, they still practice shark calling.” FSRN sent multiple interview requests to Nautilus Minerals over a three-week period. A company representative said Nautilus CEO Mike Johnston would be unavailable for comment until after the story’s publication. In past statements, Nautilus Minerals has expressed confidence that cutting edge technology will allow the company to mine the seabed in an environmentally responsible way. But Professor Steiner, who conducted his own independent study into the proposed mine, says the project warrants extreme caution. “Scientifically, there’s just too many unknowns about these deep sea vent communities, so we really can’t accurately predict what the impacts will be,” Steiner points out. “But we do know that they will be severe on a local scale and they could actually be severe and long lasting – there could be species extinctions caused just on this 11 hectare site.”

While some environmentalists argue there is insufficient conclusive evidence to give the world’s first commercial deep sea mine the green light, Nautilus argues the benefits of deep sea mines outweigh those of terrestrial mines. “I think that the one thing Nautilus has done well is that they’ve been very good about collecting scientific information. They’ve been very open about what they’ve found in terms of the biodiversity,” says Professor Elaine Baker, an expert in the sustainable use of marine resources at the University of Sydney. “They’ve have engaged top scientists from around the world to do the environmental impact study, and they’ve taken note of criticism – they’ve actually really progressed the science and our understanding of these organisms by the number of studies that they’ve done.” Copper density in the Solwara deposit is reputedly several times higher than what is typical in terrestrial mines. It’s copper that Nautilus says will help meet worldwide demand for goods like smartphones and computers.

Natalie Lowrey of the Deep Sea Mining campaign says consumers need to consider costs behind the price tag. “Solwara 1 is gold and copper. We don’t really need any more gold – 80 percent of gold is used for jewelry, it’s not a necessity. Copper, yes, I can understand, copper is used in a lot of things, but these are things that could be recycled,” Lowrey points out. “We could really look at it like the idea of urban mining in the economy is actually cradle to cradle, so actually the way we design our products in the first place that they can last longer but also we’re able to extract the minerals and metals from there in the best way possible.” While Nautilus has outlined mitigation strategies, such as transplanting sea animals in the path of the mines, with the integrity of their sea life and cultural practices at stake, locals say court action is foreseeable. With operations set to commence in 2018, the clock is ticking.

## **New Zealand seabed mining opponents want a say**

Laurel Stowell, Wanganui Chronicle, January 11, 2017

The Environmental Protection Authority has failed on two counts in the lead-up to hearings on Trans-Tasman Resources' application to mine the South Taranaki seabed, Rochelle Bullock says. Trans-Tasman Resources wants marine consents to mine nearly 66 square kilometres of seabed offshore from Patea. Hearings on the matter begin next month. Ms Bullock liaised between opponent groups during Trans-Tasman Resources' (TTR's) last applications in 2013 and is doing so again. Opponents include iwi from the region, Kiwis Against Seabed Mining (KASM) and others. The authority (EPA) has failed to keep in touch with submitters and also failed to hold hearings in the places where most of those who want to speak live, Ms Bullock claims.

Anyone who wants to speak during the hearings must contact the EPA before noon today to let it know. Otherwise they will not be able to speak. Ms Bullock said that last time all the submitters were warned of the deadline by email, but that hasn't happened this time. She was desperately trying to get the word out yesterday. She also said it was not logical or ethical to hold hearings only in Wellington and New Plymouth. Submitters had asked for hearings in the places that would be most affected by the mining - from Patea south toward Whanganui. Hearings for TTR's first application were held in several places in 2013, including Pariroa Marae near Kakaramea and at the Wanganui District Council. KASM says there have been 17,000 submissions to the applications. A spokeswoman for the EPA could not confirm this, saying as they were still being counted.

The "highest density" of people who wanted to speak at the hearings was in Whanganui, Ms Bullock said. The EPA could not confirm that either. When Ms Bullock rang the EPA to ask why the hearings would only be in Wellington and New Plymouth, she was told those locations were more accessible and had venues. She told the staff member there was no lack of venues in Whanganui. "It's very unfair to expect a whole community to travel to Wellington or New Plymouth. [The hearings] should be held in the place of the people directly affected. There seems something very obviously wrong when you choose not to go to the people that are submitting," she said.

## **Anti mining lobby denied charitable status**

Post-Courier, January 05, 2017

Kiwis Against Seabed Mining has been denied charitable status and the accompanying tax benefits because it's considered an advocacy rather than educational group. KASM describes itself as a community-based action group that raises awareness of mining proposals and educates the public. It made submissions against Trans-Tasman Resources' application for permission to mine in the South Taranaki Bight and NZAX-listed Chatham Rock Phosphate's bid to mine the Chatham Rise, some 450 kilometres offshore to the east of Christchurch. The group also attended relevant hearings and engaged legal counsel and scientific and economic experts about the proposals. The Charities Registration Board said in its December 15 decision that it agrees KASM does have a charitable purpose in protecting the environment. But because its main way to achieve this was by advocating for a moratorium on seabed mining applications, the board said it could not decide if the end result was charitable.

"Given the potential consequences of preventing seabed mining until all environmental impacts can be understood and mitigated, the board does not consider it can determine a charitable public benefit," the board said. "Any public benefit is unlikely to be capable of demonstration by evidence." In the year ended March 31, 2016, KASM generated about \$25,500 in income, of which \$17,200 came from membership and donations. It spent \$21,300, with its biggest expenses being legal costs at \$8,800 and wages at \$8,600. KASM argued it was only opposed to non-essential seabed mining,

not all seabed mining, and its advocacy work was ancillary to its main purpose of advancing education. The group also argued relevance from a Supreme Court finding on Greenpeace's charitable status. In that case, the majority of the bench found political advocacy could be charitable, depending on the goal and its promotion, particularly where environmental objectives were at stake. –NZN

### **K6m financing notice for Nautilus**

Post-Courier, January 05, 2017

NAUTILUS Minerals has delivered a US\$2 million (K6 million) Financing Notice for November 2016. This was released last month in its market report announcing it was pursuant to its subscription agreement with Mawarid Offshore Mining Ltd and Metalloinvest Holding (Cyprus) Limited. The "Investors" dated August 21, 2016, as amended (the "Subscription Agreement"), the Company has delivered a financing notice dated November 21, 2016 (the "Financing Notice") to the Investors in respect of a private placement of an aggregate of 15,539,080 common shares of the company at an issue price of C\$0.174 per share for aggregate proceeds to the company of US\$2,000,000. The private placement will be allocated equally between the two investors.

In accordance with the Subscription Agreement, the issue price equals the five day volume weighted average trading price of the company's shares on the Toronto Stock Exchange immediately prior to the date of the Financing Notice, and the number of shares to be issued under it was calculated based on the noon US/CAD exchange rate of 1.3519 posted by the Bank of Canada on the last business day prior to the date of the notice. Closing of the private placement under the Financing Notice is required to occur during December, 2016 and within 10 business days following payment of the subscription proceeds by the investors to the company, pursuant to the Subscription Agreement. The private placement forms part of the up to US\$20 million (K65 million) financing approved by the company's shareholders at the extraordinary general meeting of the company held on October 26, 2016.

### **'Casper octopod under threat from deep sea mining'**

By Helen Briggs, BBC News, 19 December 2016

A deep sea octopod, dubbed "Casper" after the film ghost because of its appearance, could be at risk from mining, scientists say. The animal, possibly a new species, was discovered last spring at depths of more than 4,000 metres (2.5 miles). Studies suggest females nurture their eggs for several years on parts of the seabed that contain valuable metals. Commercial companies are interested in harvesting metals and minerals from the bottom of the ocean. Media captionAn octopod, dubbed "Casper" after the film ghost, could be at risk from deep sea mining. There are growing concerns about the future impact of mining on life in the deep sea, much of which has yet to be discovered and categorised.

### **New marine life found in deep sea vents**

#### **Ghost-like 'Casper' octopod discovered**

The octopus lays its eggs on the dead stalks of sponges, attached to rocky crusts which are rich in metals like manganese. The female then protects the eggs as they grow, perhaps for a number of years. "The brooding observation is important as these sponges only grow in some areas on small, hard nodules or rocky crusts of interest to mining companies because of the metal they contain," said Autun Purser, of the Alfred Wegener Institute's Helmholtz Centre for Polar and Marine Research in Germany. "The removal of these nodules may therefore put the lifecycle of these octopods at risk." The "Casper" octopod was spotted last year by the camera of a submersible vessel remotely operated by NOAA off Necker Island near Hawaii.



A type of octopus without fins, it crawls along the seafloor. Jon Copley of the University of Southampton, who is not connected with the new research, said the record for octopus mothers keeping vigil over their eggs is four years, by another deep-sea species in the Pacific. If this species is similar, then it could be particularly vulnerable to disturbance by deep-sea mining, he said. "This discovery shows how we need far greater understanding of fundamental ecology - and far greater knowledge of the natural history of individual species - in deep-sea environments being targeted for future mining, before its potential impacts can really be assessed," Dr Copley told BBC News.

### **Metal-rich deposits**

The German and US researchers investigated deep sea environments using remotely operated vehicles, and towed camera surveys, between 2011 and 2016. They observed 29 octopods from two distinct species on the bottom of the Pacific Ocean off the Hawaiian Archipelago and in part of the Peru Basin. Image copyright Alfred Wegener Institute Image caption An octopod brooding its eggs on the stalk of a dead deep-sea sponge. Two octopods were seen to be brooding clutches of eggs that were laid on stalks of dead sponges, which require manganese to grow and stay attached to these rocky crusts or nodules. "These nodules look a bit like a potato, and are made up of rings of different shells of metal-rich layers," said Dr Purser. "They are interesting to companies as many of the metals contained are "high-tech" metals, useful in producing mobile phones and other modern computing equipment, and most of the land sources of these metals have already been found and are becoming more expensive to buy." The scientists say the future of octopods and other animals, large and small, must be considered when managing "commercially attractive, yet bio-diverse and poorly understood deep sea ecosystems". The research is published in the journal, [Current Biology](#).

### **New marine life found in deep sea vents**

By Helen Briggs, BBC News, 15 December 2016

Six new animal species have been identified at deep-sea vents beneath the Indian Ocean. The remote area is home to life not seen elsewhere in the world's oceans, yet has been earmarked for future mineral exploration. Hydrothermal vents form at locations where seawater meets magma. They are surrounded by a large number of organisms that are new to science. The latest finds include worms, snails and a crab. UK researchers explored an area of the Southwest Indian Ridge, which bisects the ocean between Africa and Antarctica, in 2011. Scientists at Southampton University revealed they had found many new creatures using a remote-operated underwater robot.

### **Species spotted at deep-sea vent**

They have now analysed samples from the site, known as Longqi, or "Dragon's Breath", and compared them with known species based on the animals' genetic make-up. The study, published in the journal *Scientific Reports*, shows six animals new to science.

### **The six new species**

- a "Hoff" crab
- a "giant peltospirid" snail
- a whelk-like snail
- a limpet
- a scaleworm
- a polychaete worm

Hydrothermal vents were first discovered in 1977. Since then, more than 400 new animal species have been discovered living around them across the world's oceans. "Hydrothermal vents form a network of marine life in the deep, and so far we've only glimpsed one node of the network in the south-west Indian Ocean," said Dr Jon Copley, who led the research. "Our results show that we

need to explore this network much further, if we're going to understand the possible impacts of any future mining at hydrothermal vents in this region." Image copyright University of Southampton  
 Image caption A vent chimney known as "Jabberwocky" Mining on the seabed is expected to be a growth area in the future. Contracts for seabed mining exploration and eventual mining in the high seas are granted to individual countries by the International Seabed Authority, an organisation created by the United Nations. Over one million sq km of ocean floor (400,000 sq miles) in the high seas of the Pacific, Atlantic and Indian Oceans has been earmarked for exploration by at least 16 countries. A Chinese research vessel has been surveying the hydrothermal vents in the Southwest Indian Ridge for mineral deposits this year.

### **German NGOs call for a ban on deep sea mining**

Seas at Risk, 15 December 2016

The German Federation for Environment and Nature Conservation (BUND), member of Seas At Risk, called for a ban on deep sea mining together with several other German NGOs (PowerShift, Fair Oceans, Brot für die Welt, MISEREOR, Stiftung Asienhaus, Forum Umwelt und Entwicklung). The ban was called for in the context of the International Conference on deep sea mining hosted by the German Federal Ministry for Economic Affairs and Energy on December 13th, and in which BUND and Seas At Risk participated. Germany has already received exploration licenses for 85,000 km<sup>2</sup> of seabed in the Central Pacific and the Indian Ocean and during the conference the Ministry clearly expressed the intention to have a leadership role in the development of deep-sea mining.

The German NGOs fear that in the current race for marine resources, harms to the vulnerable deep sea habitats and ecosystems may be neglected. The knowledge of the deep sea ecology is far too scarce to estimate the risks of deep sea mining. The exploitation of unique habitats will lead to serious and irreparable loss. In addition to a ban of all mineral exploitation projects in the deep sea, the NGOs also called for alternative strategies to reduce raw material consumption, by enhancing recycling rates and developing smart and sustainable product design. They also emphasised the importance to respect the human rights of the Pacific civil societies that are currently opposing seabed mining projects. Local communities see the Pacific as their 'fluid continent' and they oppose to their land and sea becoming an experimental field again as in the times of nuclear testing.

### **Seabed mining in PNG: environmental experiment, false hope of economic returns**

Media Release, Deep Sea Mining Campaign, 14 December 2016

Nautilus Minerals pedalled false hope for experimental seabed mining at the PNG Petroleum and Mining Conference in Sydney. NGOs and civil society in PNG raise serious doubt about the commercial and environmental viability of the Solwara 1 seabed mining project. Natalie Lowrey, Deep Sea Mining campaign said, "Despite securing bridge financing with its two biggest shareholders to continue the Solwara 1 project, Nautilus faces significant technological and financial uncertainties. They are yet to demonstrate that seafloor resource development is commercially viable and environmentally sustainable." "The Nautilus Annual Information Form for the Fiscal Year ending 2015 highlights the potential for equipment damage, mechanical failure and operational failure and it warns that the projected yields and costs for Solwara 1 should be viewed with a low level of confidence."

According to the Form's section on risk factors, Nautilus has not completed and does not intend to complete a preliminary economic assessment, pre-feasibility study or feasibility study before embarking on mining at the Solwara 1 Site. The Form also acknowledges that the impact of any seabed

mining operation on the environment will only be determined by monitoring after Solwara 1 has been developed. “This does nothing to reassure local communities. The proposed Solwara 1 site is right in the middle of our fishing grounds and ocean currents operating at the Solwara 1 site would bring pollutants to our shores,” stated Jonathan Mesulum, from the PNG Alliance of Solwara Warriors. Christina Tony, from the Bismarck Ramu Group in PNG said, “These admissions formally confirm what community members and activists have asserted for some time, that Nautilus and the PNG Government are using the Bismarck Sea as their testing ground and that Solwara 1 is indeed Experimental Sea Bed Mining”

“The business case for Solwara 1 is extremely weak and is a huge risk for the PNG government. It will not generate revenue, employment or business opportunities for the local communities whose lives and livelihoods depend on the ocean. Our former prime minister and Governor of New Ireland province, Sir Julius Chan, cast his doubts about experimental seabed mining as a serious environmental risk for our seas which are the gardens for our people.” The Parties to the Nauru Agreement (PNA), who control the world’s largest sustainable tuna purse seine fishery, have warned this week that without caution and adherence to the precautionary principle sea bed mining will go down the same track as the tuna fishery- foreign companies over exploiting Pacific Island resources with no tangible benefits delivered to local populations. The National Fisheries Authority in PNG has also expressed its concerns over seabed mining in the country.

### **New Zealand seafloor needs protection from experimental seabed mining**

Victoria University of Wellington, 14 December 2016

Seafloor communities within New Zealand’s Exclusive Economic Zone (EEZ) need better protection against deep-sea mining, according to a Victoria University of Wellington researcher working with NIWA scientists to investigate the environmental effects of deep-sea mining. Rachel Boschen, who graduates with a PhD in Marine Biology today, says although there is interest in mining for Seafloor Massive Sulfide (SMS) deposits within the EEZ, little is known about the seafloor communities that are found there and potentially at risk from mining activities. SMS deposits are mineral-rich ore deposits that form on the seabed. Within the New Zealand EEZ, deposits form at submarine volcanos at 1000–2000m depth along the Kermadec Volcanic Arc. Part of Rachel’s research involved reviewing 70 hours of video footage covering more than 50 km of seabed across three seamounts on the Kermadec Volcanic Arc. From the footage, she was able to characterise the structure and distribution of seafloor communities.

“Seafloor Massive Sulfide deposits are formed by hot springs on the seafloor, which are known to be important habitat for specially adapted animals. What I didn’t expect was that not only did the areas with active hot springs support unique communities, but areas where springs are no longer active also hosted unique communities. These communities have complex distributions, with each of the studied seamounts supporting communities not found on the other seamounts. “The action of the hot springs causes SMS deposits along the Kermadec Volcanic Arc to be rich in copper, zinc, lead, gold and silver, and there has been interest in mining them. If mining occurs, the unique communities found in my study could be at risk. “To mitigate the impacts of any future mining, it’s important to designate protected areas that conserve seabed hosting unique or particularly sensitive communities to ensure they are not lost from the region.” Animal collections taken during the study also allowed her to determine the connectivity of populations of a deep-sea mussel species found at seafloor areas at risk from mining. Rachel examined the DNA of seven populations of a mussel species endemic to active hot springs along the Arc, to assess the populations’ genetic connectivity across the species’ 830 km range.

“By looking at their DNA I was able to determine how connected different populations are along the Arc. The results suggest that although connectivity is generally high amongst populations, some central populations may play an important role in maintaining connectivity in the region. Another population at the northern extent of the species’ range is less connected and may be more at risk from deep-sea mining disturbance. “The results indicate that to preserve the connectivity and health of these deep-sea mussel populations, we need multiple protected areas of seabed, designed as a network.” Rachel adds that a protected network should include SMS sites that are both thermally active and inactive to protect the range of communities and include sites key to population connectivity.

She says while the New Zealand Government’s proposed 620,000 km<sup>2</sup> Kermadec Ocean Sanctuary, announced in 2015, was “a big step towards protecting areas potentially at risk from deep-sea mining”, it may not be enough to safeguard unique communities from mining activities. “There are many SMS deposits south of the proposed sanctuary that are not offered adequate protection, including the seamounts in this study and some other sites on the Arc that are important to regional population connectivity.” Rachel’s supervisors Professor of Marine Biology Jonathan Gardner at Victoria, and Dr Ashley Rowden and Dr Malcolm Clark from NIWA agree her research provides valuable information that can safeguard the future of this ecologically important area. Professor Gardner says: “Her research highlights the threats posed by deep sea mining before it begins, giving us a much better idea of how we need to set up areas for both mining and conservation.”

### **Opposition to South Taranaki seabed mining proposal triples in two years**

JEREMY WILKINSON, Taranaki Daily News, December 13, 2016

Opposition against proposed seabed mining in South Taranaki has more than tripled in just two years, a campaign group says. The last time Trans Tasman Resources applied to mine 50 million tonnes of iron-laden sand per year from the seabed off the coast of Patea, in 2013, more than 4,680 people opposed them. Now, after the Environmental Protection Authority’s (EPA) submission period ended on Monday, Greenpeace and Kiwis Against Seabed Mining (KASM) say they have collected more than 17,000 submissions against the mining going ahead. The application for seabed mining in Taranaki has proved controversial. KASM chairman Phil McCabe said it was likely a record number of submissions and proved opposition had grown exponentially. “Last time Trans Tasman Resources tried – and failed – to gain approval for a similar proposal, the EPA received more than 4,600 submissions against it – which was a record at that time,” he said.

Kasm Chairman Phil McCabe said the 17,000 submissions was likely a record response. “We have blown that record out of the water, proving that opposition to seabed mining has grown exponentially.” McCabe said the focus now would be on the preparing for the EPA hearing into the application - which is due to be scheduled sometime in January. “We cannot let this proposal go ahead, as it would create a precedent for other mining proposals, not only on the North Island’s West Coast, but also a proposal off Waihi Beach,” he said. Ngati Ruanui’s general manager Debbie Ngarewa-Packer slammed the EPA’s submission process. Trans Tasman Resources applied to mine the same area in 2013, but was rejected by the EPA on the basis it had not done enough consultation with the community and the environmental effects of the mining were unknown. In the first application, just 11 people submitted in favour of the proposal. This time around the submission period was extended twice, first due to affected iwi Ngati Ruanui objecting to the company’s cultural impact assessment process. The second extension came after KASM, Ngati Ruanui and Talley’s Fisheries took the EPA to the Environment Court over a decision to allow certain sections of Trans Tasman’s application to stay blacked-out.

The authority lost the battle, meaning it had to release the redacted (physically blacked-out) information and extend the submission period by another month. Ngati Ruanui's general manager Debbie Ngarewa-Packer said the fact the submission needed to be extended several times was "indicative of the total incompetence of the whole process". "The total number of submissions against them doesn't matter, what I think is important is that there has been massive engagement," she said. "It validates the fact that kiwis as a community are extremely concerned about this kind of activity." Ngarewa-Packer said they were not challenging the application for "the sake of challenging". "When they came back a second time and kept pushing it became obvious we would need to be more active and more informed," she said. "This time around we've put a lot of man hours into understanding this application and breaking it down into understandable chunks." A spokesperson for the EPA said it would take some time to process the submissions and "therefore cannot at this stage give any indication of submission numbers".

**World-first PNG seabed mining project forges ahead; miners express confidence about commodity prices.** By Sajithra Nithi, ABC News, 9 December 2016

The world's first project to mine the seabed for minerals is expected to begin operations in Papua New Guinea in early 2019. Nautilus Minerals is the Canadian company in charge of the Solwara 1 project, which will see copper and gold deposits mined from the seafloor at a depth of 1,600 metres, 30 kilometres off PNG's New Ireland Province in the Bismarck Sea. A few months ago, Nautilus reported funding issues for Solwara 1. Adam Wright, vice-president of PNG operations for Nautilus, said the global oil and iron ore price had an impact on some shareholders, who have now put in a bridging finance facility for the project. Speaking at a conference about mining in PNG, he said a big incentive for mining the seabed is the higher concentration — or grade — of the metal deposits. "The grades of the Solwara 1 deposits [are] 7.2 per cent copper. If you look at the average grades of copper in terrestrial copper mines, it's now less than 0.7 per cent copper," Mr Wright said.

"Yes, you can still find copper on land, but as grades fall you're going to have to clear more land ... relocate more communities, you're going to have to store more tailings, you have to dispose of more waste ... accessing an ever-decreasing resource with ever-increasing costs." Solwara 1 is being developed in a joint venture with state entity Kumul Minerals Holdings. The plan to mine the seafloor has raised concerns about the possible effects on the environment. In July, PNG's former attorney-general Sir Arnold Amet joined the campaign against Solwara 1, calling it a "Papua New Guinea pig" experiment. He said the licence was issued even though PNG has no national policy on deep sea mining nor an appropriate legal framework to regulate such operations. However, Mr Wright from Nautilus said the company submitted an environmental impact study to PNG's Conservation and Environment Protection Authority (CEPA), which was then independently verified.

**Concern over experimental seabed mining and fisheries in Pacific**

Rosalyn Albaniel, Post Courier, December 9, 2016

THE Pacific's two largest fisheries blocs - the Pacific Islands Fisheries Forum Agency and Parties the Nauru Agreement - are treating the issue of experimental seabed mining cautiously. Pacific waters are home to the world's largest fishery currently accounting for around 56 per cent of the global supply of tuna. The dilemma the region faces is that those same waters will also be hosting the world's first ever copper-gold project. Papua New Guinea heavily relies on its extractive industry and the progress of the Solwara 1 project, now under development in its territorial waters, will mean added revenue to its national coffers while also much needed foreign exchange. Canadian miner Nautilus Minerals has already been granted the environment permit and mining lease required for



resource development at this site. It has indicated plans to grow its tenement holdings in the exclusive economic zones and territorial waters also in the Solomon Islands, Tonga and other locations in the Western Pacific.

PNA chief executive officer Ludwig Kumoru, who trained and worked as a fisheries scientist, said he considered deep sea safer for tuna than land based mines. This is because the proposed seafloor mining operations would be done at 1600 metres beneath the surface, well away from the 200 metre water level where the tuna live and breed. However, he said the eight-member group recognised that being the first of its kind there were questions and different circumstances in different locations. However, land mines still posed more risk. "Worse is the tailings that come through the rivers from land based mines and into the sea, that to me will affect the fish to head the PNA. "But it depends on the sites, in other places it may be different, there may be a lot of strong under-current which could move the cloud (plumes) up (to the 200m mark) or the way they move the minerals up, then there is going to be problem," Mr Kumoru said.

### **New Ireland governor casts more doubt on PNG seabed mining**

Radio New Zealand, 8 December 2016

The Governor of Papua New Guinea's New Ireland province has cast further doubt on the viability of seabed mining. Sir Julius Chan, who is a former prime minister, says he is in a dilemma over the Solwara 1 mining project planned for the sea in his province. While he is keen on economic developments, Sir Julius said the sea is the "garden" of his people, yet the impacts of seabed exploration are a set of unknowns. Although interested in what new technologies can achieve, he questions the veracity of the environmental impact study by project developer Nautilus. "Maybe they have found some solutions to the environmental protection and I would be far behind if I don't look into the future, if I stop the whole project now then possibly I may miss out, if I allow it to happen it may be disastrous for my people."

The national government has a 15 percent stake in Solwara 1, yet Sir Julius said his provincial government has not taken up an offer to buy in to the project at this stage. He said the national government has not properly consulted the province about such developments and just bulldozes them through. This is why, according to Sir Julius, his provincial assembly in September unilaterally declared New Ireland to be an autonomous province of PNG. The government has yet to formally respond to this. However, Sir Julius believes PNG needs to take a serious look at modifying the current Westminster-based, centralised system. "I think we need some form of restructuring and even to the extent of having a constitutional sort of reform to decentralise more powers, and we should form something like federalism in Papua New Guinea."

### **Analyse des volkswirtschaftlichen Nutzens der Entwicklung eines kommerziellen Tiefseebergbaus in den Gebieten, in denen Deutschland Explorationslizenzen der Internationalen Meeresbodenbehörde besitzt, sowie Auflistung und Bewertung von Umsetzungsoptionen mit Schwerpunkt Durchführung eines Pilot-Mining-Tests Studie im Auftrag des Bundesministeriums für Wirtschaft und Energie**

Studie im Auftrag des Bundesministeriums für Wirtschaft und Energie, Hamburg, 1. Dez. 2016.

Das Interesse an der Entwicklung des Tiefseebergbaus hat in den letzten Jahren international erheblich zugenommen. Deutschland hält seit 2006 über die Bundesanstalt für Geowissenschaften und Rohstoffe (BGR) bei der Internationalen Meeresbodenbehörde (IMB) eine Lizenz zur Exploration von Manganknollen im Pazifik. Eine weitere Lizenz zur Exploration von polymetallischen Sulfiden im Indischen Ozean wurde im Mai 2015 unterzeichnet. Im deutschen Manganknollen-Lizenzgebiet

hat die BGR bereits umfangreiche Erkundungsarbeiten durchgeführt. In der Studie wird unter volks- und betriebswirtschaftlichen Aspekten beleuchtet, ob und inwiefern ein fortgesetztes deutsches Engagement im Tiefseebergbau sinnvoll und gerechtfertigt ist und welche weiteren Schritte anstehen könnten.

Link: <http://www.bmwi.de/BMWi/Redaktion/PDF/Publikationen/Studien/analyse-desvolkswirtschaftlichen-nutzens-der-entwicklung-eines-kommerziellentiefseebergbaus,property=pdf,bereich=bmwi2012,sprache=de,rwb=true.pdf>

### **The Sinking Titanic: International Seabed Authority and Mining the Common Heritage of Humankind**

*NGOs and civil society from Papua New Guinea and around the world challenge the development of regulations[1] for deep sea mining by the International Seabed Authority (ISA). Their call for a ban on this frontier industry highlights the need for debate on progressing deep sea mining when alternatives are available. Media Release, Deep Sea Mining Campaign, 29 November 2016*

Natalie Lowrey, Deep Sea Mining campaign stated, “The development of regulations for deep sea mining is akin to loading more passengers onto a sinking Titanic. Report after report[2] demonstrate that the world’s oceans are already on the brink of peril. Recent research from the MIDAS consortium indicates a concrete risk that deep sea mining would lead to serious irreversible harm. The ISA is paving the way for yet another assault upon our oceans – an unprecedented and unnecessary assault.” The Deep Sea Mining campaign made a joint submission to the ISA on the draft framework for the regulation of deep sea mining in May 2015. The submission highlighted that decisions on deep sea mining should be underpinned by implementation of the Precautionary Principle[3], achieving Free Prior and Informed Consent (FPIC)[4], and gaining broad civil society support. “Our current submission reflects our disappointment that these critical elements have been ignored in the draft regulations now produced by the ISA. Without them there should be a complete ban on deep sea mining”, continued Ms Lowrey.

The call for a ban on deep sea mining reflects the views of communities in Papua New Guinea and across the Pacific. Opposition to deep sea mining throughout the Pacific is strong and growing[5]. Christina Tony, from the Bismarck Ramu Group in PNG said, “The oceans are part of our Common Heritage. The ISA’s prime mandate is to protect the deep sea (Article 145, UNCLOS). Where is the discussion on needs-based mining vs profit-based mining?” “In Papua New Guinea and across the Pacific we do not see experimental seabed mining as a need for our communities nor a benefit for humankind as a whole. In PNG, and across the world, we already have plenty of land based mines and they have plenty of problems.”

“Enough is enough!” stated Jonathan Mesulam from the Alliance of Solwara Warriors. “People from the Pacific are custodians of the world’s largest oceans and it is these oceans that connect everyone in the Pacific. The oceans are as important as land as sources of food and livelihoods, they are of strong cultural and spiritual importance. Experimental seabed mining threatens this.” “There are alternatives to extracting minerals resources from our oceans, these include the improvement of product design and the reuse and recycling of materials through processes as urban mining”, said Ms Lowrey. “There is yet to be a rigorous and thorough examination of the potential impacts of deep sea mining on the environment and human health. Deep sea mining should therefore not proceed.”

### **NOTES**

[1] Comment by ISA members and stakeholders closed to the initial working draft regulations and standard contract terms on exploitation for mineral resources on Friday 25 November 2016. The purpose of the comments is so the Commission can get the “views and opinions on the content and

structure (as opposed to any fine-tuning of the drafting language) of the working draft from the Authority's stakeholder base. These views will be presented to the newly elected Commission in February 2017 together with a revised working draft. It is intended that the next Commission will formulate a clear methodology with regards to the elaboration of the Mining Code, timelines and stakeholder contribution in the regulatory content and drafting process in connection with regulatory development."

<https://www.isa.org.jm/news/deadline-comments-working-draft-exploitation-regulations-extended>  
 [2] Reports include: World Wildlife Fund (WWF) [Reviving the Ocean Economy](#) (2015) and [The Living Planet](#) (2016); International Union for Conservation of Nature (IUCN) [State of the Ocean](#) (2013) and [Explaining Ocean Warming](#) (2016); and the [United Nation's World Ocean Assessment](#)

2016 which is a global inventory of the state of the marine environment and problems threatening to degrade the oceans.

[3] The United Nations World Charter For nature (1982) states that the precautionary principle requires

that "activities which are likely to pose a significant risk to nature shall be preceded by an exhaustive examination; their proponents shall demonstrate that expected benefits outweigh potential

damage to nature; and where potential adverse effects are not fully understood, the activities should not proceed."

[4] [Free Prior and Informed Consent \(FPIC\)](#) currently exists in many international law instruments. It is most clearly articulate in UN Declaration of the Rights of Indigenous Peoples (UNDRIP, 2007). The Deep Sea Mining campaign calls for FPIC to recognised and extended to the Common Heritage and Benefit of Mankind including our international oceans.

[5] [Lutherans Walk 9 days Across Highlands Region Campaigning Against Deep Sea Mining in Papua New Guinea](#), EMTV and VIDEO: [Lutherans Campaign Against Deep Sea Mining in PNG](#), EMTV online

35

*Download the Deep Sea Mining campaign submission to the ISA:*

[www.deepseaminingoutofourdepth.org/wp-content/uploads/Deep-Sea-Mining-Campaignsubmission-to-the-ISA-Nov-2016.pdf](http://www.deepseaminingoutofourdepth.org/wp-content/uploads/Deep-Sea-Mining-Campaignsubmission-to-the-ISA-Nov-2016.pdf)

## **Undersea mining not beneficial, says Sir Julius Chan**

November 28, 2016, The National

NEW Ireland Governor Sir Julius Chan has spoken out against undersea mining in his province by Nautilus Minerals. He said New Ireland had also not benefited fully from the Lihir mine. Sir Julius said last Friday that he had a lot of reservations given the possible environmental impact of undersea mining in his province. "When you drill down, one-mile deep, I don't know," he said. "The sea, in my province, is the garden of my people. "That's why we don't have too much food security problems. "I have great reservations and I want to tell you that I'm not a friend of Nautilus. They make all kinds of promises. "They even promised me they would build bridges four years ago but they did not even design a bridge for me to have a look at. "I've trod very cautiously on this one." Sir Julius said the Lihir Island had also not benefitted fully from the mine. "After 20 years, Lihir has not even got a proper ring road," he said. "The water is polluted, sometimes the fish die. "They say all the nice and promising things in their negotiations, but when they start to operate, they put up barricades."

## A New Threat to Oceans: Deep-Sea Mining for Precious Metals

Posted By Sarah Fahmy, Nautilus, New York, Nov 27, 2016

Around 500 miles southeast of the bright turquoise waters at Honolulu Harbor, and two and a half miles down to the dark ocean floor, a massive carpet of potato-sized rocks stretches thousands of miles on the seabed. These rocks, called polymetallic, or manganese, nodules, are made up of manganese, nickel, copper, and cobalt. The nodules' growth is one of the slowest geological processes in the world—it takes millions of years for one to grow a couple of millimeters: Tiny particles precipitate from the surface of the ocean to the seafloor and conglomerate around a core, like a rock or a shark tooth, and create a nodule. John Mero, a professor of mineral technology at the University of California, Berkeley, was the first to eye them as a potentially revolutionary mineral resource. “Development of the means to mine manganese nodules could serve to remove one of the historic causes of war between nations, supplies of raw materials for expanding populations,” he wrote in his 1965 book, *The Mineral Resources of the Sea*. “Of course it might produce the opposite effect also, that of fomenting inane squabbles over who owns which areas of the ocean floor and who is to collect the protection money from the mining companies.”

Whether mining these nodules will help end cycles of war and peace still remains to be seen, but Mero was right about one thing: They are now the precious targets, worth millions of dollars, of an emerging deep-sea mining industry, and that's making many researchers like Craig Smith, a professor of oceanography at the University of Hawaii at Mānoa, cautious. As the head of the Smith Lab, he focuses on the seafloor ecology of various habitats, including the abyssal plains, which cover 50 percent of Earth's surface. “We assume that it is likely that more species occur in the deep sea than anywhere else on Earth,” the authors of one paper wrote. “To pick up nodules, a mining machine, kind of like a potato harvester, would come along and dig up sediment. This would disrupt the top 10 to 15 centimeters of sediment, which is most of the habitat of the seafloor,” Smith tells me. “Nodule mining, because of its vastness and the slowness for the environment to recover, is basically an instantaneous wipeout of a community and ecosystem.”

When researchers from the University of Hawaii, like Smith, take box-core samples from the seabed, it's the norm to discover new species, not the exception. The rare deep-sea communities based on and around the nodules respond, unsurprisingly, extremely slow to change. They hardly ever experience any disturbance: “Even after a very small-scale scientific dredge, we can still see the tracks on the mud 30 years later,” says Jeff Drazen, the chair of the Biological Oceanography Division at the University of Hawaii. “They look like they were made yesterday.” The highest concentration of polymetallic nodules is in the Clarion-Clipperton Fracture Zone (CCZ), an area roughly 70 percent of the size of the continental United States, between Mexico and Hawaii. The zone has been divided up into 15 national claim areas, seven environmentally protected areas, and one reserved area for the International Seabed Authority (ISA). Countries including Tonga, China, the United Kingdom, and Singapore all have claims. The metals these nodules contain are essential to modern technology. “The technology sector”—which includes the manufacturers of steel, fMRIs, smart phones, and LCD screens—“is completely dependent on these elements,” says Alex King, the director of the Critical Materials Institute, operated by the United States Department of Energy.

Above-water mines supply the global rare earth industry with over 100,000 tons of metals per year, according to a 2015 report by the U.S. Geological Survey. A 2013 paper, published in *Ore Geology Reviews*, states, “The mineral resources required to sustain growth and to support green- and emerging-technologies can no longer be supplied solely from land-based sources,” but they're “abundant in deep-ocean crust and nodules.” Take thallium, for example, a metal used in optics, electronics, and magnet-based machines—the nodules in the CCZ contain 6,000 times more of the stuff than the “entire terrestrial reserve base for those metals.” The necessary mining technology is too expensive relative to mineral prices for deep-sea mining to be profitable, though, so no one's

mined the nodules just yet. “Right now, it is nonexistent, a wannabe industry,” says John Wiltshire, the director of the Hawaii Underwater Research Lab, who has 40 years’ experience in the mining industry. Nevertheless, he says, it’s the “long-term future of mining.”

“Vast areas are being targeted by concession holders for future mining,” a recent *Scientific Reports* paper states. “Despite the present lack of knowledge, large-scale harmful effects of these activities are expected.” To prepare for that, the ISA requires a biological baseline study be undertaken for each contract area. These studies will inform environmental-impact assessments on the effects of deep-sea mining. The ABYSSLINE project, for example, a program led by Smith, started baseline surveys for the United Kingdom Seabed Resources Ltd. exploration contract area in 2013, which should be completed by 2018. But, given how little is known about the environment in the first place, it’s not clear how much help these assessments will be, says Diva Amon, a post-doctoral researcher at the University of Hawai’i’s Mānoa School of Ocean and Earth Science and Technology. “There are a lot of effects of mining that we can’t even anticipate,” she says. “We’re just starting to answer the question of what actually lives down there and we’re still not even close to answering that.”

## **Transparency Needed On PNG Seabed Mining Project**

By Franklin Koma

PORT MORESBY, Papua New Guinea (PNG Post-Courier, November 25, 2016) – Some nongovernmental organisations are concerned about the lack of transparency behind the world’s first seabed mining project set to begin operations in 2018 in the Bismarck Sea. It was claimed yesterday that Canadian company Nautilus Minerals, responsible for the project dubbed Solwara1, had kept its operations and plans secret from the Papua New Guinea public. Bismarck Ramu Group’s Christina Tony told the media that Nautilus Minerals’ refusal to provide key information on its operations was unfair to the people. Ms Tony said that the seabed mining project – 15 percent of which is owned by the State – would have environmental impacts and that any endeavour with such ramifications should have total transparency.

“We are not saying that the project is some evil thing that is utterly bad, all we hope to have is a report and if possible a second opinion on what environmental impacts could be wrought from the project,” she said. Ms Tony said that there remained strong opposition to the project among local communities and environmentalists, the World Bank included. The Mining Ministry yesterday that an environmental impact study has indeed never come out to the public and that only the PNG Government through the Mining Ministry was presented information on planned operations. Further, an independent company in Australia recently reviewed that environmental impact report that was presented and reported several concerns. “That information hasn’t been extended to the public yet.”

A representative of the Alliance of Solwara Warriors, Jonathan Mesulam, said that they have been fighting for public rights to information in PNG for many years. Last year, PNG’s Mining Minister Byron Chan said communities in the Bismarck Sea area had been continuously consulted about the project. However, according to Mr Mesulam, “Nautilus does not have the consent of local communities. We still don’t know what the impacts of this experimental mining will be. According to Minister Chan, PNG stands to gain US\$124million from the mining project, and describes the expected environmental impacts of the project to be “relatively small”. Efforts at making contact with a representative from Nautilus Minerals were in vain.



## **Deep concerns remain in PNG on mining in the Bismarck Sea**

Radio New Zealand, 24 November 2016

A Papua New Guinea NGO says communities around the Bismarck Sea are not convinced by government assurances over the safety of seabed mining. Canadian company Nautilus Minerals is expected to begin its Solwara 1 project in 2018 in what is set to be the world's first seabed mining operation. The Bismarck Ramu Group was concerned that government gave approval for the project after only one environmental impact study carried out by Nautilus. The NGO's Christina Tony said that despite assurances to New Ireland communities by both government and Nautilus that they don't have anything to worry about, people are deeply worried. "They are asking questions about how the government and Nautilus can guarantee them that these machines will not have a direct impact on the ecosystem that we depend on. The Bismarck sea and the Solwara 1 project is used as a science lab by Nautilus," said Christina Tony.

## **Lutherans Walk 9 days Across Highlands Region Campaigning Against Experimental Seabed Mining**

Rachel Shisei, EMTV News, 23 November 2016

Their outreach awareness focused on the issues affecting 'God's creations', or the natural resources in the country. The campaign specifically aimed at the Experimental Seabed Mining project, the only kind in the world licensed by the government, to operate in the country. "We are not in favor of this 'experimental' seabed mining project to happen in the country, so we're including and doing awareness in our outreach. If we don't do it, who else will?" said Pastor Matei Ibak, the Lutheran Youth Bible Study Master. Ibak said, despite speaking about the 'sea' to people of the Highlands provinces; most people were in tears when the youth group from Karkar Island performed dramas and songs, expressing the importance of the sea to their livelihood, and country as a whole. This, he said, is a sign that people agree, that things are going the wrong way and may become worse, if nothing is done in time.

Former Chief Justice, a Karkar Islander and a Lutheran churchgoer himself, Sir Arnold Amet weighed in on the issue saying that in terms of awareness, the government has a lot more work to do to help the people understand the environmental; biological; and oceanographic impacts that the mining activity can have on the sea once disturbed. "The potential impact upon the sea life is still uncertain so I am expressing the view against the project from continuing until those issues are fully explained to the people. Sir Amet said, it is very vital that for such projects, the whole government, regardless of the various departments and levels of government, should unite and respond in accordance. "There's a lack of united response that results in many issues remaining outstanding until disasters strike," said Sir Amet. Pastor Ibak pointed out, that their awareness is not based only on the Lutheran faith, but promoting Christianity as a whole in the country; that in the beginning God created the earth, and gave man his first duty to look after the land and everything on it.

## **Deep sea mining plans for Papua New Guinea raise alarm**

David Hutt, Mongabay, 18 November 2016

*Hydrothermal vents create both hotspots of deep-sea biodiversity and rich mineral deposits. Papua New Guinea is at the centre of a debate about whether these sites should be preserved or mined.*

- *Plans are moving forward to launch operations at the world's first deep sea mine, in Papua New Guinea's coastal waters.*
- *Nautilus Minerals, Inc. claims the project will have less ecological and social impact than on-shore mines.*
- *The mine's opponents say too little is known about the risks such projects pose to deep sea*

*ecosystems and coastal communities.*

- *Despite its mineral riches, Papua New Guinea has very poor indicators for human health and well-being, and a long history of unrest centered on resource extraction.*

Remote-controlled vehicles will soon begin churning up the ocean floor off the coast of Papua New Guinea, searching for millions of tons of copper and gold. In 2011, Canada-based Nautilus Minerals, Inc. was granted a 20-year mining license by the government of Papua New Guinea to begin exploring almost 500,000 square kilometers (193,000 square miles) in the Bismarck Sea. The project, called “Solwara 1,” was granted the first-ever permit for deep sea mining. After a series of disputes and financial setbacks, extraction is slated to begin in the first quarter of 2019. The project aims to mine deposits laid down over thousands of years around underwater hot springs, otherwise known as hydrothermal vents.

These are found between one or two kilometers (0.6 to 1.2 miles) below sea level, where islands of life are created by a rare combination of superheated highly mineralized vent fluids, cold seawater and microbes that are capable of using these conditions to produce organic nutrients. The resulting ecosystems are rich in carbon dioxide, hydrogen sulfide, organic carbon compounds, methane, hydrogen and ammonium. What’s more, as one report opined, there is evidence to suggest that deep sea hydrothermal vents may be “where life first evolved on earth.” These same conditions make deep sea vents very attractive for resource extraction companies; when hot, mineral-rich vent fluids hit cold seawater water, gold and other precious metals drop to the sea floor.

“We know very little about deep sea ecosystems; some scientists say we know more about the surface of the moon,” said Natalie Lowrey, communications coordinator for the Deep Sea Mining Campaign told Mongabay. “The proponents of this ‘frontier’ industry are pushing the line that deep seabed mining will have less impact than terrestrial or land-based mining. This is a very irresponsible argument as there is no scientific evidence yet provided to say there will be little to no environmental impact.” Before mining is allowed to commence, Lowrey said, “independently verified research must be conducted to demonstrate that neither communities nor ecosystems will suffer long term negative impacts.” Nautilus maintains that it carried out extensive impact studies before applying for a mining permit, and found that mining more than 1,300 meters (4,265 feet) below the surface would not affect shallower water, due to the temperature and density of water at such great depths.

The company also commissioned US-based consultancy firm Earth Economics to write a report on the possible implications of the operation. The overall conclusion of the report, titled *Environmental and Social Benchmarking Analysis*, was that the deep-sea mine would be “remarkably advantageous” because no people live at the site, so there would be “no cultural or historical claims to the site.” The report also concluded natural resources will be “less impacted” than with conventional mining since fresh water will not be contaminated, and that the possible impact of the mine would be less significant than the impacts of a nearby erupting underwater volcano. “The overall conclusion is that Solwara 1 has the potential for far fewer social and environmental impacts than the existing terrestrial mines examined,” it stated.

When the report was published last year, it was widely criticized by environmental groups, economists and civil-society organizations. The critique was encapsulated in a rival report, titled *Accountability Zero*, authored by Helen Rosenbaum of the Deep Sea Mining Campaign and Francis Grey, of Economists at Large. According to its critics, the Earth Economics’ report used an unsatisfactory comparison between Solwara 1 and existing land-based copper mines to examine environmental impacts. Conservation biologist Richard Steiner told Mongabay Nautilus has “absolutely not” done enough research into possible affects. “These are poorly understood deep sea communities, and we are unclear what the full immediate and long-term impacts of mining disturbance

would be,” Steiner continued. “But we do know that thousands of vent chimneys, and their associated biological communities, would be destroyed. It is likely that species yet to be identified may become extinct.

And that raises some very serious ethical concerns.” A 2011 report, again authored by Helen Rosenbaum, titled *Out of Our Depth*, noted that even before last year’s Earth Economics’ report, the “government of Papua New Guinea has granted a 20 year license for Solwara 1 based on a flawed Environmental Impact Statement and a superficial understanding of social and economic impacts.” The report added: “It may be concluded that in the case of Solwara 1, Papua New Guinea’s environmental approvals process has failed to protect the health of the marine environment, the livelihoods and well-being of coastal communities, and fisheries of national and regional economic importance.” Aside from the unpredictability of the operation, there are more practical risks associated with the endeavor.

Janet Tokupep, the Alliance of Solwara Warriors, a community group that opposes deep sea mining, said in a statement last year that since the proposed mine site lies only thirty kilometers away from the mainland, it will greatly impact on the coastal communities, especially the fishermen who earn their living in the area daily. “The serious liabilities associated with the risks of Solwara 1 make it a disastrous investment,” Tokupep said. What this means is that, today, very little is known for sure about the possible risks of the Solwara 1 project. The human and ocean life near the mine are set to be the proverbial Guinea pigs for a still untested technology.

### **Why is Papua New Guinea risking so much?**

“Papua New Guinea undoubtedly is a mining state.” So reads the homepage of the country’s Mineral Resources Authority. Indeed, Papua New Guinea relies on its natural resources, including oil and gas, copper, gold and other valuable minerals. The Asian Development Bank estimates that from a high of 30 per cent of the GDP in the 1990s, the mining and petroleum sectors now amount to around 20 per cent of the country’s GDP. However, there is reason to believe this is significantly higher. For example, a report by Pricewaterhouse Coopers suggested that gold alone contributed to 15 per cent of the country’s GDP in 2012, the highest contribution to a gold-mining country’s economy in the world. In 1988, then-prime minister Pias Wingti announced his ‘look north’ policy, intended to court investment from China and Japan. In recent years, Chinese companies have invested heavily in mining in Papua New Guinea. In May, the firm PanAust Ltd announced a \$3.6 billion investment to expand the Frieda River copper-mining project, though this may take another two-years for approval.

So far, the growth of the extractive sector has rarely translated into tangible improvements for the majority of the country’s inhabitants. In 2013, the Center for Global Development released its Millennium Development Goals (MDG) Progress Index, which tracked progress toward reducing hunger, poverty, child mortality and improving health and education. Papua New Guinea came second from bottom, only beating the Democratic Republic of Congo. Mineral rich Papua New Guinea has also suffered greatly from the extractive industry. In 1988, civil war broke out in the islands of Bougainville following protests over the Panguna copper mine. Sabotage and attacks were carried out by the Bougainville Revolutionary Army, which led to the closure of the mine and the call for independence. The civil war came to an end in 1998, costing the lives of between 15,000 and 20,000 people, and led to Bougainville being made an autonomous region of Papua New Guinea. While this was the most serious of the crises, it was not the only problem caused by mineral extraction. Protests are common throughout the country as many of the country’s poor feel they have been left out from reaping the benefits, only to suffer from the process.

### **Global concerns**

As Mongabay reported last month, Solwara 1 is the beginning in a new trend in deep-sea mining.

Using software developed by Deep Sea Mining Watch that allows internet users to track vessels engaged in deep sea mining activities from anywhere in the world, researchers found that five Russian-flagged vessels were charting waters belonging to the Polynesian kingdom of Tonga, and another vessel has been scouting areas near the Mariana Trench. As of last year, the Center for Biological Diversity estimates there to be 26 permits in operation for deep-sea mining. For example, an estimated 1.5 million square kilometers (about 580,000 square miles) of ocean floor in the Pacific Islands Region is now believed to be under exploration by private companies and state-owned firms. “Deep Sea Mining is a highly experimental and untested activity. At present, there are no viable deep-sea mining operations – and there are no enforceable regulations governing such exploitation,” said Payal Sampat, Mining Program Director of Earthworks.

“It’s hard to imagine that DSM will be commercially viable in the next few years given the many uncertainties and risks involved.” According to Lowrey, the Solwara 1 project, based on such limited research and information, has established “a frightening precedent” for the Pacific region. “Very little is understood about the possible impacts of this one project let alone the many projects for which exploration is starting throughout the Pacific,” she said. Steiner argues there should be a 10-year moratorium on issuing any permits for deep-sea mining. “We simply do not have the understanding of these deep ocean biological systems to feel comfortable with moving forward with this scale of industrial development,” he said. “Unfortunately, with such strong coast state government support and industry interest, and demand for more raw minerals in the global economy, there is a great deal of pressure to conduct deep-sea mining.” He added: “The effects could be greater than any industrial activity to date anywhere.”

### **Solwara One project may begin in 2019**

November 16, 2016, The National

By SHIRLEY MAULUDU

NAUTILUS Minerals says the development of the Solwara One project in New Ireland may begin in 2019. A spokesperson told The National yesterday that the company was still sourcing additional funding for the development of the project. “The company has now secured the necessary bridge financing to facilitate the time required to secure additional required funding,” the spokesperson said. “If the additional required funding is secured by June 2017, and subject to ongoing detailed planning, the company could be in a position to commence the initial deployment and testing operations at the Solwara One project by the end of Quarter One in 2019.” Nautilus earlier said in the event that the required funding was secured and the company could continue development of the Solwara One project, the schedule would be delayed.

In a statement in August, Nautilus noted that there was no assurance that the company would be able to obtain the necessary project financing on acceptable terms or at all. The failure to secure project financing may result in the company taking various steps to maximise shareholder value, including suspending or terminating the development of the Solwara One project, and engaging in various transactions including, without limitation, asset sales, joint ventures and capital restructurings. The company also previously told The National: “Nautilus Minerals is still committed to delivering the Solwara One Project in Papua New Guinea. “We are currently in discussions with various parties that are commercially sensitive. “We will continue to update all stakeholders as things progress. We remain confident that we can deliver the project and appreciate the strong support we have from our shareholders, partners and stakeholders.” Solwara One is located approximately 30 kilometres from the nearest coast (New Ireland).

## **NZ Activists take seabed miner to court**

Simon Hartley, Otago Daily Times, 8 November 2016

The first of what is likely to be many challenges by environmentalists against a seabed mining proposal started in the Environment Court yesterday, with Kiwis Against Seabed Mining taking Trans Tasman Resources to task over redacted documents. Trans Tasman recently made its second application to the Environmental Protection Authority (EPA) to mine the South Taranaki Bight seabed for iron sands. Its first application last year was declined by the EPA, after Trans Tasman spent \$66million on research and development. However, the basis for the court challenge by KASM was prompted after Trans Tasman was successful in lobbying the EPA to redact large swathes of its second application from public scrutiny.

While KASM has been mobilising thousands of individuals to make submissions on the application, its chairman Phil McCabe said yesterday Taranaki iwi Ngati Ruanui and Talley's Fisheries had both made submissions supporting KASM's case in the Environment Court. Mr McCabe said the "hundreds of pages of redactions" included details of the content of the Bight's seabed sediment, the modelling, and detail, of the sediment plume which would be spread across the Bight from seabed mining, as well as economic data. "We were forced to take our case to the Environment Court because the redacted documents provide crucial information about the potential environmental impact of digging up 50 million tonnes of the seabed a year for 35 years,"

Mr McCabe said in a statement. Both Trans Tasman and separate seabed mining proposer Chatham Rock Phosphate had their respective first applications turned down by the EPA, meaning every step of the legal process becomes precedent-setting. Mr McCabe noted no information was redacted in either Trans Tasman or Chatham's first, unsuccessful, applications and saw no reason for that to have changed. He said the redacted documents could only be viewed if a party signed a confidentiality agreement, which severely restricted distribution and discussion of the content and put signatories at risk of civil and criminal penalties if they breached that agreement. The hearing is expected to last for two days. In mid-October, the EPA extended the public submission period by a month to November 14, following requests for more information. The extension meant the formal application would now begin no later than January 31.

## **Nautilus Minerals linked to corruption allegations around Namibian seabed mining**

PNG Exposed, 31 October 2016

Prospective Solwara 1 seabed mining company Nautilus Minerals can be linked to the allegations of corruption surrounding a controversial decision by the Namibian government to allow seabed mining. Namibia's Fisheries Minister, Bernhard Esau, is crying foul over a government decision to allow phosphate mining on the seabed. He says the decision to grant an environmental permit to Namibian Marine Phosphate was done behind closed doors and in defiance of an earlier government imposed ban. As Fisheries Minister, he says he was denied an opportunity to present his own proposal for a detailed 3-5 year environmental study before any approvals were granted. Namibian Marine Phosphate is owned by the same company, MB Holdings, that is the largest shareholder in Nautilus Minerals. MB Holdings owns 85% of Namibian Marine Phosphate through its wholly owned subsidiary, Mawarid Mining LLC. MB Holdings is owned by Omani business man Mohammed Al Barwani.



## **Seabed mining ‘catastrophic’**

*Marine phosphate mining is nothing like diamond dredging and will have extreme and irreversible consequences for millennia to come, says an expert.*

Catherine Sasman, Namibian Sun, 26 October 2016

Marine biologist and former director of the Sam Nujoma Marine and Coastal Resources Research Centre of Unam, Professor Edosa Omoregie, has warned that marine phosphate mining, however small or large the scale, will lead to devastating and long-lasting effects on the marine ecosystem. He said this could cause serious damage to the productivity of the Namibian marine environment and the country’s fisheries. Omoregie made these remarks at the first annual research conference of the Sam Nujoma campus at Henties Bay in late September. Despite strong resistance from environmental groups, environmental clearance has been granted to start with marine phosphate mining. The Ministry of Environment and Tourism has granted the certificate to Namibia Marine Phosphate, which is developing the world’s first marine phosphate project off the coast of Namibia. Omoregie said marine phosphate mining involves massive seabed dredging that removes as much as 20 metres of the top sediments that have accumulated for millions of years.

With massive removal of this large quantity of sediments, reclamation after mining would be practically impossible, hence other countries with huge marine phosphate deposits have refused to allow mining. The presentation noted that the high productivity of the Namibian marine ecosystem is dependent on the biological and chemical processes taking place in these sediments. Once these sediments are disturbed and eventually removed, the consequences could be extremely devastating to marine life. Another concern raised by Omoregie is that marine sediments rich in phosphorite are known breeding grounds for several commercial fish species and other marine life. The removal of these sediments would, therefore, directly affect fish stocks. There is currently no scientific data on the effects of marine phosphate mining on fish productivity because it has never been done anywhere in the world.

And for good reason, figured Omoregie, because of what is known about disturbances of the seabed, which should concern everyone, including decision-makers and politicians. “Remediating phosphate mining on land is easy but in the deep sea reclamation would be practically zero and will take several million years to recover,” was Omoregie’s apocalyptic prognosis. Another concern he raised is the release of several types of nutrients into the water column, including inorganic phosphates that have been locked up within aggregates in these sediments. One consequence of this release would be red tide and sulphur eruptions, which the mariculture industry is scared of. Another consequence would be the direct toxic effects of nutrient over-loading. Omoregie and others have investigated the effects of varying concentrations of a single superphosphate fertiliser on the survival and respiratory dynamics of Nile tilapia under laboratory conditions. They concluded that fertilisers in water bodies stimulate growth of phytoplankton and waterweeds, which in turn provide food for fish. However, at certain concentrations of these fertilisers, algae and waterweeds grow wildly, clogging the waterways and depleting the dissolved oxygen present in the system. In short; aquatic life suffocates as a result.

Moreover, said Omoregie, the geology of the seabed is poorly understood and for this, it is not clear to what extent massive removal of seabed sediments would disrupt underlying rock formations. It is a known scientific fact that there are several vents within underlying rocks of seabed sediments. Massive sediment dredging could expose some of these vents, making whatever has been locked up within the vents erupt into the water column. Omoregie likened this eventuality to the 2010 Deepwater Horizon oil spill in the Gulf of Mexico, recognised as the worst oil spill in the history of the USA, in which an estimated 3.19 million barrels of oil spilled into the sea. “The incident in the Gulf of Mexico will be child’s play if anything should happen here,” he warned, as it is a known fact that there are massive gas reserves beneath the sea bedrock.

He said while taking cognisance of rapid economic development in several countries and the global need for more food production both for human and bio-fuel production, extensive removal of deep seabed sediments would set up disruptive events that cannot be reverted for millions of years to come. “Why would Namibia want to play the guinea pig?” he asked, since no other country has allowed massive removal of deep seabed sediments for whatever reason, be it marine phosphate mining or any other kind of mining based on the outcry from the scientific community. “What we as scientists refer to is what can be proven scientifically but the choice lies with decision-makers and politicians,” Omoregie said.

### **Namibia approves world’s first marine phosphate mining project**

African News Agency via Mining Weekly, 19 October 2016

The Namibian Ministry of Environment and Tourism (MET) has approved the marine phosphate mining application from an Omani mining company, paving the way for the opening of the world’s first ever sea-bed phosphate mining project. In a letter addressed to the company and circulated on local media, Namibian Environmental Affairs commissioner Teofilus Nghitila said the environmental impact management plan submitted by Namibian Marine Phosphate (NMP) was sufficient enough to mitigate the anticipated impacts of sea-bed mining operations. NMP is a subsidiary of the Omani mining joint venture company, Mawarid Mining, which is 85% owned by billionaire Mohammed Al Barwani while the remaining 15% stake is held by local company Havana Investments. The mine will cover part of a sea-bed phosphate concession that lies about 120km into the Atlantic Ocean, off the coast of Walvis Bay. “This letter serves as an environmental clearance certificate for the (marine phosphate mining) project to commence,” Nghitila said.

He said the company should carry out regular environmental monitoring and evaluation and set timelines for further improvement of the environmental impact management model. He said the plans should be advanced in line with government regulations. Among other regulatory demands, the company would be required to regularly monitor sea-bed and water quality and submit reports on a quarterly basis. “In view of the fact that your project is located in an environmentally sensitive area, this ministry reserves the right to attach further legislative and regulatory conditions during the operational phase of the project,” Nghitila said. However, he said the clearance letter did not ‘in any way’ hold the Ministry of Environment and Tourism accountable for misleading information or any adverse effects that may arise from the implementation of the project.

“If it is identified at any time during the environmental monitoring and reporting stages that significant negative environmental impacts have been proven to be associated with the proposed mining, processing or beneficiation techniques, such operations will be terminated,” the commissioner said. Meanwhile, the ministry has called on members of the public and interest groups, such as fishing companies, to submit any objections to the phosphate mining projects to its offices across the country. Local fishing groups have vehemently opposed the proposal for marine phosphate mining saying it was a threat to the industry while environmental conservation groups said it would upset an already fragile marine ecosystem.

### **\$3.7m study to reveal deep-sea mining impacts in New Zealand**

New Zealand Herald, 11 October 2016

The potential environmental impacts of controversial deep-sea mining will be investigated in a new multi-million dollar study. Dr Malcolm Clark, a fisheries scientist at the National Institute of Water and Atmosphere (Niwa), said a lack of knowledge about life on the seafloor and how it could be affected had been one of the major factors that led the Environmental Protection Authority to refuse

the two off-shore mining applications lodged so far. There were particular concerns around impacts from sediment plumes, created by disturbance to the seafloor and mining operations discharging the processed water back into the ocean. Clark is now leading a \$3.7 million programme to tackle the questions. While the Government has stated a strategic priority to reap benefits from seabed resources, the sustainability and integrity of the natural environment also had to be maintained, he said.

What we know about the structure of deep-sea communities remained limited, Clark said; it's estimated that only 20 to 30 per cent of the seafloor species have been formally described. "Of particular importance, however, is a lack of knowledge of the key species or communities that drive ecosystem function, and when human activities could tip a system from the one we know to something different." In deep sea environments, this was especially tough to study, given the cost of funding the large ships and technology needed for the research, and the fact that the ecosystems themselves were so large. Of those research expeditions that had been led, nearly every survey had recorded new species, and there was much more to discover. Global estimates of the number of known marine species total 250,000 - but scientists believe this figure is only about one quarter of what is believed to really be out there.

While we know more than 15,000 marine species inhabit our coastal waters and ocean territory, it's estimated there may be a further 50,000 yet to be found. "This means that extensive and detailed biodiversity surveys are required to characterise the baseline conditions of any proposed area before mining can be considered." The study would test the belief that life is highly sensitive to sedimentation stirred by seabed disturbance, and investigate specific impacts, any differences in resilience and prospects for recovery. Clark said we already knew what general effects could be expected from seabed mining, ranging from physical damage to the seafloor as it was mined, to those that could affect a wider area, through sediment plumes that could bury animals, or eco-toxic releases that could contaminate environments. Yet, because deep-sea mining had not yet taken place anywhere in the world, the actual effects were uncertain.

Most studies to date had focused on the direct impact of disturbance, and there had been little work looking at the effects of sedimentation from deep-sea mining. Work that had been carried out in shallow water couldn't be applied to what might be expected in deep-sea habitats, where effects would vary between sites and depths. But Clark said it could still be assessed how ecosystems responded to decreased light levels, how their feeding or respiration was affected and whether such effects were lethal or could be tolerated for certain periods of time. The Niwa-led study would combine in-situ observations on the effects of sediment deposition with lab-based experiments. Areas of the seabed would be disturbed, then closely monitored by ship-based surveys, with sampling to be repeated over time to determine which seafloor communities were more affected than others, and whether species and communities could eventually recover. The churned-up sediment itself would also be assessed to refine plume models that predict spread, while back in labs, experiments would use live deep-sea coral and sponge species to assess their resilience.

Ultimately, the research would define the levels at which sediment impacts became ecologically damaging and offer insights into how such impacts might be reduced. Clark expected the study would be mainly used by mining companies as part of impact assessments and management plans, but also by fisheries companies assessing effects of bottom trawling. But he said the science wasn't being carried out in support of what remains a controversial industry. "The work is not about advocating for a new industry, but to provide environmental managers with information that is needed to evaluate the nature and extent of potential impacts on deep-sea communities, and what measures could be needed to reduce these effects if mining was allowed to proceed," he said.

"Science around environmental effects of any activity is balanced with social and economic issues, and that is one of the roles of the EPA that requires more information on the long-term sustainabil-

ity of affected ecosystems." The study comes as company Trans Tasman Resources (TTR) has drawn fresh protest with a second attempt to mine ironsands on the South Taranaki Bight, two years after its first bid was rejected by the EPA. TTR executive chairman Alan Eggers has described the area where it wants to extract 50 million tonnes of seabed material each year, in waters 20m-42m deep, as "a largely featureless area of naturally shifting sands and sediments colonised by hardy species of common forms of marine life of no unique or special ecological significance".

### **Off-shore mining in New Zealand**

- No application to mine on New Zealand's sea floor has succeeded. Trans Tasman Resource's first bid failed in 2014 after the EPA raised concerns about the impact on the environment, iwi and fishing interests, and its economic benefits.
- Last year, an application by Chatham Rock Phosphate Limited was also rejected, with the EPA concluding its operation would cause "significant and permanent adverse effects" on the seabed environment at its proposed site on the Chatham Rise off the coast of Canterbury.
- Last month, TTR lodged a second application, prompting a protest hikoi led by Taranaki iwi Ngati Ruanui and delivering to Parliament a 6000-signature calling for a moratorium on seabed mining.

### **Watch the Advent of Deep Sea Mining Unfold With this Big Data Tool**

Becky Ferreira Vice, 5 October 2016 via PNG Mine Watch, October 10, 2016

The deep sea is the most mysterious realm on Earth, and remains virtually untouched by human activity. But this vast wilderness may soon experience a rude awakening. Over one million square kilometers of ocean floor, between 800 and 6,000 meters deep, have been earmarked for exploration by mining companies. While seabed mining has occurred at shallower locations within national borders, it has never been conducted in deep international waters before. Unlike the offshore oil industry, which has been drilling in underwater environments for decades (with sometimes devastating consequences), the machinery required to mine gold, zinc, nickel, copper, manganese, and other valuable minerals from the deep sea is only now reaching maturation. It may be less than a year before this type of industrial extraction kicks off, and vessels are already prospecting to get a sense of their potential yield.

Now, you can track these ships online with Deep Sea Mining Watch, a web tool launched on Wednesday at the Dreamforce software conference in San Francisco. It's the first public platform that allows users to directly follow the movements and distribution of these vessels, according to Douglas McCauley, director of the Benioff Ocean Initiative and a marine biology professor at UC Santa Barbara. "Our philosophy is just serving up information, trying to make it more accessible, and letting people know exactly where and what is happening with this industry in the oceans," McCauley told me over the phone. The tool's dataset is generated by automatic identification system (AIS) trackers that ships are required to carry to prevent collisions with other ocean traffic. McCauley and his team previously used this method for a project called Global Fishing Watch, which uses AIS trackers to monitor fishing vessels around the world, in part to ensure that they don't exploit protected areas.

"Everyone behaves more responsibly when they have a tracker attached to them," he noted. For Deep Sea Mining Watch, the team developed new parameters to sift for signs of ocean prospectors in a dozen regions across Pacific, Atlantic, and Indian Oceans. "You can have a fishing vessel that can be pretty small, but you can't have a small mining vessel," he explained. "We started searching for big vessels that are doing particular kinds of mining and prospecting-associated behavior. That's how we pull them out of the billions of data points about all vessels that are floating around on the ocean." The map illustrates the growth of this emerging industry. For instance, this graphic from the

new tool displays claimed regions stretching 4,500 kilometers across the equatorial Pacific Ocean, a distance roughly equivalent to the diameter of the continental United States.

Even ocean experts like McCauley were surprised at how actively the seabed is being probed for minerals, now that companies have developed the technologies necessary to extract them. “I thought, ‘wow it’s actually happening and these vessels are out there searching around inside their claims’,” he told me. “I think that same epiphany, or that same kind of connection to the reality of this, is what we’re hoping to inspire for anybody who jumps on the tool. It’s not the material of *The Abyss*, or science fiction. This is something that we’re able to do.” The question is: Should we do it, and if so, to what extent? The intimidating 300-ton bulk cutters that mining companies plan to drive through these undisturbed regions will no doubt tap into a wealth of new resources, but they will also disrupt delicate seafloor ecosystems that we know next to nothing about.

“These are often very ancient, very slow-growing ecosystems,” McCauley pointed out. “Species are found there and nowhere else on the planet, and many of the species are just getting discovered. So, the prospect that you are going to grind a road on that space and then roll one of these 300-ton robots over the top of it and suck it all out—that makes a few alarm bells go off in terms of what the impact would be.” Indeed, these hulking machines would not only be disrupting life in their direct path. They are also expected to create a lot of noise pollution, while kicking up plumes of sediment that could choke out organisms in higher escalons of the water column. They might even contribute to climate change by disturbing normal carbon storage processes in the ocean. Some companies have acknowledged the potential environmental costs of seabed mineral extraction, including Nautilus Minerals, the industry’s main trailblazer, which is headquartered in Toronto. But Nautilus CEO Mike Johnston has argued that it would be more damaging to continue mining solely on land than to open up this new frontier.

“Growing copper demand requires our industry to look at more sustainable ways to meet this demand,” Johnston said in a statement. “As showcased in Earth Economics’ Report, seafloor mining has the potential to not only provide economic benefits within the communities nearest to the operations while minimizing the impact of copper mining, it also has the potential to change the physical nature of the mining industry for the better.” The Jamaica-based International Seabed Authority, an intergovernmental organization established in 1982 by the United Nations, is responsible for balancing the interests of the mining industry with environmentalists and advocacy groups. “It is a brand new legal space and technological space,” McCauley told me. “The International Seabed Authority has been writing the rules literally as they go forward because we have never mined in the oceans, and we are figuring out how to do it.” To that point, tools like Deep Sea Mining Watch will play an essential role for public activism about seabed mining and its consequences. “I think it will at least make people want to engage more with the question when you see and learn about the slow life history and the unique species that are being discovered,” McCauley said.

### **Nautilus’ support vessel on dry dock**

October 10, 2016, *The National Business*

NAUTILUS says the production support vessel was on dry dock last week to allow the launching of two adjacent vessels. The vessel is to be used by Nautilus and its PNG partner Eda Kopa (Solwara) Limited as the base for its seafloor operations planned at Solwara 1 project site. “The company was very excited to see the support vessel (PSV) floated in the dry dock last week. It shows the fantastic progress the team at the Fujian Mawei Shipyard Ltd (FMSL) and Marine Assets Corporate (MAC) have made over the past three months,” Nautilus chief executive officer Mike Johnston said. “When you consider the first block for the PSV was laid on June 10 this year, to having a 220-metre hull



able to be floated some 14 weeks later, it is a huge achievement by FMSL and a significant milestone for our company. “We have worked with FMSL, MAC and others on the PSV for over two years now. “During this time we have established a good working relationship, with very capable stakeholders. “We are now looking forward to continuing that very strong working relationship as we progress the final build phase and fit out of the vessel.”

### **China’s deep-sea mission to mine the wealth beneath the ocean floor**

South China Morning Post, 6 October, 2016

Resource-hungry China is stepping up activity in one of the final frontiers of mineral wealth – the remote seabeds lying kilometres beneath the Indian and Pacific oceans. The world’s largest consumer and importer of minerals and metals is now studying the core technologies of seabed mining in the Indian Ocean, according to Tao Chunhui, one of the country’s leading oceanographers and a researcher at the State Oceanic Administration. Vast sulphide deposits on the 3,000 metre deep seabed might contribute to China’s metal supplies in the long term as it tried to narrow the technological gap with other maritime powers, said Tao, who was chief scientist of a number of China’s Indian Ocean expeditions. The volcanically formed hydrothermal sulphides on the seabed contain copper, zinc and precious metals including gold and silver. They are formed in hot underground springs seeping through cracks in the seabed. Tao said that to prepare for the future exploitation of seabed minerals, Chinese scientists are developing techniques to mine the ocean floor, extract minerals and bring them to the surface without damaging the environment.

“When we will actually be able to do it depends on commodity prices as well as the state of the technology,” he said. “Our focus now is to figure out where the minerals are.” Unlike some of its contentious claims in the South China and East China seas, Beijing’s seabed mining activities have been carried with the full blessing and involvement of other countries under exploration contracts awarded by the International Seabed Authority (ISA), an intergovernmental organisation established by the UN Convention on the Law of the Sea (Unclos) to regulate deep-sea mining. It was the international arbitration tribunal of Unclos that earlier this year rejected China’s historic claims to the South China Sea in a case raised by the Philippines. China has been exploring sulphide deposits in the Indian Ocean since it was awarded a contract in 2011 by the International Seabed Authority, an intergovernmental organisation established under Unclos to regulate deep-sea mining.

The 15-year contract allows Beijing to prospect for seabed sulphides across a 10,000 sq km area in the Southwest Indian Ridge just south of Madagascar. Tao said the next expedition would take place in November, by which time China’s unmanned submersible Qianlong would have been upgraded. Beijing depends increasingly on imported metals and minerals to meet its growing demand for commodities. State-owned companies have been snapping up mining projects across Africa, Latin America and Asia. China is world’s main importer of metals, growing from less than 10 per cent of global share in 2002 to 46 per cent in 2014, according to the International Monetary Fund. To secure its supply of resources, the Ministry of Land and Resources vowed in a strategic plan released last month to boost “deep-underground, deep-sky and deep-sea” capabilities in the coming five years.

The plan’s tasks include developing a submersible that can dive to 11,000 metres by 2020. This is slightly more than the deepest known point in the seabed, the Challenger Deep in the Mariana Trench near Guam. Besides the Indian Ocean, China is also looking for seabed minerals in two areas in the western and northeastern Pacific. Tao said these exploration projects had become drivers of the country’s deep-sea technology. He has taken the Jiaolong submersible, China’s first manned deep submersible, to a depth of 3km in the Indian Ocean. The vessel reached 7km on a subsequent mission in the Pacific. Two domestically produced submersibles have also been deployed to

the Indian Ocean. "China has made huge progress in deep-sea technology," Tao said. "We went from importing and copying to making our own innovations."

But some key components, such as high-accuracy sensors, are still imported. The country also relies on some foreign-made equipment to analyse samples from the ocean. Meanwhile, China's advances in deep-sea research have made some countries anxious that Beijing's motives are not entirely economic. Pankaj Jha, director of research at the Indian Council of World Affairs, a government-funded think tank, said it would be years before China could start mining in the Indian Ocean, but its long-term presence there was a concern for India. "China's lack of transparency and inflated claims about its research shows that it wants to conduct more operations under the garb of technological achievements and discovery of mineral resources," Jha said. "The long deployments of research vessels and on-board deep-sea diving equipment will certainly raise suspicions about China's intentions."

### **Nautilus Minerals Vessel Progress Update**

Press Release, Nautilus Minerals, Marketwired, October 6, 2016

Nautilus is pleased to note that the [Marine Assets Corporation] Production Support Vessel (PSV) was floated in the dry dock last week to allow the launch of two adjacent vessels. The PSV is to be used by Nautilus and its PNG partner, Eda Kopa (Solwara) Limited, as the base for its seafloor operations planned at the Solwara 1 Project site, in the Bismarck Sea of Papua New Guinea. Mike Johnston, Nautilus' CEO commented: "The Company was very excited to see the PSV floated in the dry dock last week, as it shows the fantastic progress the team at the Fujian Mawei Shipyard Ltd (FMSL) and Marine Assets Corporate (MAC) have made over the past three months. When you consider the first block for the PSV was laid on the 10th of June this year, to having a 220 meter hull able to be floated some 14 weeks later, it is a huge achievement by FMSL and a significant milestone for our Company. We have worked with FMSL, MAC and others on the PSV for over two years now. During this time we have established a very good working relationship, with very capable stakeholders. We are now looking forward to continuing that strong working relationship as we progress the final build phase and fit out of the vessel." Subject to further financing, Nautilus' objective remains to develop the world's first commercial high grade seafloor copper-gold mine and launch the seafloor resource production industry.

### **US company to explore Cook Islands seabed for minerals**

Radio New Zealand, 29 September 2016

A new US company says it has signed an agreement with the Cook Islands granting it rights to prospect and explore the country's seabed for minerals. In a statement the Texan company Ocean Minerals said it had secured exclusive access to parts of the seabed within Cook Islands exclusive economic zone. The company said it believed these areas contained sediments enriched with rare earth elements. It said this was based on research conducted by the Houston-based Deep Reach Technology Inc. on existing archived samples throughout the Pacific. Ocean Minerals said it plans to undertake several phases of seabed sampling over the next few years which will incorporate the collection of environmental baseline data.

In July the Cook Islands Investment Corporation's chair, Mike Henry, signed a contract with the United Nations' International Seabed Authority giving it exclusive mineral rights to an area of 75,000 square kilometres in the Clarion Clipperton Fracture Zone. The 7,240 km long mineral rich zone extends over millions of square kilometres in the north Pacific. Cook Island News also reported that a joint venture agreement was also signed with Belgian company, GSR, giving it the

possibility of exploring and exploiting the Cook Islands ocean floor minerals. The Texas Limited Liability Company Ocean Minerals was formed in 2016 and is focused on developing the Rare Earth Element enriched sediment resources in the Cook Islands EEZ.

### **Pacific warned against being exploited by seabed miners**

ABC News, 21 September 2016

Researchers are warning that the Pacific risks becoming an experimental test centre for seabed mining if regional nations don't adopt proper policies. The potential impacts of seabed mining are not fully known but concerns have been raised about damage to fish stocks and marine ecosystems. PNG Centre for Climate Change and Sustainable Development Director, Professor Chalapan Kaluwin has told the Pacific Islands University Research Network meeting in Samoa that seabed mining in places like Papua New Guinea shouldn't go ahead until proper checks have been put in place. Link: <http://www.abc.net.au/news/2016-09-20/pacific-warned-against-being-exploited-byseabed/7862522>

### **New Zealand: Moratorium on seabed mining needed**

*"Seabed mining should be considered a novel experimental activity"*

Gareth Hughes MP, NZ Greens, 19 September, 2016

Today at Parliament, I accepted a petition signed by more than 6,000 people calling for a moratorium on seabed mining. This is also the day Trans-Tasman Resources' (TTR) second application attempt to mine the seabed of the South Taranaki Bight opens for the twenty days of submissions period under the Environmental Protection Authority's (EPA) rules. It was fantastic to see the petition organised from Kiwis Against Seabed Mining (KASM), who have led the successful campaigns that saw TTR's first application and Chatham Rock Phosphate's seabed mining applications declined by the EPA. Three busloads of local iwi Ngāti Ruanui also travelled down from Patea for the event and they say consultation with TTR has been flawed. This company is applying for consent to suck up 50 million tonnes of seabed, extract the iron ore and dump 45 million tonnes of sediment back. This is in the feeding ground of the world's largest whale and the habitat for the world's smallest and rarest dolphin so it's no surprise there's huge opposition. Last time TTR tried, only 8 of the of the 4800 submissions to the EPA supported the mining.

Seabed mining is a controversial new activity. The two applications to date were rejected by the EPA because of environmental impacts and scientific uncertainties. One thing that has stuck in my head from the last process was the Rumsfeldian quote 'the uncertainties around the uncertainties is uncertain'. This is an entirely new field, apart from a little shallow water diamond mining. Seabed mining should be considered a novel experimental activity. Both Australia's Northern Territory and Namibia, who have grappled with seabed mining, have instigated moratoria. I support KASM's call for the Government to place a moratorium on the activity here. We have the fourth largest Exclusive Economic Zone in the world and with huge scientific uncertainties surrounding seabed mining, it's responsible to wait and to learn more before risking our marine ecosystem and fisheries. I'd contend it's better for the companies interested in undertaking seabed mining too, as consent applications can cost millions of dollars, so a delay and more research benefits everyone. The petition will be referred to a select committee to consider and with only twenty days to make a submission on TTR's application, I hope you can make one.

## **New Zealand Iwi bracing for another fight against seabed mining**

Isaac Davison, NZ Herald, September 18, 2016

Iwi members will arrive in their busloads on Parliament's front steps tomorrow to protest a mining company's latest bid to scour the seabed off the coast of the North Island for iron ore. A hikoī led by Taranaki iwi Ngati Ruanui and environmental advocates will deliver a 6000-signature petition to MPs, calling for a moratorium on all seabed mining in New Zealand. The petition comes as mining company Trans Tasman Resources makes its second attempt to get approval to mine ironsands on the South Taranaki Bight, around 30km off the west coast of the North Island. The company's application was notified by the Environmental Protection Agency (EPA) on Friday, meaning the public has 20 days to make submissions. No application to mine on New Zealand's seabed has succeeded.

Trans Tasman's first bid failed in 2014 after the EPA raised concerns about the impact on the environment, iwi and fishing interests, and its economic benefits. The EPA also said the company's proposal was "premature" and that it should have done further work on understanding the environment and engaging with local residents. Trans Tasman now believes it has addressed those gaps. Executive chairman Alan Eggers said the company had carried out additional research to refine the environmental aspects of its application, and had met with "a wide range of stakeholders". The group travelling to Parliament tomorrow believes little has changed. Kiwis Against Seabed Mining spokesman Phil McCabe said the method of mining was still experimental and damaging. "It's inherently a destructive activity. If you're looking at deep-sea oil, you're poking a needle through the bottom of the ocean.

"But in this one, the moment they start, they're breaking stuff. There's sensitive habitats out there." It was frustrating and exhausting to have to fight the company a second time, McCabe said. Hikoī leader Debbie Ngawera-Packer said her iwi and residents of Patea, near the proposed mining site, did not protest lightly. "This is a real humble community that doesn't mobilise like that. "They live off an average of \$17,000 a year. They are used to going without and things not going their way. "So when they mobilise it's because they feel there's a real injustice." Trans Tasman is seeking approval to extract 50 million tonnes of seabed material a year, of which 45 tonnes would be returned after the iron ore was extracted. It estimates that the mining project would boost export earnings by \$300m a year and would support up to 1650 jobs - 300 in the immediate region.

## **Nautilus pushes Solwara 1 production back by 12 months**

Start date for experimental seabed mining pushed back to 2019 but Nautilus STILL needs to find substantial extra funds to meet that deadline

Henry Lazenby, Mining Weekly, 16 September 2016

Cash-strapped marine mining pioneer Nautilus Minerals has pushed out the start of production from the offshore Papua New Guinea (PNG) Solwara 1 project by about 12 months from the original schedule, citing a cash crunch. In providing an update on company activities Friday, CEO Mike Johnston outlined the company's revised plans, pending the company successfully raising the required capital by June 2017. The revised work programme entails a more staged approach, moving the Nautilus equipment integration phase of vessel construction out until after the vessel has been delivered by Marine Assets Corporation and Fujian Mawei shipyard, in the fourth quarter of 2018. This will result in a 12-month delay to the original schedule, pushing first production out to the first quarter of 2019. Johnston advised that the vessel, which keel-laying ceremony was held on June 10, continues under a revised schedule that splits funding requirement into three or four "more manageable" chunks. Current estimates valued the first chunk of the financing required for the dewatering plant and derrick structure at about \$50-million.

Meanwhile, all ‘below-waterline’ production equipment has been completed in January and shipped to Oman, where it remains in storage. The company has received additional opportunities for the equipment’s wet testing phase, that management is looking at. The subsea slurry and lift pump has recently completed factory acceptance testing and will be delivered in November by GE Hydril. The riser system is now complete and in storage, also located in the US. Johnston said key minor contracts are continuing and all major outstanding contracts will probably be awarded to Chinese companies, including the derrick structure, the dewatering and flotation plants, as well as flexible hoses. Work is also progressing on the production simulator and control systems, while the environmental monitoring and management plan and associated baseline data collection activities are ongoing, to provide a detailed base data set to compare the impact of marine mining with.

## **FINANCE UPDATE**

Johnston advised that Nautilus has about \$51.4-million in cash at the moment. It has recently signed a subscription agreement for about \$20-million with its largest shareholders Mawarid Offshore Mining and Metalloinvest Holding. Under to the subscription agreement, the shareholders will buy shares on a private placement basis, in monthly tranches from December 1, through to November 30, 2017, should Nautilus need capital. Nautilus will hold an emergency shareholder meeting on October 26 to seek approval of the bridge financing, which will keep the project on track as Nautilus pursues further funding. Johnstone advised that discussions with other interested parties and stakeholders are ongoing. “We do require more funding to cover the build and delivery of the project, to maintain and grow the project ad to commence deployment and operations the Solwara 1 by the end of Q1 2019,” he stated.

The company has reduced staff levels by some 60%, maintaining only Johnston as president and CEO and VP for PNG operations Adam Wright in its executive management structure. The company is looking towards achieving its next milestones, including completing environmental monitoring and management plan in the first quarter of 2017; vessel launch at the end of the second quarter 2017; securing additional finance by mid-2017; the second dry docking of the production vessel in the third quarter of 2017; and committing to contracts for the dewatering plant and derrick structure by the fourth quarter 2017. Further, the company is busy modifying its exploration drill rig to significantly reduce costs. It plans to explore initial targets on water by year-end, pending financing. Meanwhile, Nautilus is maintaining all its PNG political and social licences in good standing, Johnston said. Nautilus formed a joint venture company with PNG’s nominee, Eda Kopa (Solwara), in December 2014 to mine high-grade polymetallic seafloor massive sulphide (SMS) deposits. Nautilus has an 85% shareholding and Eda Kopa (15%). As of November 25, 2011, the Solwara 1 project had an indicated mineral resource of one-million tons, grading 7.2% of copper, 5 g/t of gold, 23 g/t of silver and 0.4% of zinc. Its inferred resource comprised 1.54-million tons, grading 8.1% of copper, 6.4 g/t of gold, 34 g/t of silver and 0.9% of zinc.

## **Experimental seabed mining a threat in at least ten PNG Provinces**

ACT NOW! 15 September 2016

As much as half of the whole of Papua New Guinea could be impacted by potentially destructive experimental seabed mining operations. While a lot of attention has been focused on the small area between East New Britain and New Ireland, known as Solwara 1, where Nautilus Minerals intends to start mining the seafloor in 2018, the Canadian company has far grander plans for experimental seabed mining and has recently been joined by the Chinese government in searching large areas of our sea floor. Nautilus’ exploration activities include the whole of the Bismarck Sea and parts of the Solomon Sea. Areas indicated in red are where the company already holds exploration licences. Areas in green show exploration licences being transferred to Nautilus and areas in yellow are where Nautilus has applied for an exploration licence. In addition, the Chinese government is cur-



rently surveying the New Britain Trench looking for potential seabed mining sites. The Trench is situated in the Solomon Sea between New Britain and Bougainville.

In combination, experimental seabed mining could potentially directly impact the lives of over 3 million people living in East Sepik, Madang, Manus, East and West New Britain, New Ireland, Morobe, Oro and Milne Bay Provinces and the Autonomous Region of Bougainville. Nautilus is struggling financially, has been forced to stop machine development, lay off staff and close offices, but the threat of experimental seabed mining, whether by Nautilus, another mining company or the Chinese is still very real. The potential impacts of seabed mining are still not fully known but they could be devastating for PNG with people's lives and livelihoods potentially impacted across ten Provinces and untold damage to our economically important tuna stocks and marine ecosystems.

### **Nautilus obtains bridge financing**

Post-Courier, September 12, 2016

Nautilus Minerals Incorporated has signed a subscription agreement for its common shares which will see it raise proceeds of up to US\$20million. The agreement was signed with two of its major shareholders-Mawarid Offshore Mining Limited and Metalloinvest Holding (Cyprus) Limited. Nautilus chief executive officer Mike Johnston said the gross proceeds available under the Subscription Agreement will provide the bridge financing necessary to enable the Company to operate and to carry on the Solwara 1 Project, while it continues to explore additional financing, joint ventures or other transactions that provide the funding required in order to complete this project. "The Company appreciates the ongoing support of its two major shareholders through this bridge financing arrangement, especially given current market conditions.

"We are also heartened by the continued support of all of our key stakeholders, in particular, our joint venture partner in the Solwara 1 Project, the Independent State of Papua New Guinea's nominee and our vessel contractors, Marine Assets Corporation and Fujian Mawei shipyard. "The global interest in seafloor mining continues to grow, and Nautilus remains the industry leader in this expanding field, Mr Johnston said. As previously disclosed, the company requires significant additional funding in order to complete the build and deployment of the seafloor production system to be utilised at the Solwara 1 Project by the Company and its joint venture partner (as to 15 per cent), the Independent State of Papua New Guinea's nominee. "Pursuant to the Subscription Agreement, the shares will be purchased on a private placement basis and will close in tranches, on a monthly basis, during the period from December 1, 2016 through to November 30, 2017, at the election of the Company," the firm reported.

### **Another seabed mining bid in New Zealand**

Simon Hartley, Otago Daily Times, 12 September 2016

Chatham Rock Phosphate expects to rejoin the permitting fray surrounding seabed mining, with expectations it will make a second application to the Environmental Protection Authority (EPA) next year. Seabed mining is back on the mining agenda, and environmentalists' watchlists, after Trans Tasman Resources (TTR) reapplied a fortnight ago for its environmental permit to take iron-sand from Taranaki's sea floor, at depths of up to 40m. Environmental group Kiwis Against Seabed Mining has vowed to again fight the proposal, having mobilised thousands of people to protest during the first application. TTR had spent \$66million in research and development and Chatham Rock spent more than \$30million, but both had their first applications turned down by the EPA. In a presentation to the annual mining conference of the New Zealand branch of the Australian Institute of Mining & Metallurgy in Wellington last week, Robin Falconer, a consultant and director of

Chatham Rock Phosphate outlined the process so far. Chatham Rock wants to suction up phosphate nodules from the sea floor at depths up to 450m on the top of the Chatham Rise, taking 1.5million tonnes a year.

Mr Falconer remained adamant the Chatham Rise phosphate was a "strategic" for New Zealand's economy, in displacing imported Moroccan phosphate and potentially as an export earner. Although separate projects, Mr Falconer said Chatham had been working with TTR and would continue to do so. "We'll wait and see how TTR gets on," Mr Falconer said of its application, which is yet to be formally accepted by the EPA, and will then be publicly notified. When asked in question time, Mr Falconer said Chatham intended to reapply to the EPA in mid-2017. "We have the capital to see us through and meet our commitments," he said. In July, a share purchase plan for Chatham Rock was oversubscribed and it raised \$616,000, plus issued 8.74million shares to qualified investors, reaping \$52,500 more. Mr Falconer noted that while "finance is hard to get" at present, he was still adamant "this is still a doable project," and could be operational by 2020.

In an earlier presentation at the conference, the EPA warned applicants in general that simply filing volumes of work and research was not adequate, and parties had to do more to prove how mitigation procedures, and outcomes, would work. There is a question of the plume created by seabed mining on the sea floor, and the plume on the surface if spoil was tipped off the ship. Chatham's design work to date is not to release tailings from a ship, but release them 10m above the sea floor. Mr Falconer said "We could do more plume work, but that would just be moving a decimal point to already world-class results." The discovery of beds of coral on the seabed around the Chatham Rise had raised concerns. "We could spend \$2million to \$3million on just looking at coral distribution," Mr Falconer said.

### **Scientists fear deep-sea mining**

Euronews, 5 September 2016

Scientists fear that even before one of the last frontiers of exploration, the ocean deep, has been properly studied it will already have been exploited by commercial deep-sea mining looking for rare metal and minerals on the ocean floor, leaving its unique ecosystems badly damaged. Astonishingly less than 0.05 percent of the ocean floor has been mapped at a level of detail where objects a few metres in size can be discerned. Marine biologists estimate that there are around 750,000 marine species yet to be identified, many of them likely to be found in the deep sea. The mining industry has been developing technologies to extract metals and minerals more than 500 metres down on the seabed and it's expected that commercial mining will start for the first time in 2018 around Papua New Guinea. One mining method is to use a conveyor belt system of buckets to bring soil containing metal and mineral deposits from sites on the sea floor up to a mining ship for processing. A second method is to use pipes to hydraulically suck up soil from sites on the sea floor, also to a mining ship for processing.

But before that happens the MIDAS project, which is made up of scientists, industry figures, NGOs and legal experts from 32 organisations across Europe, hopes to gather enough data to gain a good picture of what damage might be done by mining and so inform regulators of what needs to be put in place to protect the deep sea environment. Currently the UN Convention on the Law of the Sea governs activity on the seabed and since around 70 percent of the world's surface is covered by ocean – and more than half of that is designated as international waters – the area potentially under threat is enormous. The 1982 UN Law of the Sea treaty states that international waters are the "common heritage of mankind" and that the International Seabed Authority (ISA), based in Jamaica is the body responsible for administering it.

It's in the process of drawing up a mining code to govern deep-sea mining before 2018. On board the MIDAS project's research ship just off the Azores Islands in the Atlantic Ocean its chief scientist explained to Euronews why the seabed is now so attractive to mining. "There are a number of deposits that are on the sea floor that people think may be exploited for commercial purposes; they're principally metallic, but also phosphates, and we think hydrates, for energy. There's a lot of interest at the moment, there's a lot of investment going on, and there are a number of projects that are going to be coming to fruition fairly soon," Ian Stewart said. MIDAS fears that mining will greatly damage fragile seabed habitats, although it's hard to be certain since deep sea ecosystems remain so poorly studied. Marine biologists on board the research ship are focusing on how exactly corals react to damage associated with mining.

One marine biologist from the University of the Azores is researching the damage done to coral reefs by humans such as bottom fishing, the trawling of the ocean floor with fishing lines. She is also looking at copper pollution, an unwanted by-product of deep-sea mining. "This group of corals was subjected to mechanical damage, which can be a significant risk for a colony. This other group has been subjected to copper pollution in a concentration that would be sufficient to affect their physiology," Inês Martins said, standing in front of two sections, a metre square each, containing the two coral groups. Working from the research vessel located above the Mid-Atlantic Ridge Martins and her colleagues are putting a section of damaged coral and a section of undamaged coral back on the seabed to monitor how they survive and grow in the future. "This research is crucial, as corals are the basis of the deep sea ecosystem. We need to understand how they will be affected, because the whole of the rest of the ecosystem depends on them," another marine biologist, Antonio Godinho, working alongside Martins explained. The coral samples will be deposited more than 200 metres deep at several underwater locations and the whole process will be visually controlled with a remotely operated underwater vehicle or ROV.

"We monitor the deployment of the corals and then, once they are landed, vertically we go along and cut the deployment ropes, make sure everything's clear. And just take a positional fix of the position of the landers on the seabed, so that they can find them when they want to recover them in a month's or a year's time," Paul Bond, a technician from Subsea Vision explained, sitting in front of screens on the ship showing the ROV's underwater progress. However scientists, already troubled by the lack of data, remain concerned that they need a lot more observations to draw firm conclusions. "Scientists would always like more data – this is why we're on this cruise here. What we really need to understand better are the processes and the interactions in the deep sea, how would they respond to the mining activities; we still need a lot more research on this. And without more research, it's very difficult to predict accurately what the effects may or may not be," Ian Stewart said.

## **NZ seabed mining company slammed as 'arrogant' by South Taranaki iwi**

Jeremy Wilkinson, Stuff, 2 September 2016

Iwi have labelled a seabed mining company "arrogant" and slammed their consultation process in applying to mine offshore in South Taranaki. For the second time in as many years Trans Tasman Resources have applied for consent to annually mine 50 million tonnes of sand from the seabed off the South Taranaki coast. The Environmental Protection Authority denied the company's application in 2014 deeming the effects of uplifting so much sand would have an unknown effect on the environment. TTR applied again to mine the seabed on August 23 this year. The 66 square kilometres off the South Taranaki coast where Trans Tasman Resources have applied to mine iron ore.

Now kairataki of Te Runanga o Ngati Ruanui Debbie Ngarewa-Packer has said she, and her iwi, were extremely disappointed with the way TTR had gone about consulting with them in their re-

application. "From our perspective there has been extremely poor consultation from their end," she said. "There's a high degree of arrogance from that company in that want us to clear their application on our end, but won't show us their science." Ngarewa-Packer said Taranaki iwi dealt extensively with oil and gas companies and had never before been kept so in the dark. "We've never had a problem like this before, companies we usually deal with are falling over themselves to give us as much information as possible," she said. "This is the exact opposite, they're saying it won't have any effect on the seabed but refuse to prove it to us."

The 66 square kilometre area TTR want to mine was last week described as a "vast expanse of sand" by the company, however a recent report tabled at the Taranaki Regional Council on Thursday indicated a variety of life on the sea floor. The report, conducted by the Cawthron Institute, found there were no threatened species within the 12 mile Coastal Marine Area (CMA) but further offshore within the Exclusive Economic Zone where TTR have applied to mine, there are at least five threatened species of invertebrate. While the Taranaki Regional Council has no jurisdiction in the EEZ they do have a say on activities which can affect the CMA. Councillor Craig Williamson said when the TTR appeared before the council several years ago their presentation was that it was pretty much just mud and sand. "Now I'm looking at this report which says there's a huge cluster of life that needed to be protected right in the very zone they are planning on sand mining," he said.

"In my opinion any adverse effect is too much of an effect, and I'm hoping that's the position the EPA will take." However, a spokesperson for TTR said the Cawthron report focused on marine life within the council's jurisdiction and referenced data commissioned by the TTR. They also said the company had done extensive work to limit the spread of the sand plume. "This has included controlled deposition of the de-ored sediment 4 metres above the seabed into areas from which the sediment was extracted," they said. Kiwis Against Seabed Mining (KASM) chairperson Phil McCabe said the Cawthron report was damning for TTR's latest application. "The miners say this area is a 'virtual desert', yet here we have scientists telling us quite the opposite," he said. "Many people are simply unaware of how much life exists on the sea floor, and how important that life is to maintain a healthy marine environment." The Environmental Protection Agency has until Tuesday September 6 to decide whether TTR's application is complete. From there the public will be notified and have 20 days to make submissions.

### **Sensitive marine habitats near proposed mining area**

*A report has found that 158 unique species and sensitive marine habitats exist off the Taranaki coast in an area bordering a proposed seabed mining operation.*

Radio New Zealand, 1 September 2016

Taranaki Regional Council commissioned the Cawthron Institute to investigate the region's coastal marine area as it prepares a new management plan. It found as well as unique species, the area included valuable kelp and sponge gardens, and was more significant than previously thought. Trans Tasman Resources has re-applied to the Environmental Protection Authority for resource consents to mine millions of tonnes of iron sands off the Taranaki coast. The company's initial application was rejected in 2014 because it did not consider the wider effect on the environment.

### **Vessel to conduct environment exploration**

August 31, 2016, The National Business

A DEEP sea marine research vessel is in Lihir, Namatanai district, New Ireland, to conduct environmental exploration along the New Britain Trench in the Pacific Ocean. The mv Zhang Jian arrived in Lihir last weekend. Staff on board will sample seafloor sediment and conduct other marine

surveys until September 3, 2016. The visit to Lihir was commissioned by gold mine developer Newcrest Mining Limited. It is the mother ship of Rainbow Fish, a submersible capable of diving to 11,000 metres. Welcoming the visiting 16 scientists from three Chinese universities and crew members, Lihir Mining Area Landowners executive chairman James Laketan said the people of Lihir were looking forward to the survey and exploration findings. “Environment and health issues are among our priority areas of concern. Deep-sea tailings have been banned in most resource project areas around the world,” he said. “But the story has been different here in Papua New Guinea, especially for the Lihir gold and Ramu nickel and cobalt projects.

“Such surveys will identify the amount of sediment and wastes in our waters and coastlines and assist the Government and local authorities manage and prevent damage to our marine environment and protect the health of our people.” He said since mining started on the island, villagers had been experiencing health and other concerns as a result of chemical spills contaminating the environment. “While control mechanisms have been established, there is no 100 per cent guarantee on prevention of health issues relating to mining,” he said. “LMALA has raised these issues time and again with the developer and we will continue to do so for the good of Lihirian people. “We are hopeful that with its state-of-the-art facilities, the Zhang Jian team will deliver findings that will help all stakeholders continue to properly monitor and manage our ocean environment.” Zhang Jian is carrying 16 scientists from the Tongji University, Shanghai Ocean University and Chinese Academy of Sciences who will test the navigation abilities of the ship and its scientific equipment before it heads out on a more challenging voyage to the 11,000-metre-deep Mariana Trench at the end of year.

### **One million sign petition against Nautilus and Solwara**

PNG Mine Watch, 25 August 2016

Over one million people have signed a [global petition](#) opposing Nautilus Minerals’ plans for experimental seabed mining in Papua New Guinea and the number is still rising. The petition calls on the PNG government and potential investors not to support the mining plans which could be catastrophic for our climate and biodiversity - and for people living around the mine site who rely on the sea for their subsistence lifestyles. Community advocacy group [ACT NOW!](#) advertised the petition on [their Facebook page](#)

### **NZ communities vow to fight seabed mining – again**

KASM, Scoop, 24 August 2016

Coastal communities are preparing to fight a new application to mine the seabed, lodged with the Environmental Protection Agency yesterday, Kiwis Against Seabed Mining said today. Trans Tasman Resources (TTR), whose 2013 bid to mine ironsands from the seabed in the South Taranaki Bight was turned down by the EPA in 2014, is making another attempt to get a marine licence, lodged with the EPA yesterday. It is understood TTR is applying to mine the same 66sqkm of seabed as its last application. “Last time this company tried to get permission to dig up 50 million tonnes of sand a year from the seabed, communities up and down the west coast of the North Island objected in their thousands, with record numbers of submissions against the project,” said Phil McCabe, KASM chairperson. “From surfers to recreational fishers and local Iwi, ocean lovers made a stand against this destructive and experimental practice, and we were proved right. The EPA said there were too many unknowns, and nothing has changed.

“It’s disappointing that TTR is back with the same application, trying to wear down public opposition, but this foreign-owned company should know that they will continue to meet strong resistance



from Kiwis who will stand up for their beaches ocean and marine environment.” “From the public reaction this week on social media, we know the strength of feeling against seabed mining hasn’t gone away. If anything, it’s stronger,” he said. Given the unknown impacts of seabed mining, KASM has gathered more than 4700 signatures on a petition calling for a moratorium on seabed mining in New Zealand waters. The EPA has turned down two applications on seabed mining: the first was Trans Tasman Resources application to mine the South Taranaki Bight, and then Chatham Rock Phosphate’s bid to mine phosphorus off the deep seabed of the Chatham Rise.

### **Nautilus closes Port Moresby office**

Insider, PNG Mine Watch, August 24, 2016

Nautilus Minerals has sacked twenty-six people from their organisation. All of the Port Moresby office employees have been made redundant, AGAIN, and the POM office is closing its doors, AGAIN. This will be the third time this has happened (redundancies), yet the Executive Committee look like they are sitting pretty YET AGAIN. In all probability MB Holdings will probably buy out the company and see it forward from here. The employees, the shareholders and the people of PNG have been taken for a ride AGAIN. Someone should look into the way Nautilus Minerals has been operated over the past 10 years and look closely at how money has been spent on things such as travel, furnishings for offices, nepotism and cronyism, where did the \$10M dollars actually go, and how was it possible that Shontel Norgate made a transfer without checking the banking details, and, why was she allowed to keep her job after losing such a huge amount of money. The excessive travelling of staff, to and from Moresby office and Brisbane office and the appointment of unqualified people to positions such as CSR Specialist. It is time to stop trusting the individuals from Nautilus (or any other company for that matter) who operate under the concept of White Privilege and realise that if Nautilus Minerals (or whatever form it takes from this point on) or any other company that wishes to exploit the riches and people of PNG, had better start acting in a manner that actually reflects the so called values of the company. "Nautilus Cares", It truly has been a race to the bottom, just not the one we expected to see!

### **Nautilus Obtains Bridge Financing and Restructures Solwara 1 Project Delivery**

Marketwired, 22 August 2016

Nautilus Minerals Inc. (the "Company" or "Nautilus") announces that it has signed a subscription agreement (the "Subscription Agreement") with Mawarid Offshore Mining Ltd. ("Mawarid") and Metalloinvest Holding (Cyprus) Limited ("Metallo," and together with Mawarid, the "Purchasers") under which the Purchasers have agreed to purchase such number of common shares of the Company that will raise gross proceeds of up to US\$20 million. Mike Johnston, Nautilus' CEO commented "the Company appreciates the ongoing support of its two major shareholders through this bridge financing arrangement, especially given current market conditions. We are also heartened by the continued support of all of our key stakeholders, in particular, our joint venture partner in the Solwara Project, the Independent State of Papua New Guinea's nominee and our vessel contractors, Marine Assets Corporation and Fujian Mawei shipyard. The global interest in seafloor mining continues to grow, and Nautilus remains the industry leader in this expanding field."

As previously disclosed, the Company requires significant additional funding in order to complete the build and deployment of the seafloor production system to be utilized at the Solwara 1 Project by the Company and its joint venture partner (as to 15%), the Independent State of Papua New Guinea's nominee. The gross proceeds available under the Subscription Agreement will provide the

bridge financing necessary to enable the Company to operate and to carry on the Project as described in detail below, while it continues to explore additional financing, joint ventures or other transactions that provide the funding required in order to complete the development of the Solwara Project. There can be no assurances that the Company will be successful in securing any such transactions. Pursuant to the Subscription Agreement, the shares will be purchased on a private placement basis and will close in tranches, on a monthly basis, during the period from December 1, 2016 through to November 30, 2017 (the "Financing Period"), at the election of the Company. The Company will determine the amount of funds to be raised under each tranche during each month of the Financing Period, subject to the limitations of receiving maximum subscription proceeds of US\$2 million per month and an aggregate maximum total amount of US\$20 million during the entire Financing Period.

Shares will be issued under each tranche at a price that is equal to the volume weighted average trading price of the Company's common shares on the Toronto Stock Exchange (the "TSX") for the 10-day period immediately prior to the date the Company issues the Purchasers a notice that the tranche will proceed. Closing of the bridge financing remains subject to the approval of the TSX. As the Purchasers are related parties to the Company, Multilateral Instrument 61-101 *Protection of Minority Security Holders in Special Transactions* and the rules of the TSX require that shareholder approval be obtained in order for the issuance of shares in the bridge financing to exceed 25% of the Company's market capitalization or 10% of the Company's current number of outstanding shares. The Company plans to hold an extraordinary general meeting of its shareholders on October 26, 2016 in order to seek approval of the bridge financing. Further information regarding the terms of the bridge financing and the relationship between the Company and the Purchasers will be included in the information circular to be mailed to the Company's shareholders and filed on SEDAR in connection with the meeting of shareholders. For the purposes of the additional funding required and in order to continue operating during the Financing Period, the Company will implement a restructuring plan that involves the following:

– Completing the Company's three key equipment contracts and storing that equipment when delivered, which includes:

- the Seafloor Production Tools and associated equipment being supplied by Soil Machine Dynamics;
- the Riser Pipe being supplied by General Marine Contractors; and
- the subsea slurry lift pump being supplied by GE Hydril.

- Marine Assets Corporation continuing the construction of the production support vessel at the Fujian Mawei Shipyard up to the completion of the hull, with further construction dependent upon the Company securing additional funding.
- Undertaking, with its joint venture partner, the activities necessary to maintain the good standing of the Mining Lease and Environmental Permit for the Solwara 1 Project, including the completion of Environmental Management and Monitoring Plans, as well as the completion of local community projects in the regions of Papua New Guinea closest to the Solwara 1 Project area.
- Terminating other contracts for the construction of any seafloor production equipment that are in the early stages of development and not entering into any new construction contracts until additional funding is secured.
- Reviewing the joint venture's remaining development, testing and operations plans to take account of current market conditions.
- Reducing Company staff numbers by approximately 60% to maintain the key resources required to implement the above activities, whilst ensuring project and corporate knowledge is retained.

In this regard, the remaining members of the Company's executive management team, who will be responsible for implementing the restructuring plan, are:

- Mike Johnston, President & CEO; and
- Adam Wright, Vice President -- PNG Operations.

• Staff reductions will include the departure of the following members of the Company's executive management team by September 2, 2016:

- Shontel Norgate, Chief Financial Officer;
- Kevin Cain, Vice President -- Projects;
- Jonathan Lowe, Vice President -- Strategic Development and Exploration; and
- Karen Hauff, General Counsel / Company Secretary.

The Company previously disclosed that in the event that the required funding is secured and the Company is able to continue development of the Solwara 1 Project, the schedule would be delayed. The Company has now secured the necessary bridge financing to facilitate the time required to secure that additional required funding. If the additional required funding is secured by June 2017 and subject to ongoing detailed planning, the Company could be in a position to commence the initial deployment and testing operations at the Solwara 1 Project by the end of Q1 2019.

There can be no assurances that the Company will be able to obtain the necessary project financing on acceptable terms or at all. Failure to secure project financing may result in the Company taking various steps aimed at maximizing shareholder value, including suspending or terminating the development of the Solwara 1 Project, and engaging in various transactions including, without limitation, asset sales, joint ventures and capital restructurings. The Company will provide updates as circumstances warrant. Any transaction(s) will be subject to all necessary stock exchange and, if applicable, shareholder approvals, as well as compliance with all other regulatory requirements.

### **PNG Undersea Miner Cutting Back Activities Under Money Pressures**

*Nautilus Minerals plans for Bismarck Sea faces fierce opposition*

WELLINGTON, New Zealand (Radio New Zealand International, August 17, 2016) – The company planning to mine the seabed of Papua New Guinea's Bismarck Bay has advised that it's cutting back its activities because of money pressures. Nautilus Minerals is reducing its workforce and ending contracts for the construction of equipment for the seafloor mining it was expecting to begin by 2018 for its Solwara 1 project in PNG. Mining Weekly reported the company saying it was looking for 'significant additional project funding.' Nautilus's plan had been to mine high-grade polymetallic seafloor massive sulphide deposits. Mining Weekly said the joint venture had already taken delivery of the three main seafloor production tools which had been built in England. They were scheduled to undergo extensive wet testing in Oman. The underwater mining project, a world first, has faced fierce opposition from environmentalists and the communities surrounding Bismarck Bay.

### **Mining industry worried over seabed mining**

Jez Abbott, Environmental Data Services, 16 August, 2016

Long-awaited regulations on seabed exploitation will not throw enough incentives to mining companies to coax them into investing in deep-sea drilling, legal experts warn. Law firm Pinsent Masons' energy and natural resources expert Steve Potter said a recent draft from the International Seabed Authority (ISA) needed more work. "A huge amount of work still needs to be done to finalise the regulations if they are to provide a sensible regulatory framework," Potter said. "It needs to incentivise mining companies to commit significant investment into deep seabed mining in interna-

tional waters." The working draft represents the first phase in the development of regulations including rules, regulations and procedures on environmental assessment and management of mining. ISA is the international organisation set up by the United Nations to control activities on seabeds beyond national jurisdiction, with a focus on mineral resources.

New rules are due in two years' time and ISA, which wants feedback on changes by November, has yet to publish details on environmental rules or the fee levels and royalties contractors must pay. The ISA signed 15-year exploration contracts with 24 contractors, which must have a sponsoring state but can be privately owned companies. Several of these early exploration contracts were extended recently involving countries including the UK, China, Japan Russia, France, Germany and India. Contracts include exploration for polymetallic nodules in the Indian Ocean basin and cobalt-rich crusts in the Western Pacific Ocean.

However, Potter said: "Much will depend on the level of royalty that contractors will have to pay to the ISA on minerals recovered and this has yet to be proposed. "Current exploration contractors are also concerned by proposals to hold regulatory reviews after the first five years. "These contractors have campaigned for regulatory stability to avoid more onerous regulation and cost increases that would threaten the economic viability of their projects." ISA is also proposing fees, payable for processing an exploitation application, which is expected to be significantly higher than the current exploration application fee. Fees are also planned for the renewal of exploitation contracts, and for material changes to mining plans.

### **Cash-strapped Nautilus to lay-off workers, cancel contracts for delayed Solwara 1**

Henry Lazenby, Mining Weekly, 16 August, 2016

Despite having \$51.3-million in its coffers as at the end of June, marine mining pioneer Nautilus Minerals on Monday announced that it would implement several measures aimed at preserving the company's capital position while it sought to secure further project financing. The TSX-listed company advised that following a review of all aspects of its business, it was reducing the workforce, terminating contracts for the construction of any seafloor production equipment that was in the early stages of development and that it would not enter into any new construction contracts until it could source additional funding. The company had previously planned for the construction and development of the entire seafloor production system for initial deployment and testing operations at the Solwara 1 project, offshore Papua New Guinea (PNG), to be completed by first quarter of 2018, based on the company's project timetable and subject to securing additional project funding.

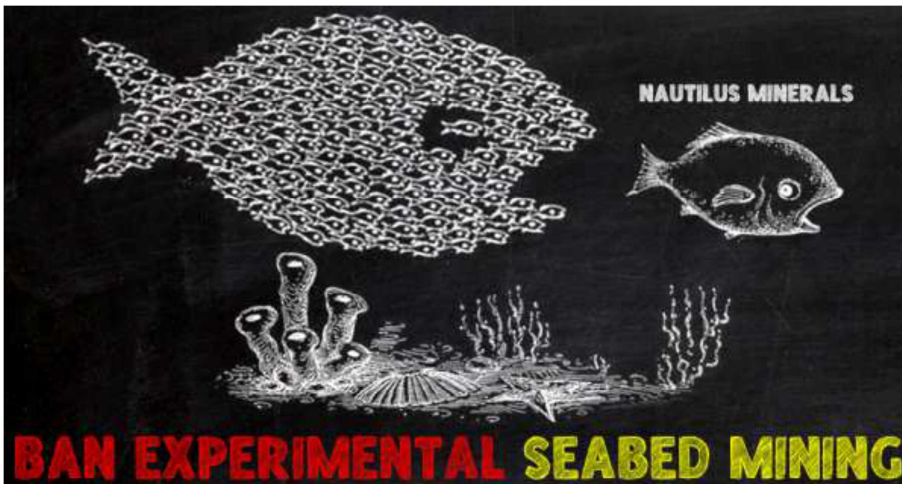
However, Nautilus had thus far been unsuccessful to secure the required money, resulting in an indefinite delay of production. Nautilus advised that the company and its operating subsidiaries was exploring alternatives for securing immediate bridge financing to facilitate the time required to secure the "significant additional project funding" that is needed and/or to explore alternative transactions aimed at maximising shareholder value. There could be no assurances that the company would be able to obtain the necessary bridge financing on acceptable terms or at all, it advised. The total capital cost for the system to deliver dewatered ore on board barges to the Port of Rabaul, including a 17.5% contingency, was estimated at \$383-million. The operating cost, excluding contingency, was estimated at \$237 000/d, or about \$64/t of mined ore, transported to the port based on a production rate of 1.35-million tons a year. With a 10% contingency, these operating costs totalled \$261 000/d or about \$70/t.

Nautilus had formed a joint venture (JV) company with PNG's nominee, Eda Kopa (Solwara), in December 2014 to mine high-grade polymetallic seafloor massive sulphide deposits. Nautilus held

an 85% shareholding and Eda Kopa 15%. The JV had taken delivery of the three main seafloor production tools (SPTs) from British manufacturer Soil Machine Dynamics' (SMD's) facility, in Newcastle upon Tyne. They had been moved to Oman, where they were scheduled to undergo extensive wet testing at the Port of Duqm. Nautilus planned to use the SPTs to cut and extract high-grade copper and gold from the seafloor at the Solwara 1 project site in the Bismarck Sea. The proposed project had been met with fierce opposition from environmentalists arguing that the impact of deep sea mining on the various levels of marine ecosystems were not fully understood.

### **Are Nautilus plans for experimental seabed mining dead in the water?**

Act Now! via PNG Mine Watch, August 16, 2016



Credit: Alliance of Solwara Warriors

The problems just keep stacking up for prospective experimental seabed mining company, Nautilus Minerals, and its planned Solwara 1 mine in Papua New Guinea. Mining was slated to begin in early 2018, but that date has already abandoned and in the meantime the breadth and volume of opposition just keeps growing. Over the last few months climate scientists, lawyers, politicians, church leaders, environmentalists, ngos and even the World Bank have all taken aim at Nautilus and Solwara 1 and, with the financial markets running scared, Nautilus doesn't have the cash to buy a single voice to back their controversial plans. A recent [plea from the Lutheran Church](#) in PNG for greater transparency around the mine approval process and [350,000 signatures](#) from all around the planet opposing seabed mining are just the latest headaches for Nautilus executives.

In April, it was revealed Nautilus has [admitted in company documents](#) its mining plans are highly speculative and experimental with no assurances the mining machines will actually work or certainty about the environmental impacts. This has scared potential investors and [Nautilus is desperately short of funds](#), leading to delays in the production and commissioning of vital mining machinery and its giant support ship. Already Nautilus has announced it will not be ready to start mining in early 2018 as promised and currently it has not been able to provide a new timetable. In the meantime there seems to be no end to the stream of negative legal and scientific reports casting doubts on the probity of seabed mining.

In June, a new scientific report from the University of Oregon revealed seabed mining could have [catastrophic climate impacts](#) while other [scientific research](#) is revealing the proposed mining sites are 'bursting with rare marine species'. In PNG, the Constitution Law Review Committee has [questioned plans for ESM](#). While, in June, law firm [Blue Ocean Law and PANG](#) published a report detailing the risks and pitfalls of deep sea mining, based on an independent legal and policy analysis



of the legislation of 14 Pacific Island nations, and in-depth case studies in Tonga, Papua New Guinea, and Fiji. To make matters even worse for Nautilus, its mining plans are becoming politically toxic in PNG. Prominent former Attorney General and Madang Governor, Arnold Amet, has [spoken out against the proposed mining](#); the Leader of the Opposition has attacked the government over ESM on the floor of Parliament and people's champion, MP and Governor Gary Juffa, continues to vocally oppose the mining.

With a National election looming in 2017, the political voices opposing the mining are expected to grow both in number and volume. In May, the campaign against Nautilus and Solwara 1 was taken onto the international stage with [a civil society protest](#) outside a Seabed Mining Summit in London. [Research published by the University of Washington](#) says the proposed Solwara 1 mine could have "*a large impact on local fishing*" which families rely on for their food and incomes. National Geographic Society Explorer, [Dr Sylvia Earle has branded plans](#) for experimental seabed mining as an 'invisible land grab' that threatens '*wholesale destruction*' and '*a serious threat to the stability of ocean systems*'. Even the [World Bank has urged the Pacific](#) to be cautious over seabed mining while Mexico has recently [rejected a proposed seabed mine](#) citing environmental concerns. With so many different national and international voices coming from so many different perspectives in opposition to experimental seabed mining; no voices in support; and Nautilus incapable of mounting a response, maybe, for once, common sense might prevail and Solwara 1 could be dead in the water?

### **Mining the Ocean Floor: Good Idea?**

By Adam Minter, Bloomberg, Aug 14, 2016

While commodities traders still work their way out of a historic slump, Japan is looking ahead to the next boom. According to Bloomberg News, next year a group of Japanese companies and government agencies will start mining minerals at a site 1,000 miles southwest of Tokyo -- and one mile beneath the ocean's surface. It will be the first large-scale test of whether mineral deposits can be mined commercially from the seafloor. The project is fairly bold. The seafloor is home to priceless deposits of minerals such as gold, copper and cobalt. And thanks to new technologies, it might soon be exploitable. That's potentially good news for miners and commodity speculators. But it poses some alarming challenges for the marine environment -- and the economies that depend on it. At least as far back as the 1960s, scientists have known that rich deposits of minerals could be found in metallic nodules strewn like stones across the deep seabed. In 1977, researchers discovered hydrothermal vents on the ocean floor, along with some of the richest ore bodies in the world. In both cases, though, slumping commodity prices and high extraction costs doomed exploitation efforts.

China changed everything. As its economy picked up earlier this decade, and demand for commodities surged, the search for alternative sources of raw materials gained steam. Resource-poor Japan resuscitated its interest in seabed mining. China started building its own underwater mining capabilities, including a proposed partnership with India. Between 1984 and 2011, the International Seabed Authority -- which oversees seabed mining under a United Nations convention -- issued just six exploration permits. Since 2011, it's issued 21, covering nearly 400,000 square miles of ocean floor that could one day be mined. Exploration isn't disruptive to the environment. But seabed mining will be. For one thing, it requires underwater harvesters that will suck up those valuable rocks -- and any organisms or habitats that get in the way. Some will recover, but others never will: Nodules, which support an abundance of organisms, require millions of years to form. Even worse, the harvesters will kick up huge sediment clouds that could spread over vast areas of the seabed, potentially ravaging corals and sponges.

These disruptions might even ricochet through the aquatic food chain. Last year, New Zealand denied a permit to mine the seabed off its coast after the seafood industry argued that it could deposit 45 million tons of sediment into its fisheries each year -- fisheries that help feed people around world. The deep sea also plays a crucial role in regulating the climate by serving as a giant carbon sink. Anything that churns up the seafloor has the potential to disturb that sink -- with unpredictable consequences. Craig Smith, an oceanographer at the University of Hawaii, recently speculated that seabed mining "will probably have the largest footprint of any single human activity on the planet." The key word there is "probably." As Smith and others point out, scientific knowledge of the seafloor is thin. That's begun to change as regulators and mining companies sponsor environmental reviews.

But that research is moving slowly in light of what looks like a looming gold rush. Fortunately, the International Seabed Authority has yet to issue its first permit to actually mine a claim. In fact, it only issued the first draft of its mining regulations last month, and they'll likely be under review for years. But the ISA can only adjudicate claims in international waters. Territorial projects, such as Japan's, can proceed according to local law, regardless of the methods used or their potential effects on fisheries. That makes addressing the environmental impact even more urgent. The ISA should place a moratorium on new exploration permits until a reliable way to shield vulnerable habitats and species from mining is devised. Extending the concept of Marine Protected Areas -- which are used to preserve sensitive ecosystems -- to parts of the international seabed that haven't yet been licensed for exploration would also help. Such restrictions won't please everyone. But as this new gold rush speeds up, they could offer a chance to preserve some of what will be lost in the chase.

## **Second company keen on sea bed mining around Cook Islands**

Radio New Zealand, August 4, 2016

The Cook Islands says there is interest from a second mining company wanting to explore the country's seafloor for minerals. Last month the Cook Islands Investment Corporation's chair, Mike Henry, signed a contract with the United Nations' International Seabed Authority giving it exclusive mineral rights to an area of 75,000 square kilometres in the Clarion Clipperton Fracture Zone. The 7,240 km long mineral rich zone extends over millions of square kilometres in the north Pacific. The Cook Islands News reports a joint venture agreement was also signed with Belgian company, GSR, giving it the possibility of exploring and exploiting the Cook Islands ocean floor minerals. The Finance Minister Mark Brown, who is also the minister responsible for seabed minerals, said the Government was expecting to sign their second exploration licence with another company in the coming months. He says it is a significant step forward for the country in its push to be involved in mining seabed minerals.

## **Cook Islands Seabed Mineral Exploration Gains Momentum**

*Cook's Finance Minister: Cooks "positioned very, very well as a country within this particular industry".* By Rashneel Kumar

RAROTONGA, Cook Islands (Cook Islands News, August 02, 2016) – Cook Islands' effort to explore the potential mineral resources on the seabed floor within its EEZ is gaining momentum following interest from a second company to be part of the exploration phase. On July 15, the country represented by Cook Islands Investment Corporation chairman Mike Henry signed a contract with the United Nations' International Seabed Authority (ISA) to exclusive mineral rights to an area of 75,000 square kilometres in the Clarion Clipperton Fracture Zone of the Pacific Ocean.

A joint venture agreement was also signed with GSR which allows the Belgium-based company the opportunity to explore and one day, exploit the contract area that the Cook Islands hold. Finance minister Mark Brown, who is also the minister responsible for seabed minerals, said the government was expecting to sign their second exploration license with a separate company in the coming months.

He said it was a significant step forward for the country in the field of seabed minerals. One of the companies and countries involved in the exploration phase would be testing a prototype of their machine that would go down to the sea floor to collect the mineral deposits sitting there, he said. In the next five years, it was hoped technology would be developed to get the information required to be able to move towards the exploitation of these minerals in the future. “We are positioned very, very well as a country within this particular industry. We are up there partnering with GSR but we are also closely working with other countries such as Korea and others that are seen as the forefront in developing the technology for seabed minerals exploration,” Brown said. The drive to explore and potentially exploit seabed mineral resources began in the 1970s when the then leader, late Sir Albert Henry, joined the New Zealand delegation to the Law of the Sea Conference in Caracas, Venezuela.

He was given the opportunity to speak and on behalf of all small island states in the world, he made an impassioned plea to the larger nations to recognise the rights of island people and nations to the resources of the ocean. This initiative gained momentum recently when the Seabed Mineral Authority was formed in 2012 to look into the opportunities regarding seabed mineral exploration and exploitation. Brown was initially supposed to seal the deal with the ISA and GSR in June in New York but a minor amendment to the agreement proposed by GSR delayed the signing. The government’s legal team reviewed the proposal and made the appropriate adjustments before it was put through the process of formal approval by cabinet, culminating in the signing in Jamaica two weeks ago. “In terms of the exploration, there is also requirement in terms of partnership with our joint venture partner to provide training opportunities to the Cook Islanders to build our capacity in this particular area,” Brown said. “The exploration phase is to identify areas in the seabed where the best potential for exploitation should occur.” Brown added the exploration phase would also determine the economic benefits and the environmental impacts from such activities. These information would then be used to seek the exploitation license in the near future, he added.

### **Cooks Contract With International Seabed Authority A 'Significant Milestone'**

*Cooks granted mineral rights in Exclusive Economic Zone*

RAROTONGA, Cook Islands (Cook Islands News, July 26, 2016) – The Cook Islands Investment Corporation has signed a contract with the International Seabed Authority a deal that is regarded “as being a significant milestone in the Cook Islands aspirations to realise the potential of the mineral resource within its Exclusive Economic Zone”. The EEZ covers 1.8 million square kilometres and the ISA gives the Cook Islands Government and people a contract to exclusive mineral rights 75,000 sq km of that in the Clarion Clipperton Fracture Zone of the Pacific Ocean. The corporation says: “This is a journey that has its beginnings in April 1972 when Sir Albert Henry, our Premier at the time, joined the NZ delegation to the Law of the Sea Conference in Caracas, Venezuela. “He was given the opportunity to speak and, on behalf of all small island states in the world, he made an impassioned plea to the larger nations to recognise the rights of island people and nations to the resources of the ocean.”

It says: “In recent times the opportunities our EEZ may one day provide have been progressed by His Excellency Tom Marsters, in his role as minister of the Crown, then by Sir Terepai Maoate.

For the past five years our country's efforts have been guided by Mark Brown, the minister responsible for the Seabed Minerals Authority and the Cook Islands Investment Corporation. "The contract we have signed with the United Nations' International Seabed Authority and the Joint Venture Agreement with GSR (Belgium) are the direct result of the hard work of a small team of dedicated Cook Islanders supported by our regional and international partners at SOPAC/SPC based in Suva and the Commonwealth Secretariat, based in London. "All Cook Islanders can be proud of the work done by Paul Lynch and his team at the SBMA in getting the Cook Islands message out to the world and managing the legislation progress." The corporation adds: "From Crown Law our new solicitor-general David James and particularly Alex Herman have been instrumental in both the work with the ISA contract and the details needed to complete our joint venture agreement."

"At CIIC, board members Malcolm Sword and Caren Rangi and our CEO Tamarii Tutangata have been involved with every step we have made since the heads of agreement was first signed in 2013. "From the beginning of this process CIIC engaged Heinz Matysik to head our legal team, which has included Lloyd Miles of CIIC, Hannah Lily and Joshua Brien of the Commonwealth Secretariat and Marie Bourrel of SOPAC/SPC. "What we have signed with the ISA ... gives the Cook Islands Government and people a contract to exclusive mineral rights to an area of 75,000 sq km in the Clarion Clipperton Fracture Zone of the Pacific Ocean. "The Joint Venture Agreement we have signed with G-TEC Sea Mineral Resources of Belgium (GSR) is a partnership that provides GSR the opportunity to explore and one day, exploit the contract area that the Cook Islands hold. "At some point in the future, we hope that GSR will also explore opportunities in our own EEZ."- Release/RM

### **Sir Arnold Amet urges govt to call off Papua New Guinea-pig mining experiment**

Post-Courier, July 26, 2016, Story courtesy of ABC Radio Australia

Former PNG Attorney General and Minister for Justice, Sir Arnold Amet, has joined the campaign against Solwara 1, the deep sea mining project in the Bismarck Sea off New Ireland province which is due to start operations in 2018. He has accused the Mining Minister, Byron Chan, of granting the Canadian company Nautilus Minerals a world first licence to conduct what he calls a Papua New Guinea-pig experiment. Sir Arnold says the licence was issued even though PNG has no national policy on deep sea mining nor an appropriate legal framework to regulate such operations, and against that background the project should not proceed.

### **Ocean Floor Mining: The Next Terrible Thing**

**"The New Gold Rush" doesn't sound so great for the oceans**

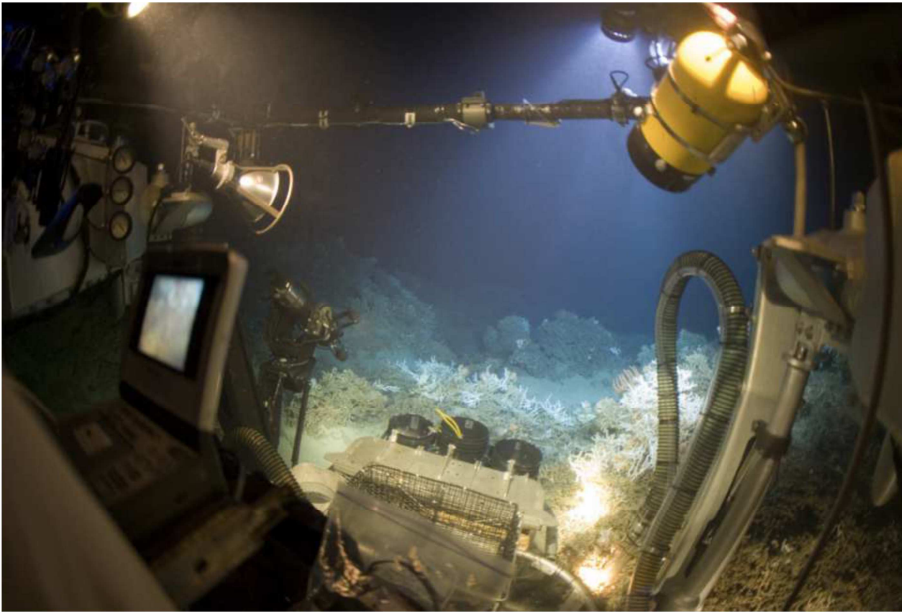
By Justin Housman, Surfer Magazine, July 21, 2016

Because we won't be satisfied until the entire surface of the earth has been rendered in a never-ending pursuit to greedily dig up things that can be burned for fuel or hammered into profitable metals regardless of the consequences, humankind's most adventurous profiteers have now set their sights on mining the depths of the sea floor for minerals and precious metals. This is one of the few zones of earth that scientists know very little about, full of strange creatures, unknown bacteria, and hydrothermal vents that may harbor the keys to how life on earth began.

*But let's dig it up anyway, say the mining companies.*

Laughably, something called the International Seabed Authority, which is not at all a group from a Wes Anderson film and was in fact created by the U.N. to administer regulations on the internatio57

nal high seas, met recently in Jamaica to begin the laborious and years-long process of dreaming up a series of rules and environmental regulations to be ignored and thwarted by international mining conglomerates. There's plenty of metals like zinc, cobalt, and manganese down there, important for many industrial uses like the building blocks of the cell phone you're reading this on. Most of those metals are near hydrothermal vents, which harbor some of the least-known ecosystems on the planet. Of course, there are also tons and tons of gold and silver and diamonds, carelessly scattered on the ocean floor by nature, far from the bank vaults in which it all rightfully belongs. *National Geographic* guesses that there could be as much as \$150 trillion (with a "T") worth of gold alone to suck up in giant vacuums.



The sea floor, home to unknown riches of all kinds. Photo: NOAA

Did I not yet mention the vacuums? One of the ways the mining companies would get at all their newfound riches would be to park giant ships on the surface and snake enormous tubes to the bottom of the ocean, sucking up whatever they feel like, but hopefully mostly gold and silver and diamonds. They'd also pilot little drone-like subs down to the bottom to strip mine the sea floor and bring little treasure holds of cargo to the surface. As you might imagine, there are environmental concerns. Nobody knows how many hydrothermal vents there are, let alone how many mineral deposits are available, or what would happen to the sea floor under sustained mining, because scientists don't know much about the bottom of the ocean yet. Nobody has any real idea of how the ocean would react to deep sea mining operations. Delicate processes of nature will certainly be affected.

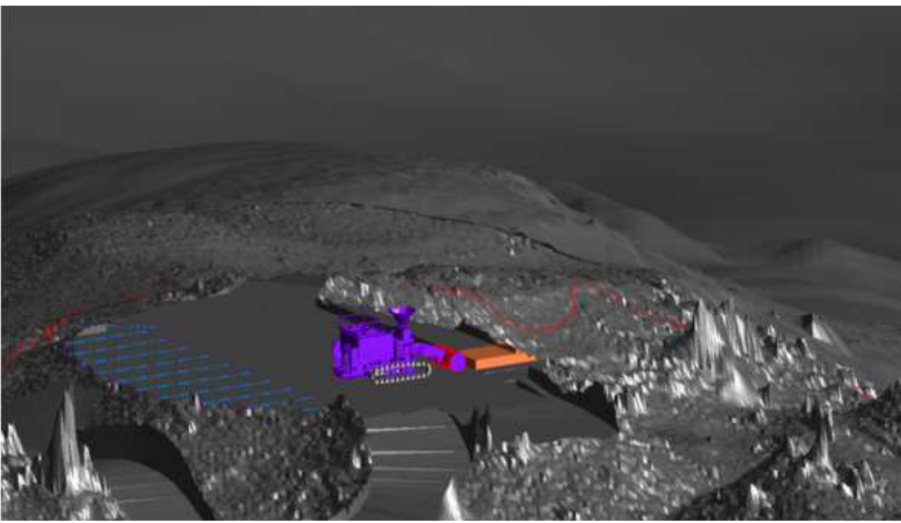
The water column will be altered, there will be massive sediment upheaval, tailings to dump, gases to vent, probably oil deposits to deal with, sulfuric acid pollution potential, oil and gas spills from ships, and probably dozens of other consequences that won't be known until they're already causing a problem. As Dr. Cindy Van Dover, director of the Duke University Marine Laboratory, told NPR affiliate KQED: As we have learned the hard way more than once, the biosphere of Earth is interconnected – what happens in one place, affects what happens elsewhere. The seafloor seems so remote to us, yet so did the ozone layer. Humans have a tremendous capacity to modify the global environment, in ways we often don't anticipate and in ways that are very detrimental to our quality of life. There's already a plan in place to begin mining a deep section of the ocean's floor near Papua New Guinea as early as 2018. When the plans were made available to local villages that explained how the mining would proceed, and even though profits would be shared with the locals, the locals were not pleased and reacted by imploring with a marine biologist studying the area to help them attack the mining ships.



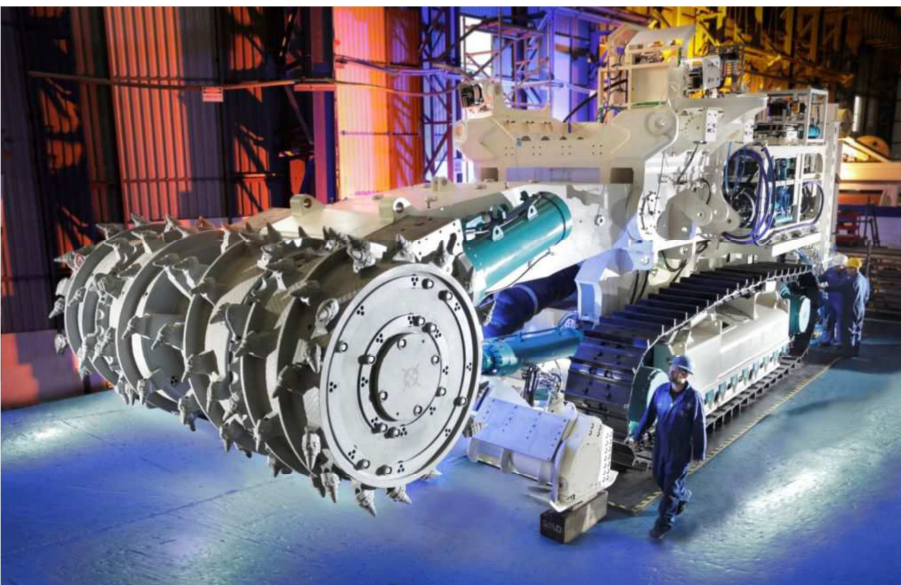
Nautilus, the company behind the Papua New Guinea plan, and a world leader in the race to dig up the sea floor, assures environmentalists that they've done the legwork to make sure all the mining is done with eco-friendliest practices—they swear. Which is a bit strange, since marine scientists still have so little idea about what is even on the sea floor to be affected. How would Nautilus even know how to begin mitigating that? So far, vast areas of the South Pacific are the first zones targeted by Nautilus and other mining groups. These are areas of the ocean that are home to fragile reef systems, some of the finest surf on earth, and, likely not coincidentally, communities of locals who don't have the means to fend off international corporations bent on resource extraction. The mining industry doesn't have a particularly shining history of leaving the land in better shape than when they found it. Sadly, it looks like the ocean may be about to suffer the same fate.

### Deep Sea Mining: An Invisible Land Grab

Sylvia Earle of Mission Blue in Ocean Views, National Geographic, July 21, 2016

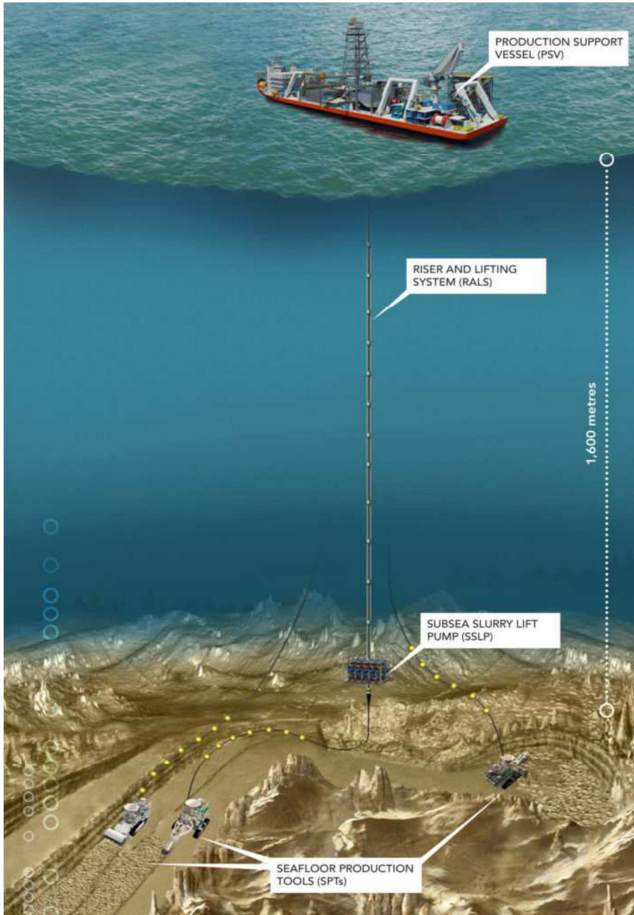


Thousands of meters beneath the azure ocean waters in places like the South Pacific, down through a water column saturated with life and to the ocean floor carpeted in undiscovered ecosystems, machines the size of small buildings are poised to begin a campaign of wholesale destruction. I wish this assessment was hyperbole, but it is the reality we find ourselves in today.



*A deep sea mining machine.*

After decades of being on the back burner owing to costs far outweighing benefits, deep sea mining is now emerging as a serious threat to the stability of ocean systems and processes that have yet to be understood well enough to sanction in good conscience their large-scale destruction. Critical to evaluating what is at stake are technologies needed to access the deep sea. The mining company, Nautilus Minerals, has invested heavily in mining machinery. However, resources needed for independent scientific assessment at those depths are essentially non-existent.



*The layout of a mining operation.*

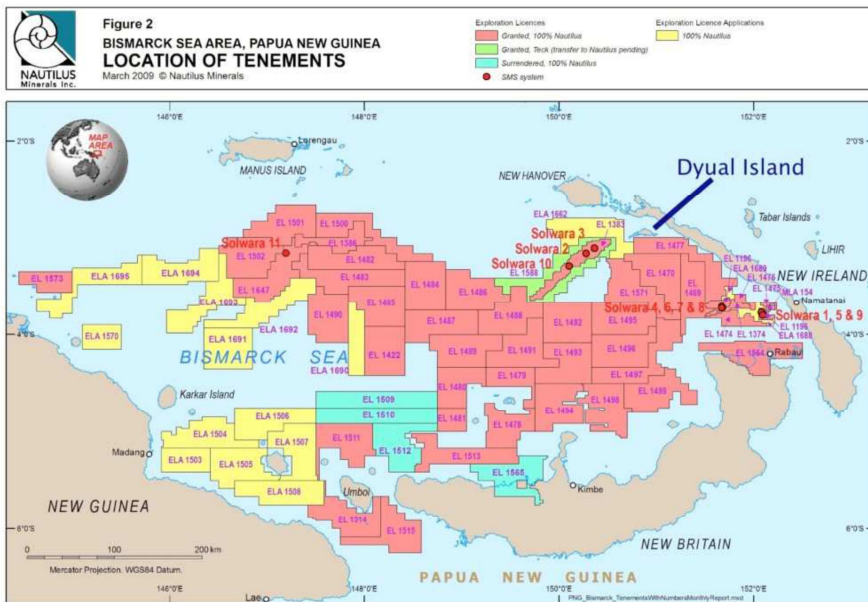
China is investing heavily in submersibles, manned and robotic, that are able to at least provide superficial documentation of what is in the deep ocean. Imagine aliens with an appetite for minerals flying low over New York City taking photographs and occasional samples and using them to evaluate the relative importance of the streets and buildings with no capacity to understand (or interest) in the importance of Wall Street, the New York Times, Lincoln Center, Columbia University or even the role of taxi cabs and traffic signals. They might even wonder whether or not those little two-legged things running around would be useful for something. The International Seabed Authority, located in Jamaica and created under the 1982 United Nations Convention on the Law of the Sea, is currently issuing permits for mining exploration. At the very least, might there be ways to issue something like “restraining orders” owing to the lack of proof that no harm will be done to systems critical to human needs? Or also at the very least protecting very (very, very) large areas where no mining will be allowed?

The role of life in the deep sea relating to the carbon cycle is vaguely understood, and the influence of the microbial systems (only recently discovered) and the diverse ecosystems in the water column and sea bed have yet to be thoughtfully analyzed. If a doctor could only see the skin of a patient, or sample what is underneath with tiny probes, how could internal functions be understood? The rationale for exploiting minerals in the deep sea is based on their perceived current monetary value. The living systems that will be destroyed are perceived to have no monetary value. Will decisions

about use of the natural world continue to be based on the financial advantage for a small number of people despite risks to systems that underpin planetary stability – systems that support human survival? In the 1980s, when deep sea mining first became a hot topic, it seemed preposterous to think that humans could up-end planetary processes by burning fossil fuels, clear-cutting forests and oceans, producing exotic chemicals and materials and otherwise transforming – “taming” – the distillation of all preceding earth history for our immediate use.



*Do you see life in this picture? I do.*



*A tragedy of the commons for the benefit of the few.*

Buried within the *Deep Seabed Hard Mineral Resources Act of 1980*, US legislation sponsored by Senator Lowell Weicker about deep sea mining, there is a provision that mandates for US interests to establish “Stable Reference Zones” of equal size and quality to those proposed for exploitation. The wording in this law was taken from a resolution crafted at the IUCN meeting in Ashkabad in



1978 that I helped draft and later took to Senator Weicker's trusted scientific advisor, Robert Wicklund, for consideration. The IUCN World Conservation Congress occurring this September in Hawaii provides a ripe opportunity to set in motion some significant and very timely actions that could help blunt the sharp edge of enthusiasm for carving up the deep ocean. Whatever it takes, there must be ways to elevate recognition of the critical importance of intact natural systems.



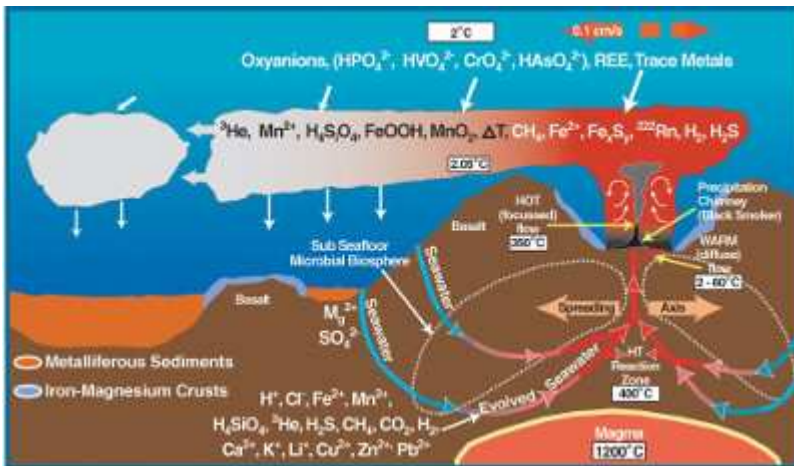
*The environmental destruction caused by open mining on land is well documented.*

We need technologies to access the deep sea to independently explore and understand the nature of Earth's largest living system. But most importantly, we need the will to challenge and change the attitudes, traditions and policies about the natural world that have driven us to burn through the assets *as if* there is no tomorrow. This "as if" can be a reality – or not – depending on what we do now. Or what we fail to do. However, there is undeniably cause for hope: there is still time to choose.

*This article was published originally on the Mission Blue website; reproduced here with permission. National Geographic Society **Explorer in Residence Dr. Sylvia A. Earle**, called *Her Deepness* by the New Yorker and the New York Times, *Living Legend* by the Library of Congress, and first *Hero for the Planet* by Time Magazine, is an oceanographer, explorer, author and lecturer with experience as a field research scientist, government official, and director for corporate and non-profit organizations including the Kerr McGee Corporation, Dresser Industries, Oryx Energy, the Aspen Institute, the Conservation Fund, American Rivers, Mote Marine Laboratory, Duke University Marine Laboratory, Rutgers Institute for Marine Science, the Woods Hole Oceanographic Institution, National Marine Sanctuary Foundation, and Ocean Futures.*

*Formerly Chief Scientist of NOAA, Dr. Earle is the Founder of Deep Ocean Exploration and Research, Inc. (DOER), Founder of the Sylvia Earle Alliance (S.E.A.) / Mission Blue, Chair of the Advisory Council of the Harte Research Institute, inspiration for the Ocean in Google Earth, leader of the NGS Sustainable Seas Expeditions, and the subject of the 2014 Netflix film, Mission Blue. She has a B.S. degree from Florida State University, M.S. and PhD. from Duke University, 27 honorary degrees and has authored more than 200 scientific, technical and popular publications including 13 books (most recently *Blue Hope* in 2014), lectured in more than 90 countries, and appeared in hundreds of radio and television productions.*

## Undersea Mining Exploration Planned In Wallis And Futuna



French government to assess territory's potential mineral wealth

WELLINGTON, New Zealand (Radio New Zealand International, July 14, 2016) – The French Government says an exploration and educational mission is being sent to Wallis and Futuna to assess undersea mineral wealth. The Overseas Minister, George Pau-Langevin, says customs authorities in the territories realised the need for economic development to retain young people in the islands. The minister was speaking after meeting with a delegation from Wallis and Futuna in Paris this week. The mineral exploration follows a proposal by the French Prime Minister Francois Hollande in February which has raised environmental concerns among traditional leaders. Ms Pau-Langevin says it has been agreed to send a mission that is both exploratory and to hear people's concerns and an educational mission to explain what will happen.

### Seabed mine warning

By AATAI JOHN, Solomon Star, 13 July 2016

REGIONAL leaders have been cautioned that non renewable resources like mineral deposits inside our ocean needs to be addressed now given the growing demand for underwater mining. This was raised by local Hawaiian-based academic Dr. Tarcisius Tara Kabutaulaka, during the Toktok session of the Pacific Islands Development Forum (PIDF) Leaders Summit on Tuesday. The two days Summit which kicked off yesterday Honiara is hosted based on the theme 'Stewardship for Healthy Oceans & Nations.' Kabutaulaka stressed that while responsible organisations of the region focus more on tuna and other living marine resources, it is very important that they must start pondering ways to tackle other fisheries issues, which remains a challenge for the pacific nation one of which is seabed mining. He added its time that regional organisations that deal with fisheries issues to extend their claws from tuna to other areas of concern which affect the lives of people and the marine environment.

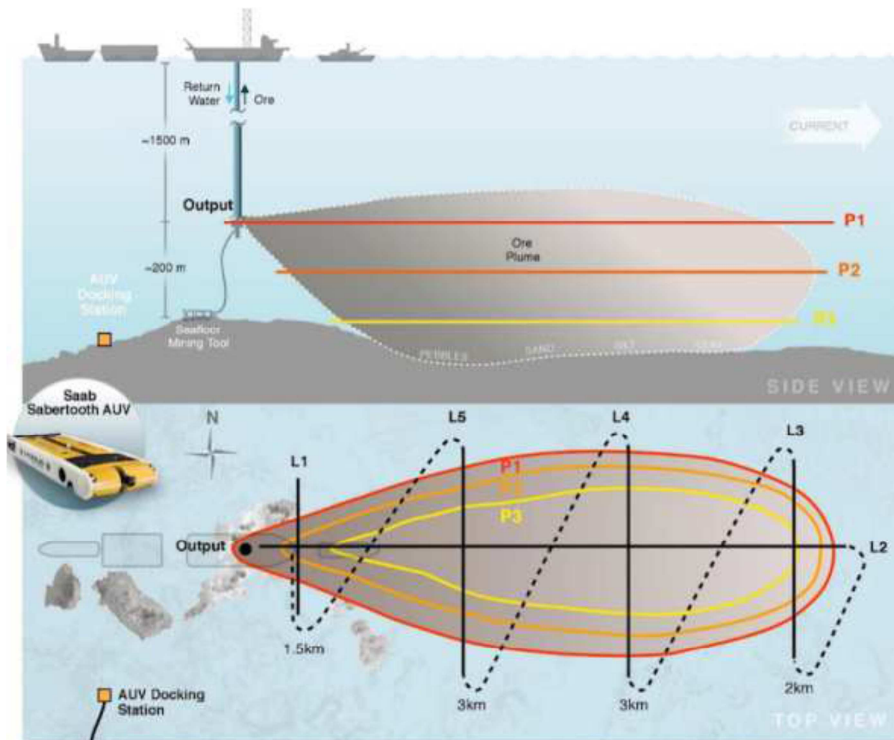
Meanwhile, facilitator of the Toktok session, who is also a representative of Party to Nauru Agreement (PNA) Dr Transform Aqorau said deep sea mining has the potential of destroying government structures of our islands nations. He reiterated that there is a need to develop a regional body to set the rules and laws to address seabed mining, in a collective way that would manage such activities. "Deep sea mining is an issue for the region now, but we still yet to establish any regional body that will deal specifically on underwater mining." Its understood Papua New Guinea (PNG) has been engaged seabed mining so far. The Summit which will end today kicked off with an official opening ceremony at the Lawson Tama stadium yesterday. Present at the ceremony were leaders from the PIDF member countries namely; Tokelau, Vanuatu, Nauru, Kiribati, Tonga, Tuvalu, Federated



States of Micronesia, and Fiji. The chief guest at the program is the Prime Minister of Fiji, Voreqe Frank Bainimarama.

## Solwara 1 experimental seabed mine could devastate fish stocks

PNG Mine Watch, July 7, 2016



The possible sediment plume from the Solwara 1 mine and proposed environmental survey routes. *Diagram by Hunter Hadaway.*

New research, published by the University of Washington School of Oceanography, says the proposed Solwara 1 experimental seabed mine could have “a large impact on local fishing” which families rely on for their food and incomes. Effective monitoring of the environmental impacts will require an underwater vehicle that will cost over K87 million to deploy, a cost, says the research, that should be paid by the mining company, Nautilus Minerals. The research says the proposed mining will create a tailings plume “and until the mining operations and monitoring begin there will be no way to know for sure how large this mining plume will be or how far downstream it will travel.” As well as depleting fish stocks, the mining could also contaminate marine life consumed by local people. The research concludes that although the mining will be at a depth of 1500 metres, contaminants from the mining could leach into the water column and increase in concentration as they move upwards:

“Once contaminants reach organisms that are consumed by Papua New Guineans the concentration will be much higher than when it was first leaked into the water and could potentially cause sickness in the consumers”. Because of the potential environmental impacts of the mining, which include “contaminations in fish, physical damage to the seafloor, destruction of isolated populations, sediment plumes, change in fluid flow, noise pollution, wastewater disposal, and leakage of equipment”, the research says it is “essential” to determine the ecological impacts and “how vulnerable the PNG population and economy is to diminished fishing”. Proper environmental monitoring will also be important “in order to avoid an extinction/poisoning/degradation of organisms that contribute to the circle of life within the ocean”.



An underwater vehicle like the SAAB Sabertooth will be required for proper environmental monitoring

The research says the only way to properly monitor the impacts of the mining will be to deploy an underwater vehicle that can send video and still images back to the shore. Deployment of a suitable vehicle, such as the SAAB Seaeye Sabertooth would cost around K87 million. “With this type of technology PNG would monitor Nautilus’ activities, and ensure they are in accordance with the previously established agreement.” The research suggests the costs of the underwater vehicle should be paid by Nautilus but the monitoring should be carried out by PNG authorities.

### **Nautilus Minerals needs more funding**

The National, July 6th, 2016

NAUTILUS Minerals is continuing to seek alternative sources of financing to maintain the development of the Solwara 1 project and its operations. The company said in a statement it required significant additional funding to complete the building and deployment of the seafloor production system to be used at the Solwara 1 project. There is no assurance that Nautilus will be able to obtain necessary bridge financing or project financing on acceptable terms or at all. Failure to secure bridge financing and/or project financing may result in the company taking steps to maximise shareholder value. It includes suspending or terminating the development of the seafloor production system and Solwara 1 project, and engaging in various transactions including, without limitation, asset sales, joint ventures and capital restructurings.

The company’s independent directors will be looking to engage a financial advisor to assist them in this process. The company said there could be no assurances that any transaction would result from these matters. Nautilus will provide updates as circumstances warrant. Any transaction(s) will be subject to all necessary stock exchange and, if applicable, shareholder approvals as well as compliance with all other regulatory requirements. Nautilus previously said the construction and development of entire seafloor production system for initial deployment and testing operations at Solwara 1 project, was to occur in the first quarter of 2018 based on the company’s project timetable and subject to additional funding. Nautilus said it would provide updates as circumstances warranted.

# PNG a global hot spot for toxic tailings dumping

PNG Mine Watch, June 22, 2016

Metal mining companies dump  
**180 Million Tons**  
 of toxic tailings into water bodies every year

**WHY TAILINGS ARE TOXIC**

Naturally occurring elements in crushed rock become toxic when exposed from mining:

- arsenic
- lead
- mercury

Additives used in processing:

- petroleum byproducts
- sulfuric acid
- cyanide

The amount of tailings dumped into rivers, lakes, and oceans could fill **1.3 million** shipping containers every year.

**WHAT'S AT STAKE**

It's cheap for companies to dump waste into oceans, rivers and lakes. But the ecological costs are high.

Marine life dosed with toxic heavy metals and milling chemicals and smothered by murkiness from suspended particles cutting off the supply of water and oxygen.

Clogged river channels are forced to change course, and tailings have smothered and flooded vast areas of wetlands and forests.

Human health is at risk as metals and chemicals increase in concentration as they travel up the food chain.

Contamination can spread from rivers to floodplains and affect grazing livestock.

Mine wastes originally dumped into rivers have contaminated home drinking water.

**7 HOT SPOTS FOR TAILINGS DUMPING**

**WHO DUMPS WASTE INTO NATURAL WATER BODIES?**

- Barrick Gold (Canada)
- BHP Billiton (Australia/UK)
- Freeport-McMoRan Copper and Gold (USA)
- Goldcorp (Canada)
- Newcrest Mining (Australia)
- Newmont Mining (USA)
- Rio Tinto (UK/Australia)
- Teck (Canada)
- Vale (Brazil)
- Highlands Pacific (Australia)
- PanAust (Australia)

**The top four mines** that dump tailings into bodies of water account for 86% of the tailings dumped into bodies of water each year:

1. Freeport McMoRan and Rio Tinto's Grasberg mine in West Papua, Indonesia
2. Newmont Sumitomo Mining's Batu Hijau mine in Indonesia
3. Ok Tedi Mining Ltd.'s mine in Papua New Guinea
4. CLIF's Mining Company's Wabash/Scully mine in Labrador, Canada

Source: "Toxicity watch" 2015 report, Earthworks and MinesWatch Canada

## Earthworks

In some parts of the world, mining companies directly dump this mine waste into rivers, lakes and oceans. In fact, mining companies are dumping more than 180 million tonnes of hazardous mine

waste each year into the world's waterways, threatening vital bodies of water with toxic heavy metals and other chemicals poisonous to humans and wildlife.

This [Tailings Infographic](https://ramumine.files.wordpress.com/2016/06/tailings_infographic.pdf) [pdf file] shows the extent of the problem:  
[https://ramumine.files.wordpress.com/2016/06/tailings\\_infographic.pdf](https://ramumine.files.wordpress.com/2016/06/tailings_infographic.pdf)

### *Fact Sheet*

## **Precautionary Approach Needed for Deep-Sea Mining**

Science-based regulations can protect underwater ecosystems in areas beyond national jurisdiction  
 The Pew Charitable Trusts, June 17, 2016



Photo: JAMSTEC

### **Overview**

Over the past half-century, ocean scientists have begun to describe the least-known places on Earth: the deep realms of the international seabed. Aided by new technologies, the pace of the seabed inventory has accelerated in recent years. Scientists have traced vast systems of underwater hills, mountains, canyons, and plains. They have also found features uniquely marine, from millions of potato-size rocks carpeting the Pacific Ocean abyss to hydrothermal vents gushing mineral-rich solutions that sustain life dependent on chemical energy, rather than sunlight.

Most of the international seabed remains uncharted, as 55 percent of the world's ocean floor lies beyond any national jurisdiction. But many minerals crucial to modern economies—such as copper, magnesium, nickel, zinc, and the rare earth elements—can be found in these areas in richer concentrations than are available on land. Seabed mining beyond national jurisdiction can take place only under contract with the International Seabed Authority (ISA), which was established by the United Nations Convention on the Law of the Sea.

The ISA, with its 167 Member States, has awarded 24 exploration contracts to Members or their designees to survey possible mining areas and submit their findings. Contractors operate under ISA exploration regulations. No contracts for commercial-scale exploitation can be awarded until the ISA approves exploitation regulations, which will guide all potential extraction through mining. Pew established its seabed mining project in 2016 to ensure that international mining regulations protect the structure and functioning of deep-sea ecosystems. Large, ecologically important areas of the seabed should be closed to mineral extraction, and precautionary standards must be adopted by the ISA to minimize environmental damage where mining does occur.



### Mineral resources and mining technologies

Three types of deep-sea deposits draw potential commercial interest: polymetallic nodules (the potato-size rocks that dot the Pacific floor), hydrothermal deposits (products of the superheated vents), and cobalt-rich crusts (the outermost layer of underwater mountains, or seamounts). The extent of most of those rich sites is not yet known, however, nor can experts make reliable estimates of the expenses incurred by the new robotic technologies that would do the work. One well-regarded study predicts that a US\$12 billion industry will extract 10 percent of the world's minerals from the ocean floor by 2030,<sup>1</sup> but doubters abound.

The ISA has awarded most of its exploration contracts for investigations of the polymetallic nodules of the Clarion-Clipperton Fracture Zone, a Pacific Ocean plain roughly the size of Europe<sup>2</sup> with an average depth of about 4,000 meters. Formed over millions of years, the nodules contain rich deposits of manganese, nickel, cobalt, and copper.<sup>3</sup> Harvesting the nodules would involve removing the top layer of the ocean floor, sending the material up a giant tube to a mother ship, and returning the commercially worthless portions back to the bottom—roughly a 10-kilometre (6-mile) round trip. Like the nodules, cobalt-rich crusts are formed over long periods. One formation has been dated at 60 million years old.<sup>4</sup> In addition to cobalt, the crusts can contain titanium, cerium, nickel, and zirconium, all minerals especially valuable to high-tech industries.<sup>5</sup> Although removing a relatively thin layer from the surface of seamounts sounds straightforward, it is likely to be technologically challenging in practice. More importantly, this lost surface layer destroys a complex ecosystem composed of attached sponges, corals, and other marine life.

Unlike the nodules and crusts, hydrothermal deposits occupy relatively small areas of the seabed. These deposits can be geologically young and their origins ephemeral. Technically labelled seafloor massive sulphide deposits, the minerals found in hydrothermal vent zones are created when hot fluids rise from underneath the seabed and meet the cold water of the ocean. The minerals that are dissolved in the hot-water plume precipitate out to become seafloor deposits of cobalt, gold, copper, and a medley of rare earth elements. The technology used to extract hydrothermal deposits is under development but is, as yet, untested. Although miners may skirt active hydrothermal vents because of the risk that the hot, acidic waters pose to their expensive equipment, rich mineral deposits are often found near active vent communities. These unique ecosystems are placed at risk of direct damage from equipment used close by or from burial from sediment plumes stirred up by mining.

### The ISA's opportunity

The International Seabed Authority faces a critical opportunity: to draft and implement regulations that protect the marine environment from an extractive activity before work has begun.





The ISA has already taken a major step by approving an environmental management plan (EMP) for the Clarion-Clipperton Fracture Zone and its giant array of polymetallic nodules. The EMP provisionally establishes nine 160,000-square-kilometre (61,800-square-mile) no-mining areas, each large enough to “ensure the persistence of representative fauna.” If this approach to establish protected areas also informs the draft EMPs for seamount crusts and hydrothermal vents, and if those EMPs are adopted, the ISA will have progressed significantly to fulfil its mandate.

But protected areas are not sufficient. The ISA exploitation regulations—the rules and processes governing seabed mining where it actually may occur—are equally important. The ISA Assembly, the organization’s final authority, has told the ISA Legal and Technical Commission that drafting exploitation regulations must be its highest priority. An initial draft is expected to be released before the end of 2016. A final version of exploitation guidelines could be ready for official ISA Assembly approval in July 2018. The Pew seabed mining project aims to monitor and inform the ISA’s work during this early period. The project will serve three main functions:

- Enable scientists and other experts to provide information and recommendations to the ISA as it drafts the regulations.
- Advocate for large protected areas and a stringently science-driven precautionary approach to exploitation outside the protected areas.
- Press for strong ISA regulatory capabilities exercised through transparent governance.
- 

Rules for mining the deep seabed are critical to protecting biodiversity and ensuring ocean health. The ISA is well-positioned to create regulations that allow for the economic opportunity of mining, while also protecting large swaths of the ocean from permanent damage. Science-based precautionary guidelines will strike an effective balance that minimizes the environmental impact of seabed mining.

#### Endnotes

1. European Commission, “Blue Growth: Opportunities for Marine and Maritime Sustainable Growth” (13 September 2012), 10, <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2012:0494:FIN:EN:PDF>.
2. Maribus gGmbH, “Manganese Nodule Treasures,” World Ocean Review, <http://worldoceanreview.com/en/wor-3-overview/mineralresources/manganese-nodules>.
3. Ibid.
4. International Seabed Authority, “Cobalt-Rich Crusts,” <https://www.isa.org.jm/files/documents/EN/Brochures/ENG9.pdf>.
5. Ibid.

#### **Abbau von Manganknollen gefährdet Artenvielfalt der Tiefsee** derStandard.at, 13. Juni 2016

Die Auswirkungen des Abbaus der langsam gewachsenen Knollen sind für etliche Lebewesen verheerend. Die Folgen sind noch 40 Jahre später sichtbar. Die Nachfrage nach mineralischen Ressourcen steigt weltweit kontinuierlich. Längst wird auch die Tiefsee nach Mangan, Nickel, Kupfer oder Kobalt erkundet. Diese wertvollen Mineralien sind in Form von Manganknollen besonders häufig im zentralen Pazifik am Meeresboden zu finden, und zwar in der sogenannten Clarion-Clipperton-Bruchzone in über 4000 Metern Tiefe. "Diese Manganknollenfelder sind aber viel mehr als nur potentielle Unterwasser-Bergbaugebiete", sagt Pedro Martínez Arbizu vom Deutschen Zentrum für Marine Biodiversitätsforschung (DZMB) in Wilhelmshaven. Er hat mit einem internationalen Team die möglichen Auswirkungen des Manganknollen-Abbaus auf die Artenvielfalt

falt erforscht. Wie die Ergebnisse in "Scientific Reports" nahelegen, leben in Gebieten mit Manganknollen doppelt so viele Individuen wie in Tiefseebereichen ohne die erzhaltigen Konkretionen.

Die Auswirkungen eines Abbaus seien zudem noch knapp 40 Jahre später deutlich sichtbar. Langsames Wachstum Manganknollen wachsen über einen Zeitraum von Millionen von Jahren. Die Fauna rund um die Tiefseemineralien ist daher an sehr gleichförmige Lebensbedingungen angepasst. Manganknollenfelder bieten einen Lebensraum für verschiedene Seesternarten, Seegurken und Seeigel. Auf den Knollen selbst leben Korallen, Schwämme, Moostierchen und Anemonen, aber auch mikroskopische Fadenwürmer, Krebse und Einzeller. "In Gebieten mit Manganknollen leben im Schnitt 25 Organismen auf 100 Quadratmetern Tiefseeboden, in Gebieten ohne Manganknollen sind es weniger als zehn. Dies zeigt uns, dass die mineralischen Knollen ein wichtiger Baustein des Lebensraums für die Tiefseefauna sind", so Martínez Arbizu. Die Wissenschaftler untersuchten, wie sich der Abbau von Manganknollen auf diese Lebewesen auswirkt und ob, wie schnell und von wo aus die abgebauten Gebiete wieder besiedelt werden.

Zwei der Beobachtungspunkte lagen daher in Gebieten, in denen vor 20 bzw. 37 Jahren der Abbau von Manganknollen simuliert wurde. "Darüber hinaus haben wir uns auch die Tierwelt in zwei aktuellen – acht Monate und drei Jahre alten – experimentell gestörten Testgebieten angeschaut", sagte der Meeresforscher. Bedrohte Korallen Mit erschreckendem Ergebnis: Selbst 40 Jahre nach dem Abbau von Manganknollen sei noch eine deutliche Störung sowie ein Verlust der Artenvielfalt zu erkennen. Am härtesten trifft der Abbau demnach Korallen und Schwämme, die den harten Untergrund der Knollen als Lebensraum benötigen – auf dem weichen Sediment in der umliegenden Tiefsee finden sie keinen Halt. "Der Abbau von Manganknollen beeinflusst die Vielfalt der Tiefseefauna auch auf lange Sicht negativ", resümiert Martínez Arbizu. (red, 13. 6. 2016) Abstract Scientific Reports: "Threatened by mining, polymetallic nodules are required to preserve abyssal epifauna" - derstandard.at/2000038824883/Abbau-von-Manganknollen-gefaehrdet-Artenvielfalt-in-der-Tiefsee

### ***Lebensraum Manganknolle***

#### **Tiefseebergbau stört die Artenvielfalt nachhaltig**

Natur, Juni 2016

Ausgerechnet dort, wo die heißbegehrten Manganknollen schlummern, liegen die Hotspots der Tiefseefauna, zeigt eine Untersuchung. Außerdem erholen sich vom Abbau betroffene Gebiete offenbar nicht, geht aus den Ergebnissen eines Langzeitexperiments hervor.

Gierig reibt man sich die Hände - am Tiefseegrund des Zentralpazifiks warten angeblich dicke Schatz-Brocken geradezu darauf, eingesammelt zu werden: In den sogenannten Manganknollen stecken heißbegehrte Erze wie Nickel, Kupfer oder Kobalt. Doch nun trüben erneut Ökologen die Goldgräberstimmung: "Diese Manganknollenfelder sind viel mehr als nur potentielle Unterwasser-Bergbaugebiete. Unsere Forschung zeigt, dass sie wahre Hotspots der Tiefwasserfauna darstellen", sagt Pedro Martínez Arbizu vom Deutschen Zentrum für Marine Biodiversitätsforschung bei Senckenberg am Meer in Wilhelmshaven.

Gemeinsam mit Kollegen aus Belgien, Frankreich und Portugal hat er die Auswirkungen eines möglichen Manganknollen-Abbaus auf die Artenvielfalt der Tiefsee untersucht. Ihre Auswertungen von Videoaufnahmen belegen, dass Gebiete mit vielen Manganknollen eine mehr als zweifach höhere Anzahl an Individuen aufweisen als Bereiche mit wenigen oder keinen Knollen. "In Gebieten mit Manganknollen leben im Schnitt 25 Organismen auf 100 Quadratmetern Tiefseeboden, in Gebieten ohne Manganknollen sind es weniger als 10 Individuen", berichtet Martínez Arbizu.



Das problematische Objekt der Begierde: eine Manganknolle. (Foto: Senckenberg/Siegler)

### **Manganknollen sind Bestandteil des Ökosystems**

Wie die Meeresbiologen erklären, sind die Manganknollen ein wichtiger Bestandteil des Ökosystems. Sie wachsen über einen Zeitraum von Millionen von Jahren - dementsprechend ist die Fauna an sie angepasst. Konkret: Auf den Knollen selbst leben Korallen, Schwämme, Moostierchen und Anemonen sowie mikroskopische Fadenwürmer, Krebse und Einzeller, belegen die Untersuchungen. Die Manganknollenfelder sind außerdem Lebensraum für verschiedene Seesternarten, Seegurken und Seeigel.

Im Rahmen ihrer Studie untersuchten die Forscher auch, wie sich Tiefseebergbau langfristig auf die Lebensgemeinschaften auswirken könnte. Sie werteten dazu die Effekte von Experimenten aus, bei denen bereits vor 20 beziehungsweise 37 Jahren Stücke des Tiefseegrunds gepflügt worden waren, um Bergbau zu simulieren. "Darüber hinaus haben wir uns auch die Tierwelt in zwei aktuellen – acht Monate und drei Jahre alten – experimentell gestörten Testgebieten angeschaut", ergänzt Martínez Arbizu. "Das Ergebnis ist erschreckend: Selbst knapp 40 Jahre nach dem Abbau von Manganknollen ist noch eine deutliche Störung sowie ein Verlust der Artenvielfalt zu erkennen."

### **Langzeitfolgen**

Konkret zeigte sich, dass die Anzahl am Boden festsitzender Organismen von 24 außerhalb des Testgebietes auf 3 Individuen pro 100 Quadratmeter innerhalb des Testgebietes gesunken ist. Am härtesten trifft der geplante Abbau dabei offenbar Korallen und Schwämme, die auf dem weichen Sediment in der umliegenden Tiefsee keinen Halt finden und deshalb die Knollen benötigen. Das Fazit der Meeresbiologen lautet nun: "Der Abbau von Manganknollen beeinflusst die Vielfalt der Tiefsee-Fauna auch auf lange Sicht negativ", so Martínez Arbizu. "Wir empfehlen daher ein verantwortungsvolles Management des Unterwasser-Bergbaus unter Berücksichtigung von Schutz-zonen für die Tiefsee-Fauna."

### **Nautilus short of US\$200 million**

PNG Mine Watch, 13 June 2016

Prospective seabed mining company Nautilus Minerals does not have the US\$200 to US\$225 million it needs to complete the construction of its giant floating production support vessel. This makes the future of its proposed experimental Solwara 1 mine in Papua New Guinea look increasingly uncertain. According to the company's Chief Financial Officer, Shontel Norgate, quoted in an article in the [Northern Miner](#), Solwara 1 requires a total capital expenditure of \$383 million but Nauti-

lus is short by US\$200 - \$225 million. This means it does not have the funds it needs to complete the construction of its support ship.



Nautilus Minerals needs another \$200 million to complete its mining ship



Nautilus attempted to raise US\$100 million in a rights offering in April, but that was a unmitigated disaster. Only 27% of the total shares on offer were sold, raising just \$28 million. Despite its lack of capital and the failed rights issue, the company bullishly says it still hopes to begin production in PNG in the first quarter of 2018. The proposed open cast mining operation will strip away the seabed to a depth of 10 metres using three giant remotely operated machines. But CEO Mike Johnston admits that timetable depends on completing the support vessel by the middle of 2017. “The critical item that determines our schedule is building the vessel, which is our mining platform.” He remains very vague though about where the money is going to come from. “We’re in discussions with groups about getting additional capital”.





The giant machines Nautilus hopes to use on the seafloor have never been tested at that depth

### **Who's Monitoring Deep-Sea Mining?**

Huffington Post article by Phil Pauley, 12/06/2015



Forget the space race. Lately, it's the race to the seabed that's been capturing headlines around the world as China's [Jiaolong submersible](#) returned from its 118-day expedition in the depths of the Indian Ocean. While the current focus of seabed studies is research and sample gathering, the long-term game is all about mining for precious minerals. But should we be allowing the pristine deep sea floor to be touched at all? With many different organisations currently probing up to 1.5 million square metres of the Indian and Pacific Oceans, how can we possibly hope to monitor and understand the ecological impacts of such actions? A series of permanent underwater human habitats able to improve localized monitoring could be part of the answer.

### **To mine or not to mine?**

Due to a lack of suitable technology, there's been a lack of activity in deep-sea mining since HMS Challenger first discovered seabed minerals in 1873. But huge investment in emerging technologies is likely to make commercial mining a reality within a few years. Countries and commercial companies are interested in exploiting rich seafloor sources of cobalt, copper, nickel, silver, gold, vanadium, titanium, manganese and rare earth elements - all of which are essential ingredients of everyday life, from mobile phone batteries to surgical instruments, engines and TV screens. In some in-



ternational waters lie billions of tonnes of metal-rich nodules, waiting to be gathered. So far, 26 permits have been issued to allow exploration. Many argue that technological advancement - even the development of renewable energy technologies - will demand sub-sea sources of minerals. Executed responsibly, seabed mining could have less of an impact than its terrestrial counterpart.

The complexity of the machinery required would likely ensure that it is a smaller-scale process, which would probably involve remotely operated vehicles and robots. And unlike mining on land, no roads or other infrastructure would need to be built in order to gain access. Yet the [Deep Sea Mining Campaign](#) insists that deep-sea mining is being initiated “in the absence of regulatory regimes or conservation areas to protect the unique and little known ecosystems of the deep sea”. A study carried out between 2002 and 2007 estimated that there could be more than 1,000 species at a single site in the key region proposed for mining. According to the [Global Ocean Commission](#), “mining at the seafloor will cause localized damage, including crushing living organisms, removal of substrate habitat and disturbance of sediment”, with further environmental impacts during processing. They list rising demand for resources, technological advances and weak high seas governance as “drivers of decline” for the oceans. The financial rewards may make deep-sea mining inevitable, but we still know precious little about this environment and its ecology. So shouldn't we be proceeding with more caution?

### **Towards more in-depth monitoring**

Since 1994, the [International Seabed Authority](#) (ISA) is the intergovernmental body responsible for handing out permits for explorations like this one, organizing and controlling all mineral-related activities in the regions of the world's oceans not covered by any country's territory. The ISA's 164 members (excluding the United States, who have not ratified the convention) work together to develop standards, regulations and guidance for seabed exploitation. It has also established nine protected areas in the Pacific where mining will be banned. But do its efforts go far enough? While concerns about emerging powers China and India dominate headlines in the Western world, the United States is pushing forward with mining plans.

In May, the [Center for Biological Diversity](#) launched a lawsuit against the U.S. government over its first-ever approval for large-scale deep-sea mining between Hawaii and Mexico. They say the project will damage important habitat for whales, sharks and sea turtles and wipe out seafloor ecosystems. Their challenge insists that environmental impact studies should be completed before exploratory permits are issued. This month's G7 Summit discussed deep-sea mining, stating in their released [Declaration](#) that they had identified the need to enhance the effective protection of the marine environment from harmful effects as a key priority, requiring a “precautionary approach”. But that precautionary approach demands that more information is provided about preliminary operations beneath the surface.

### **Keeping tabs on development from beneath the waves**

The Chinese submersible discovered new hydrothermal vents this year - unique ecosystems about which we have much to learn - and announced the gathering of huge amounts of data, samples and new species. The first commercial mining license has already been granted to Nautilus Minerals, who are planning operations in the coastal waters of Papua New Guinea - a region that doesn't fall under the remit of the ISA. With the Pacific islands' waters as ground zero for deep sea mining activity, those countries should work together to develop strong regulations so that companies cannot choose waters with lax or no regulations to go mining in.



Although there are some rules and regulations in place, it remains unclear how ISA will monitor activity to ensure that they are adhered to thousands of metres beneath the oceans' surface? Is anyone truly quantifying the impact on the seabed? My mission to develop a [self-sustaining underwater habitat](#) could help forge the infrastructure and technologies to make more in-depth monitoring possible. Forming a cooperative platform would unite industry and ecological research organisations with a permanent undersea community. NASA's [2016 X-Hab Academic Innovation Challenge](#) currently has research teams designing buildings, life support systems and technologies for "Beyond Earth Habitation". If we can create structures capable of supporting humans on Mars, it's easily conceivable that we could develop a sustainable sub-sea habitat here on Earth - perhaps even using the same approaches and technologies. Working from a combination of static or moveable underwater habitats, inhabitants could accurately research how deep-sea marine ecosystems are affected by early explorations and initial mining activities. We continue to seek partners and sponsors eager to collaborate.

### **Survey reports mining bribe claims**

Ropate Valemei, The Fiji Times, June 10, 2016

CIVIL society organisations (CSOs) report numerous instances where chiefs of deep sea mining (DSM) project-affected communities were swayed by bribes or personal favours from Government or industry to allow mining and/or other industrial activity in their villages. This included villages where CSO surveys reported 100 per cent disapproval from respondents on mining prospects on their land. This was revealed in the report by Blue Ocean Law and the Pacific Network on Globalisation, which was released early this week, on how deep sea mining and inadequate regulatory frameworks imperil the Pacific and its people. The report notes this occurred with respect to fishery agreements, where the consent of fishery owners within the village had been bypassed by obtaining the endorsement of the chief instead. "The courting of local leaders, chiefs or landowners undoubtedly poses risks for the preservation of traditions and livelihoods of indigenous communities," the report notes.

### **New Zealand government looks to change law to accommodate seabed mining**

PNG Mine Watch, June 10, 2016

### **Green Party, Foreign Affairs, June 9, 2016**

Environment Minister Nick Smith and the National Government appear to have bowed to pressure from mining lobbyists to change the law to help seabed mining companies. In 2013 Trans-Tasman

Resources applied for a marine consent under the Exclusive Economic Zone (EEZ) legislation to mine 66 km<sup>2</sup> of the seabed for iron ore off the South Taranaki coast. The Environmental Protection Agency's (EPA) Decision Making Panel refused the application. In its 2014 decision the panel said the scale of impacts was uncertain and it wasn't satisfied that potential environmental effects could be avoided or remedied. Impacts included sediment plumes with potential impacts on fisheries, ecosystem productivity and health, and marine mammals including the threatened Maui's dolphin. Documents released to the Green Party under the Official Information Act show that mining industry lobby group Straterra wrote to National Ministers shortly after the 2014 EPA decision, on behalf of Trans-Tasman Resources, pressuring the Government to review the decision making process which governs applications to mine in New Zealand's EEZ.



Photo: ROBERT CHARLES/ Fairfax NZ

Straterra also produced a paper analysing the Trans-Tasman Resources decision and seeking a range of changes to the EEZ legislation and the way the EPA operates, in order to promote mining. A year later the Nick Smith went against official advice and proposed a law change to give himself, as Minister, greater influence over decisions to approve or decline seabed mining in the EEZ. This law change, in the Resource Legislation Amendment Bill (RLA Bill), removes the independent EPA from its role appointing the Decision Making Panel which decides seabed mining and other applications in the EEZ. The Bill instead requires the Environment Minister to appoint members of a Board of Inquiry who will decide these marine consent applications. The regulatory impact statement for the RLA Bill shows that officials advised against this law change, arguing that greater ministerial involvement would not only increase costs to the taxpayer, but create a perception that the government was seeking to influence the outcome of independent decision-making process. [1]

National has not been straight-up with New Zealanders. These law changes are clearly about enabling the Minister to influence who makes decisions about controversial and high impact activities such as seabed mining. National is about to replacing an independent decision making process with a more political one, and override decisions that recognised we need to put the long-term health of our environment ahead of short-term profit making. National is deliberately eroding the independence of our Environmental Protection Authority, by instead giving the Minister the power to hand-pick the people to decide which environmentally damaging projects should go ahead. The whole point of having these things at arm's length is so New Zealanders can trust the decision makers to be fair and objective and make evidence based decisions about environmentally damaging use of natural resources. National's law changes compromise this independence, allow vested interests more influence and mean the mining industry and other resource users won't have to lift their game.

### Timeline of events

In June 2014 an EPA appointed Decision Making Committee declined Trans-Tasman Resource's application to mine the seabed off the South Taranaki coast for iron ore. [2] Four months later (October 2014) Straterra wrote to National Ministers on behalf of trans-Tasman complaining that the government wasn't doing enough to counter "an ideologically-driven, anti-mining agenda in New Zealand" and saying that changes were necessary "to the structure of the [EPA-appointed] decision-making committee, the nature and operation of the hearing process, to the way in which the EPA conducts its role, and the law." [3] In December 2015, Environment Minister Nick Smith introduced legislation (RLA Bill) which removes the EPA's role in appointing decision making panels and instead requires the Minister to appoint the Board of Inquiry to decide applications for notified activities such as seabed mining in the EEZ. [4] In November 2016, a month before the Minister publicly announced the legislative changes, Trans-Tasman Resources announced it would be making a new bid to mine for iron ore off the South Taranaki bight. [5]

### References

[1] MfE (2015) 'Regulatory Impact Statement – Resource Legislation Amendment Bill 2015: alignment of the decision-making process for nationally significant proposals and notified discretionary marine consents', page 5.

[2] <http://www.epa.govt.nz/search-databases/Pages/eez-proposals-details.aspx?ProposalNumber=EEZ000004>

[3] See letter obtained under the OIA from Straterra to Ministers titled *Minerals Policy Proposals*, October 2014, page 5.

[4] This change confirmed in government Summary of Resource Management Act Reform, page 9. The difference between the two decision-making processes as described in MfE's Regulatory Impact Statement, page 7.

[5] <http://www.stuff.co.nz/business/74547041/transtasman-resources-apply-for-new-permit-to-mine-iron-ore-from-seabed.html>

### Deep sea mining

Ropate Valemei, The Fiji Times, June 09, 2016

IGNORANCE of deep ocean conditions has allowed supporters to characterise deep sea mining (DSM) as low-impact. This was revealed in a report by Blue Ocean Law and the Pacific Network on Globalisation on how deep sea mining and inadequate regulatory frameworks imperil the Pacific and its people. However, the report states that even a cursory look at the existing scientific literature establishes that the likely outcomes of DSM include species extinction and loss of biodiversity, sediment plumes and tailings having the potential to pollute the entire water column, the uptake of heavy metals and toxins by marine animals, including commercial fisheries and the disturbance of marine mammals from constant noise and light in the water. It also suggested that the risk of oil spills and accidents from increased vessel and surface traffic, the destruction of coral reefs through increased acidity of water, potential for induced volcanism or seismic activity and increased carbon emissions.

For nations that depend so heavily upon fisheries, ecotourism, and marine resources for their livelihoods, these risks are extreme, and any activity which threatens them should trigger the utmost concern may also likely to occur. "Perhaps these risks would nevertheless merit consideration, were DSM really such a lucrative proposition." However, it states that the chances of Pacific Island nations seeing substantial revenue from DSM in the near future are low at best. "Its experimental nature in this early stage and long timeline mean it will most likely be many years before individual DSM sites are profitable even for their operators. "Mining ventures are notoriously high-risk and dependent on market fluctuations; there are numerous examples of high-cost mines throughout the

region which fail to produce profit for either their owners or governments." For example, it says Fiji's bauxite mine, PNG's Hidden Valley and Sinivit gold mines, PNG's Ramu Nickel mine, and the Gold Ridge Mine in the Solomon Islands), instead producing only environmental contamination, conflict, and other social ills.

Furthermore, it highlights that the resource revenue brings with it the prospects of greater corruption, instability, and economic challenges such as Dutch Disease and heightened vulnerability to external shocks. While it is theoretically possible to manage some of these phenomena through transparent institutions, it says most small island states simply lack the manpower and resources to do this, despite otherwise good intentions. "DSM is being considered as the provenance of governments and industry, but the aforementioned impacts will be felt by communities — most notably, vulnerable ones, including indigenous groups, women, and children." The report further states that it is absolutely imperative — and indeed required under international law — that indigenous peoples be not only consulted, but receive adequate and objective information enabling them to either give or withhold their free, prior and informed consent to any DSM projects which may impact them.

### **Deep sea mining dialogue**

Ropate Valemei, The Fiji Times, June 09, 2016

DESPITE Government's claim that the Ministry of Lands and Mineral Resources had conducted wide consultations with key stakeholders to formulate a Draft Policy on Deep Sea Mining (DSM), the Government consultations have not included a broad cross section of Fijian civil society, the public, or indigenous and/or coastal communities. This was revealed in a report by Blue Ocean Law and the Pacific Network on Globalisation on how deep sea mining and inadequate regulatory frameworks imperil the Pacific and its people, which was released early this week. The report notes that Fiji's Department of Environment (DOE) estimates that only about 40 per cent of educated people may be aware of DSM, and that coastal users and outlying communities are largely ignorant of what is happening with respect to DSM prospecting; the DOE reiterates the need for comprehensive consultations and awareness raising.

It further states that one commentator notes that the iTaukei Affairs Board, the TLTB, and the provincial and tikina councils — institutions mandated by statute to deliberate and make recommendations on developmental and other issues that impact the welfare, wellbeing, and good governance of the iTaukei or the indigenous peoples of Fiji — have not been seriously consulted regarding the development of a DSM framework. With respect to the 2013 mining decree, it adds the Ministry of Lands and Mineral Resources reportedly organised a review of the law but did not include landowners or significant civil society organisations representation in its consultations and would have proceeded with finalising the law if not for an online petition protesting the lack of consultation. Other consultations organised by the MRD in the past have been called off on short notice.

In a report staff at the Department of Mineral Resources recognises the need to both consult with and obtain consent from landowners and those communities located closest to potential DSM sites, but whether this will actually be done in the event of actual DSM remains to be seen. "Awareness of free, prior and informed consent (FPIC) throughout indigenous and local communities in Fiji is limited, and it appears that the government does not require FPIC from operators in its existing onshore mines." In existing cases involving terrestrial mining, it says there has been no FPIC, and even meaningful consultation is often lacking. For instance, the mineral prospecting that has been going on in Namosi for more than 40 years, involving more than 15 companies, many landowners have repeatedly expressed opposition to mining, withholding their consent. "Instead of heeding these clear expressions, mining companies have approached chiefs of local villages, who are not land-



owners, and paid them, or in some cases directly employed them, in order to gain their consent to mining on what, essentially, is not their land."

In the case of the Bua bauxite mine, it states the agreement with the community was signed and negotiated by a third party hired by the Government, without any legal advice provided to the community; benefits from this mine are restricted to a small number of individual landowners, while the larger community receives nothing, a situation bound to create conflict as the whole community suffers the environmental impacts of the mine. The report further note that the Tikina Namosi Landowner Committee (TNLC) notes that bribes occur at multiple stages of the process, from the local level up the ministerial chain; the putative "consent" obtained from individuals who have been paid by mining companies, in addition to being illegal under Fiji's Constitution, does not equate to the FPIC of indigenous peoples or landowners. In some cases, government officials have advised that 100 per cent of landowners surveyed expressed support for mining in Namosi; however, a survey conducted by the TNLC revealed that more than 90 per cent of the community (around 984 surveyed individuals and landowners) actually opposed prospecting. Although the landowner system does necessitate more extensive consultation measures than other jurisdictions, the report notes that obtaining legitimate FPIC in Fiji is challenging.

### **Fiji report tables dangers of sea bed mine**

Post-Courier, June 07, 2016

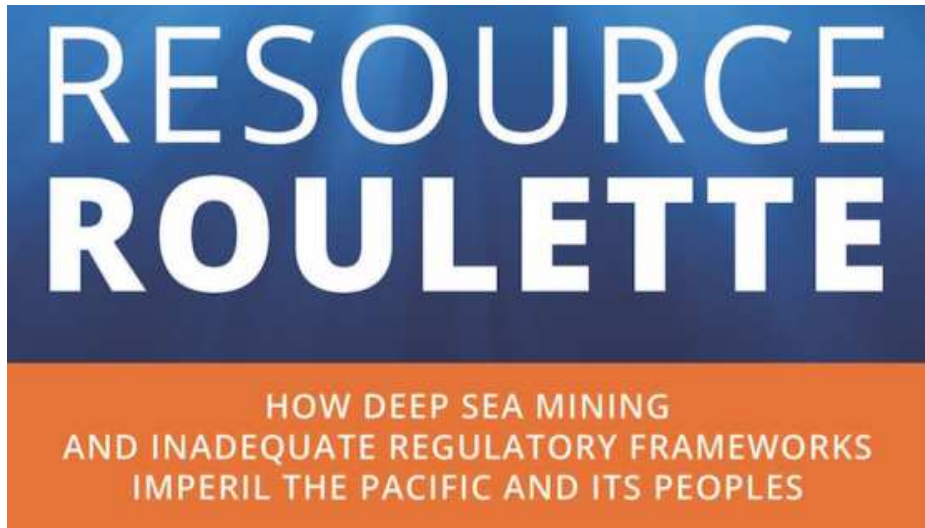
A REPORT just released in Fiji details the risks and pitfalls of deep sea mining in the Pacific in light of governments' inadequate regulatory frameworks. Titled "Resource Roulette: How Deep Sea Mining and Inadequate Regulatory Frameworks Imperil the Pacific and its Peoples", the report is an independent legal and policy analysis of the deep sea mining (DSM) legislation of 14 Pacific Island nations, and includes in-depth case studies of DSM in Tonga, Papua New Guinea, and Fiji. The sponsors of this report are the International law firm Blue Ocean Law (BOL), and Fiji-based regional non-governmental organisation, Pacific Network on Globalisation (PANG). "The report examines not only the absence of requisite indigenous rights and environmental protections in existing legislation, but the capacity of Pacific Islands to implement and enforce laws purporting to regulate deep sea mining," says Attorney Julian Aguon of BOL.

Insights gleaned from months of fieldwork and interviews with various commentators and experts have revealed that many countries are vastly under-resourced in terms of policing DSM activities in their waters. As a result, notes BOL Attorney Julie Hunter, countries who undertake DSM at this early, experimental stage, risk incurring great environmental and social harms likely to affect indigenous and coastal communities. Moreover, Pacific countries may garner little to no revenue, and in some cases, actually lose money from expenses associated with DSM, including high-risk equity investments and costly environmental clean-up, as well as arbitration and other legal proceedings. The report also documents impacts from exploratory DSM on PI nations' fisheries and tourism sectors, which have already been felt in places like Tonga and PNG. These impacts are compounded by the failure to obtain the free, prior, and informed consent (FPIC) of indigenous peoples and other affected communities, and represent the opposite of a precautionary approach to hazardous industrial ventures -- both required under international law.

"Countries in the region, particularly in Melanesia, have been rushing into agreements with mining companies without bothering to consult with or obtain the FPIC of indigenous peoples or affected groups," says PANG coordinator Maureen Penjueli. "This rush to mine is largely a result of pressure from industry and foreign governments, and has resulted in legislative frameworks favourable to mining operators, which minimise the risks of DSM and lack enforceable human rights and environmental provisions," Ms Penjueli said. Given the high number of poorly regulated, unprofitable

terrestrial mines in the region, Pacific countries are advised to adopt the cautious approach exemplified by a growing number of countries, including New Zealand, Mexico, and Australia, and enact moratoria on DSM until comprehensive scientific studies can be done on the deep ocean ecosystem.

**Resource Roulette: How Experimental Seabed Mining Imperils the Pacific and its Peoples**  
PNG Mine Watch, 7 June 2016



**Pacific Network on Globalization and Blue Ocean Law**

International law firm Blue Ocean Law (BOL), and Fiji-based regional non-governmental organisation, Pacific Network on Globalisation (PANG), have released a report detailing the risks and pitfalls of deep sea mining for Pacific peoples in light of governments' inadequate regulatory frameworks.

Titled "Resource Roulette: How Deep Sea Mining and Inadequate Regulatory Frameworks Imperil the Pacific and its Peoples", the report is an independent legal and policy analysis of the deep sea mining (DSM) legislation of 14 Pacific Island nations, and includes in-depth case studies of DSM in Tonga, Papua New Guinea, and Fiji. "The report examines not only the absence of requisite indigenous rights and environmental protections in existing legislation, but the capacity of Pacific Islands to implement and enforce laws purporting to regulate deep sea mining," says Attorney Julian Aguon of BOL. Insights gleaned from months of fieldwork and interviews with various commentators and experts have revealed that many countries are vastly under-resourced in terms of policing DSM activities in their waters. As a result, notes BOL Attorney Julie Hunter, countries who undertake DSM at this early, experimental stage, risk incurring great environmental and social harms likely to affect indigenous and coastal communities. Moreover, Pacific countries may garner little to no revenue, and in some cases, actually lose money from expenses associated with DSM, including high-risk equity investments and costly environmental clean-up, as well as arbitration and other legal proceedings.

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and has resulted in legislative frameworks favourable to mining operators, which minimise the risks of DSM and lack enforceable human rights and environmental provisions."

Given the high number of poorly regulated, unprofitable terrestrial mines in the region, Pacific countries are advised to adopt the cautious approach exemplified by a growing number of countries, including New Zealand, Mexico, and Australia, and enact moratoria on DSM until comprehensive scientific studies can be done on the deep ocean ecosystem. The BOL-PANG report has been published by the University of South Pacific and is available on the online library catalogue. The report can also be accessed from the BOL and PANG websites. It is anticipated that the report will serve as a useful tool for indigenous communities, civil society organisations, and governments currently facing the prospect of DSM in their waters.

Link: <http://nabf219anw2q7dgn1rt14bu4.wpengine.netdna-cdn.com/files/2016/06/Resource-Roulette-.pdf>

### London protest against seabed mining

London Mining Network, PNG Mine Watch, 7 June 2016



London Mining Network was involved in a protest on 24 May against the 5th annual seabed mining summit. We joined Australian-based Deep Sea Mining campaign and LMN member group War on Want in solidarity with communities across the Pacific who are calling for a Ban on Experimental Seabed Mining in their seas. We sent a short solidarity video [see below] to the Alliance of Solwara Warriors in The Pacific, who are resisting seabed mining. One of the main companies involved in developing seabed mining is Nautilus, a Canadian company in which London-based Anglo American is a major shareholder. There is plenty at stake if the company goes ahead with its ambitions plans. A successful project has the potential to set off a modern day gold rush to the sea-floor, a prospect that troubles deep-sea scientists and environmentalists who fear the mining could destroy some of the world's most diverse and poorly understood ecosystems.

### Setback for deep sea mining plan

Pacnews, The Fiji Times, June 04, 2016

SYDNEY - Opponents of an experimental deep sea mining project in Papua New Guinea's Bismarck Sea have called on investors to withdraw their support. An alliance of communities from Madang, New Britain and New Ireland say the risks are too great. "Judging from the monster size of

the machines that will be tested in our seas, there is no question that this new frontier industry will destroy our environment and communities," says Janet Tokepep from the Alliance of Solwara Warriors. "Our coastal communities live only 30 kilometres from the proposed mine site and our fishermen use the area around it daily." Canadian company Nautilus Minerals wants to tap into the mineral-rich waters to extract gold and copper.

They say the seafloor contains a copper grade of 7 per cent compared with that found in land-based mines of less than 1 per cent. The company has told Pasifik News locals have nothing to fear. "The development of the Solwara 1 Project has involved an extremely comprehensive risk assessment process," says John Elias from Nautilus. "As the first company in the world to commercially mine the seafloor, we are setting a high bar for the industry." Nautilus says the project won't release any hazardous chemicals into the water with no tailings and no blasting at the site. But the Solwara Warriors, backed by the Ocean Foundation, aren't convinced.

### **Experimental seabed mining could have catastrophic climate impacts**

PNG Mine Watch, 3 June 2016

New research reveals experimental seabed mining could have a devastating impact on life forms that are "literally saving the planet" and preventing a "doomsday climatic event". The research lists experimental seabed mining as a major threat to ocean life residing around hydrothermal vents which has been found to consume enormous quantities of methane that would otherwise enter the atmosphere. Ironically, Papua New Guinea, which has controversially already approved the mining of hydrothermal vents in its territorial waters by Canadian company Nautilus Minerals, is also home to the world's first climate refugees, people forced off the Carteret islands by rising sea water levels. Papua New Guinea has also played a major part in international negotiations to reduce the climate impacts of deforestation, work that could be completely 'undermined' by its efforts to promote experimental seabed mining.



Life forms in hydrothermal vents and seeps consume 90 percent of the released methane – a greenhouse gas 25 times more potent than carbon dioxide – and keep it from entering the atmosphere.

### **Oregon State University | Reporting Climate Science**

The hydrothermal vents and methane seeps on the ocean floor that were once thought to be geologic and biological oddities are now emerging as a major force in ocean ecosystems, marine life and global climate. However, even as researchers learn more about their role in sustaining a healthy Earth, these habitats are being threatened by a wide range of human activities, including deep-sea mining, bottom trawling and energy harvesting, scientists say in a report published in *Frontiers in*

Marine Science. Researchers from Oregon State University first discovered these strange, isolated worlds on the ocean bottom 40 years ago.

These habitats surprised the scientific world with reports of hot oozing gases, sulfide chimneys, bizarre tube worms and giant crabs and mussels – life forms that were later found to eat methane and toxic sulfide. “It was immediately apparent that these hydrothermal vents were incredibly cool,” said Andrew Thurber, an assistant professor in the OSU College of Earth, Ocean and Atmospheric Sciences, and co-author on the new report. “Since then we’ve learned that these vents and seeps are much more than just some weird fauna, unique biology and strange little ecosystems. Rather than being an anomaly, they are prevalent around the world, both in the deep ocean and shallower areas. They provide an estimated 13 percent of the energy entering the deep sea, make a wide range of marine life possible, and are major players in global climate.”

### **Life forms in hydrothermal vents “saving the planet”**

As fountains of marine life, the vents pour out gases and minerals, including sulfide, methane, hydrogen and iron – one of the limiting nutrients in the growth of plankton in large areas of the ocean. In an even more important role, the life forms in these vents and seeps consume 90 percent of the released methane and keep it from entering the atmosphere, where as a greenhouse gas it’s 25 times more potent than carbon dioxide. “We had no idea at first how important this ecological process was to global climate,” Thurber said. “Through methane consumption, these life forms are literally saving the planet. There is more methane on the ocean floor than there are other forms of fossil fuels left in the oceans, and if it were all released it would be a doomsday climatic event.” In reviewing the status of these marine geological structures and the life that lives around them, a group of researchers from 14 international universities and organizations have outlined what’s been learned in the past four decades and what forces threaten these ecosystems today. The synthesis was supported by the J.M. Kaplan fund.

These vents and seeps, and the marine life that lives there, create rocks and habitat, which in some settings can last tens of thousands of years. They release heat and energy, and form biological hot spots of diversity. They host extensive mussel and clam beds, mounds of shrimp and crab, create some prime fishing habitat and literally fertilize the ocean as zooplankton biomass and abundance increases. While the fluid flows from only a small section of the seafloor, the impact on the ocean is global. Some of the microorganisms found at these sites are being explored for their potential to help degrade oil spills, or act as a biocatalytic agent for industrial scrubbing of carbon dioxide. These systems, however, have already been damaged by human exploitation, and others are being targeted, the scientists said. Efforts are beginning to mine them for copper, zinc, lead, gold and silver. Bottom trawling is a special concern, causing physical disturbance that could interfere with seeps, affect habitat and damage other biologic linkages. Oil, gas or hydrate exploitation may damage seeps. Whaling and logging may interfere with organic matter falling to the ocean floor, which serves as habitat or stepping stones for species reliant on chemosynthetic energy sources. Waste disposal of munitions, sewage and debris may affect seeps. The range of ecosystem services these vents and seeps provide is just barely beginning to be understood, researchers said in their report. As many of these habitats fall outside of territorial waters, vent and seep conservation will require international collaboration and cooperation if they are going to continue to provide ecosystem benefits.

Contributors to this report included researchers from the Scripps Institution of Oceanography, Florida State University, the National Institute of Water and Atmospheric Research in New Zealand, University of the Azores, Temple University, Universidade de Aveiro, the U.S. Geological Survey, University of the West Indies, Dalhousie University, University of Victoria, Duke University, Ghent University and the University of Hawaii at Manoa.



## Abstract

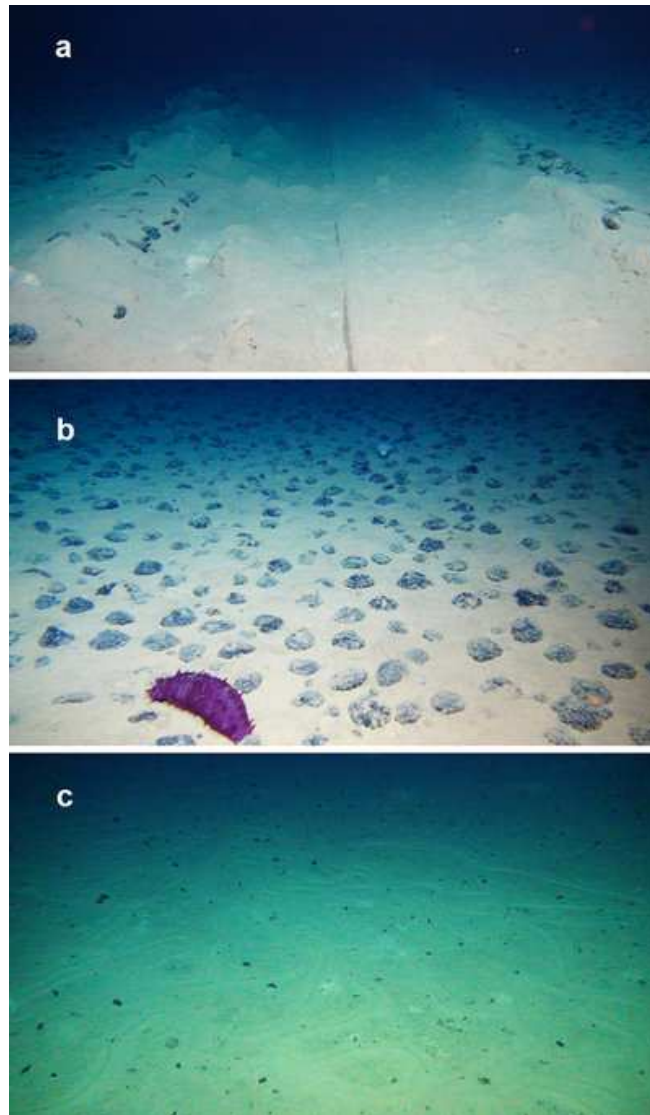
Although initially viewed as oases within a barren deep ocean, hydrothermal vents and methane seep chemosynthetic communities are now recognized to interact with surrounding ecosystems on the sea floor and in the water column, and to affect global geochemical cycles. The importance of understanding these interactions is growing as the potential rises for disturbance of the systems from oil and gas extraction, seabed mining and bottom trawling. Here we synthesize current knowledge of the nature, extent and time and space scales of vent and seep interactions with background systems. We document an expanded footprint beyond the site of local venting or seepage with respect to elemental cycling and energy flux, habitat use, trophic interactions, and connectivity. Heat and energy are released, global biogeochemical and elemental cycles are modified, and particulates are transported widely in plumes. Hard and biotic substrates produced at vents and seeps are used by “benthic background” fauna for attachment substrata, shelter, and access to food via grazing or through position in the current, while particulates and fluid fluxes modify planktonic microbial communities.

Chemosynthetic production provides nutrition to a host of benthic and planktonic heterotrophic background species through multiple horizontal and vertical transfer pathways assisted by flow, gamete release, animal movements, and succession, but these pathways remain poorly known. Shared species, genera and families indicate that ecological and evolutionary connectivity exists among vents, seeps, organic falls and background communities in the deep sea; the genetic linkages with inactive vents and seeps and background assemblages however, are practically unstudied. The waning of venting or seepage activity generates major transitions in space and time that create links to surrounding ecosystems, often with identifiable ecotones or successional stages. The nature of all these interactions is dependent on water depth, as well as regional oceanography and biodiversity. Many ecosystem services are associated with the interactions and transitions between chemosynthetic and background ecosystems, for example carbon cycling and sequestration, fisheries production, and a host of non-market and cultural services. The quantification of the sphere of influence of vents and seeps could be beneficial to better management of deep-sea environments in the face of growing industrialization.

**Threatened by mining, polymetallic nodules are required to preserve abyssal epifauna**  
Ann Vanreusel et al., *nature.com*, 01 June 2016

## Abstract

Polymetallic nodule mining at abyssal depths in the Clarion Clipperton Fracture Zone (Eastern Central Pacific) will impact one of the most remote and least known environments on Earth. Since vast areas are being targeted by concession holders for future mining, large-scale effects of these activities are expected. Hence, insight into the fauna associated with nodules is crucial to support effective environmental management. In this study video surveys were used to compare the epifauna from sites with contrasting nodule coverage in four license areas. Results showed that epifaunal densities are more than two times higher at dense nodule coverage ( $>25$  versus  $\leq 10$  individuals per  $100 \text{ m}^2$ ), and that taxa such as alcyonacean and antipatharian corals are virtually absent from nodule-free areas. Furthermore, surveys conducted along tracks from trawling or experimental mining simulations up to 37 years old, suggest that the removal of epifauna is almost complete and that its full recovery is slow. By highlighting the importance of nodules for the epifaunal biodiversity of this abyssal area, we urge for cautious consideration of the criteria for determining future preservation zones.



Examples of seafloor morphology: (a) 37-year old OMCO track (IFREMER license area); (b) Nodule landscape (IFREMER license area); (c) Nodule-free landscape (IOM area). Copyright: ROV Kiel 6000 Team/GEOMAR Kiel.

Link: <http://www.nature.com/articles/srep26808>

### **Karte für Abbau von Manganknollen**

*Forscher im Auftrag der Bundesregierung sind zurück von einer Expedition zum deutschen Manganknollen-Lizenzgebiet im Zentralpazifik. Mitgebracht haben sie eine wichtige Karte - aber auch viele offene Fragen.* Von Marlene Weiß, Süddeutsche Zeitung, 1. Juni 2016

Wissenschaftler der Bundesanstalt für Geowissenschaften und Rohstoffe (BGR) haben in einer sechswöchigen Expedition einen ersten Teil des deutschen Manganknollen-Lizenzgebiets im Zentralpazifik kartiert. Mit Videoaufnahmen bestätigten die Forscher, dass in dem 200 Quadratkilometer großen Untersuchungsgebiet fünf Millionen Tonnen der kartoffelgroßen Metallballen lagern. Neben Mangan enthalten sie Kupfer, Kobalt, Nickel und andere Rohstoffe. Mit der genauen Karte könnte nun im Prinzip ein Abbau-Test beginnen. Ob das dafür nötige Gerät - ein sogenannter Kollektor - entwickelt wird, lässt das Bundeswirtschaftsministerium noch prüfen. Bei der Expedition mit dem US-Forschungsschiff *Kilo Moana* setzten die BGR-Forscher ein neues Echolot ein, um den Meeresboden in einer Auflösung von einem Meter mal einem Meter zu vermessen. Zudem wurde ein Videoschlitten in einigen Metern Höhe über den Meeresboden geschleppt. Insgesamt ist das deutsche Lizenzgebiet 75 000 Quadratkilometer groß, bis zu 750 Millionen Tonnen der Knollen

werden dort vermutet. Allein die Rohstoffe in den beiden ergiebigsten Teilgebieten sollen neun Milliarden Dollar wert sein.

### **Studien haben gezeigt, dass Eingriffe das Leben in der Tiefsee über Jahrzehnte stören können**

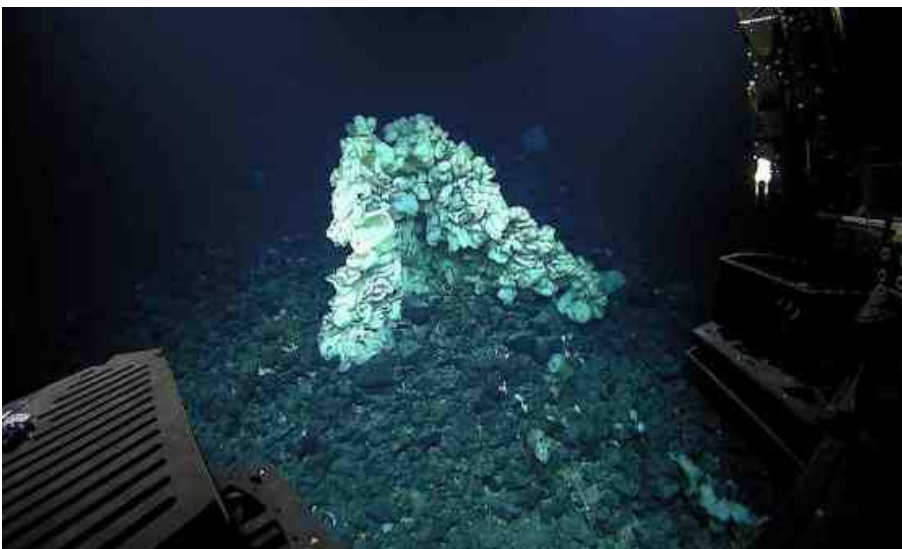
Es ist allerdings noch weitgehend unbekannt, wie sich ein Abbau auf die Lebensgemeinschaften am Meeresgrund in mehr als vier Kilometer Tiefe auswirken würde. Untersuchungen an anderen Stellen haben gezeigt, dass Störungen noch nach Jahrzehnten eine geringere Vielfalt des Lebens in der Tiefe nach sich ziehen können. Die Erkundungslizenz der Internationalen Meeresbodenbehörde ISA verpflichtet dazu, Umweltauflagen einzuhalten. Darum waren bei der Expedition auch Biologen des Deutschen Zentrums für Marine Biodiversitätsforschung (DZMB) am Senckenberg-Institut in Wilhelmshaven dabei, die Bodenproben nahmen. Zudem wurden Messgeräte geborgen, welche die Strömung am Meeresboden über drei Jahre aufgezeichnet haben. Demnach bewegt sich das Wasser dort im Schnitt mit einer Geschwindigkeit von drei Zentimetern pro Sekunde. Mit den Daten soll nun genauer geklärt werden, wie sich der potenziell schädliche Staub verteilt, der beim Manganknollen-Abbau aufgewirbelt wird.

### **Sea sponge the size of a minivan discovered in ocean depths off Hawaii**

Alan Yuhas, The Guardian, 28 May 2016

- Scientists find immense creature 2,100m below surface of the ocean
- Researcher: 'It's probably in the order of centuries to millennia old'

Deep sea scientists exploring the remote waters between Hawaii and Midway atoll have found a gigantic sea sponge "about the size of a minivan" that could be the oldest animal on earth. "It's probably on the order of centuries to millennia old," lead researcher Daniel Wagner told the Guardian. The sponge, the largest on record, is "about 12ft wide and 7ft long" he said, "so about the size of a minivan". The creature was discovered about 2,100m (7,000ft) down, in a marine conservation area between north-western Hawaii and Midway. The area is largely unexplored, Wagner said, and "over 98% of the area of this monument is below 100m, so below something that we would ever be able to dive through with scuba diving". A remote-operated submersible found the sponge while exploring the depths of the Papahānaumokuākea marine park. Cast into the sub's lights, the sponge's brain-like folds appear in a pale, nearly white shade of blue. Scientists described the animal this week, in the journal Marine Biodiversity. Wagner said they could not be sure of the sponge's age, since the animals lack growth rings found in corals that are similar to terrestrial trees.



A team of scientists on a deep-sea expedition discovered the sponge. Photograph: AP

“Corals in similar environments have made it for 4,000 years,” he said. Through measuring the rate of growth in sponges over decades, he added, “we also know that giant sponges in shallow waters can make it more than 2,000 years.” Wagner also noted that most of the planet “lies in deep waters, the vast majority of which has never been explored”, and that “7,000 marine species, a quarter of which are found nowhere else on the planet” are known to live in Papahānaumokuākea marine park alone. “This one expedition itself came back with over 100 new species,” he said, speaking of completely new species and life previously unknown to the region. “So there’s probably many, many other things down there.”

The “pristine” depths, Wagner said, included large communities of sponges and corals along with “a whole bunch of things that are associated with them: fish hiding in their crevasses, you got ctenophores, barnacles, all kinds of things that grow on top of these sponges and corals. It’s really a very diverse community.” Like the coral reefs they often grow alongside, sponges are “habitat forming” species, providing shelter, filtering sea water and removing material in the water that other animals do not eat. Sponges are ancient but primitive: they lack nervous or digestive system and rely on water flowing through their bodies to provide sustenance and clean them of waste. Christopher Kelley, a biologist at the National Oceanographic and Atmospheric Administration (NOAA) Hawaii undersea research lab, said the researchers used laser points to measure the dimensions of the bulbous animal, then compared them with the size of the submersible.



He added that sponge experts have so far been unable to identify the animal’s genus. “Here’s this animal that has presumably never been encountered before and it’s enormous and that kind of brings up a little intrigue for deep water and what else exists down there,” he said. At more than 140,000 square miles, the Papahānaumokuākea marine park is the largest conservation area in the US, and larger than every other US national park combined. Joseph Pawlik, a marine biologist at the University of North Carolina, Wilmington, said measuring the size of sponges can be difficult, given their serpentine shape and peculiar structures. By studying large barrel sponges, Pawlik has devised a method to estimate age and size based on volume. “Largest implies volume,” he said. “We have some pretty substantial sponges that are barrel sponges that have huge volume.”

### **Canadian Company Wants to Mine for Gold on the Bottom of the Ocean**

Michael Casey, Vice News, May 24, 2016

As we drive down the empty, two-lane highway, the clusters of seaside resorts, tin-roofed homes and finely manicured lawns on this Papua New Guinea island give way to lowland rain forests and



palm oil plantations. The telephone lines eventually disappear as do the satellite dishes and, within hours, the team from Nautilus Minerals is on a rutted, dirt road. Beyond the occasional sprawling logging camps on New Ireland, there are few signs the modern world has touched this part of the Asia-Pacific nation of 600 islands and 800 languages. Largely cut off from the outside world, villagers earn a few dollars each week farming small patches in the forest for sweet potatoes and coconuts and catching the occasional fish from their flimsy, dugout canoes. There is no electricity here, no toilets, no phone services, no cars. Big black pigs are a sign of status and community life revolves around ancient tribal rituals evoked by the spirit houses and shark calling, a dying tradition where villagers shake rattles made of seashells to attract sharks in the Bismarck Sea to the shores before snatching them up with their hands.

Nautilus, an exploration mining company headquartered in Toronto, has come to these villages along the coast to pitch a simple but controversial message: We can make your lives better if you let us mine the seafloor. Villagers have embraced offers of new sanitation systems, homes and bridges. But they don't fully comprehend what Nautilus wants to do starting as early as 2018 at a site 30 kilometers (18.64 miles) off the coast. Located about 1,600 meters (5,200 feet) down, the site is home to a network of hydrothermal vents and near an undersea volcano. It's a harsh environment where mineral-rich water as hot as 400 degrees Celsius (750 degrees Fahrenheit) pours through the vents, meeting icy cold water and forming the concentrations of gold, copper and other minerals that are 10 times what is found in traditional mines on land.

### **A race to the bottom of the sea**

There is plenty at stake if the company goes ahead with its ambitions plans. A successful project has the potential to set off a modern day gold rush to the seafloor, a prospect that troubles deep-sea scientists and environmentalists who fear the mining could destroy some of the world's most diverse and poorly understood ecosystems. Because of technological advances, difficulties of mining on land and growing demand for minerals like copper, gold and zinc, scores of nations and multinational conglomerates are rushing to lay claim to huge areas of the Pacific, Atlantic and Indian oceans — some sites the size of small countries. Supporters see this as a chance to tap the 70 percent of minerals not on land and transform the way we source these natural resources found in phones, computers, and other electronic devices.



A villager taking a break from preparing the evening meal in one of a string of villages that are on the front lines of the mining project. (Mike Casey)



Nautilus contends that, by drilling underwater, it can actually shrink its environmental footprint. On land, mining means displacing villages, fouling rivers with mine waste, and lopping off entire mountains to get to the minerals — none of which Nautilus says it will do. "There are a lot of resources on the seafloor. It's not inconceivable that ocean mining will be a similar thing in 20 years to what offshore oil and gas is for things like copper, nickel, cobalt, and zinc," said Nautilus CEO Mike Johnston, whose company is set to take a critical step forward when it tests its underwater mining tools off the coast of Oman in the coming months. "We can't say we are only going to do this stuff on land ... We have to look at the impact man has over the entire planet."

***"If you wipe out large areas of seafloor and cause species extinction, you actually change the future of life on earth, how it evolves, if you do it on a large enough scale."***

The idea of scooping up minerals from the sediments of the world's oceans has mesmerized adventurers for eons. Manganese nodules were first discovered in the late 19th century in the Kara Sea during the expedition of the H.M.S. Challenger. But it wasn't until the 1970s that anyone seriously considered tapping the ocean's riches of gold, silver, zinc, magnesium, iron, cobalt, and copper. Scientists from the Woods Hole Oceanographic Institution discovered the first hydrothermal vents in the Galapagos Rift, more than 2,500 meters (8,202 feet) down in the Pacific Ocean off the west coast of South America.

And Lockheed Martin spent three years collecting thousands of samples from the Clarion-Clipperton Zone of the Pacific Ocean. But the sector struggled to gain respect not only from suspicious governments, but the traditional mining industry. "A lot of people laughed at us," said Julian Malnic, an Australian exploration geologist who started Nautilus in the 1990s and has been described as the godfather of marine mining. "One high-profile commentator suggested we were going to use explosives. They don't even work down there," he said. "There was a big ignorance factor which everyone was in a hurry to showcase but, in my experience, when you have a new idea, you haven't got a friend in the world."



A copper iron sulfide from the bottom of the ocean from the Volcanic Unit of the Marianas Trench Marine National Monument. (Mike Casey)

While mining giant Anglo-American at one point had a small stake in Nautilus, none of the other big players have dipped their toes in the water. The sector has mostly dominated by tiny companies with names like Diamond Field International and Neptune Resources that fill their websites with glossy photos and videos of potential sites with a prospector's air of excitement at the incredible

minerals waiting to be mined. No one has yet to do it on a commercially viable scale. Malnic attributed that to the cautious nature of the mining industry and the boom and bust cycle that comes with the territory. A lack of governance has also hurt efforts to mine in international waters while national governments have become increasingly alarmed over fears of potential pollution from the mining. There's reason for caution.

Scientists and environmentalists warn that the technology is unproven and that widespread mining could destroy hundreds, if not thousands of miles of hydrothermal vents systems, undersea mountains, and submarine volcanoes as well as seamounts containing deep sea coral. In doing so, the world could lose scores of species before they are even investigated by scientists as well as potential resources for new classes of drugs, cosmetics, and fuels. "If you wipe out large areas of seafloor and cause species extinction, you actually change the future of life on earth, how it evolves, if you do it on a large enough scale," said University of Hawaii's Craig Smith, a co-author on a paper in *Science* last year that called for implementing adequate environmental protections for deep sea mining. "We are doing it on terrestrial environments clearly. So far, we haven't done it on that scale in the deep sea but there is potential if things aren't managed," he added.

"A lot of people are quite shocked to find out about deep sea mining," said Helen Rosenbaum of the Deep Sea Mining Campaign, a coalition of anti-mining NGOs from the South Pacific, Australia and Canada, noting that oceans are already under threat from pollution, overfishing and climate change. "The general public aren't aware of it," she said. "This is another way in which our oceans are being hammered. They are already predicted to fail ecologically over the next couple of decades if we continue business as usual with the impacts they are already experiencing — let alone this new one."

### **One company's experiment**

The companies themselves have had their own challenges, none more so than *Nautilus*. Malnic first secured rights to the site off PNG's New Ireland in 1997 after attending a presentation at Australia's premier scientific institution, the Commonwealth Scientific and Industrial Research Organisation, on the discovery of seafloor massive sulfides at the bottom of the Bismarck Sea. He did what any good mining prospector would do. He reconstructed the seafloor maps and quickly secured exploration licenses in PNG for Solwara 1 and another site in 1997. From there, he started scouring the South Pacific for other sites, recognizing that most were within the 200-mile economic exclusion zone of these island nations. "Here were these beautiful high grade sulfides coming out of the box," said Malnic, recalling the lecture when the ore from the Bismarck Sea was put on display.

"I could see immediately the great potential," he said. "I'm still totally excited. This is the frontier for copper and zinc production in the future." The excitement, however, would give way to a decade or more of frustration and delays. Traditional mining companies wouldn't touch the project and efforts to raise capital came up against, what Malnic calls, "the second half of a nuclear winter of zero capital available for exploration and mineral projects." But the 1997-98 economic crisis was just beginning. It would be another five years before the crisis eased and a metals market, driven by the emergence of the resource-hungry Chinese economy, started recovering. Soon enough, the suitors started knocking on *Nautilus'* doors. Yet even as the financing began flowing, the company struggled. Malnic left in 2006 and the company went through two more CEOs before settling on Johnston. Its stock, which debuted on the Toronto Stock Exchange, reached a high of \$4.38 in 2008 before falling rapidly to 14 cents.

At the same time, the company learned just how hard it can be to operate in a tribal society where minerals like gold and copper are abundant — but so is corruption, angry landowners, and activists increasingly fearful about the environmental damage caused by mining. It didn't help that the company was arriving on the back of several high profile mining disasters in PNG, including the spill-

age of tens of millions tons of waste from the Ok Tedi gold and copper mine that polluted a river on the island that tens of thousands depend on for water. "They spent \$400 million and didn't come up with a mine," said Malnic — money he claims mostly went to scientific studies and other fieldwork. "It was just catastrophic. They could have been mining twice over for that much and they came away with a bunch of studies and some contracts. It's unforgivable."

Nautilus and the PNG government also fell out over the government's failure to contribute its share of developing cost to the project, forcing the dispute into court and almost killing the project. The unstable government — at one point featuring two, dueling prime ministers — didn't help. But the two sides resolved their differences and the government got a stake in the project's potentially lucrative intellectual property. The settlement has the easy-going Johnston — a New Zealander who often favors a dress shirt and jeans to a suit and throws in the occasional cuss word when making a point — more bullish than he has been in years. "When we were in the dispute with the government, a lot of people were sitting on the sidelines watching," said Johnston, who has been credited with repairing relations between the two sides and has been known to spend days in villages counter rumors and allegations against the company. "Now that the dispute is finished, there is a lot of interest again. A lot of people want to see us go a little bit further."

### **A rush to get a piece of the action**

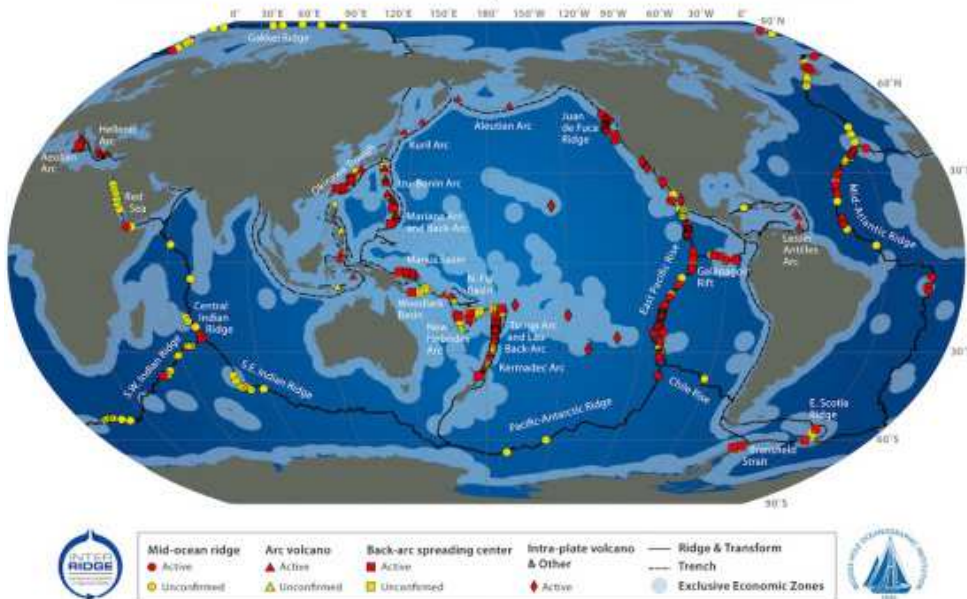
Some of the greatest interest in seabed mining in the past few years has been around the Clarion Clipperton zone, an area about 80 percent the size of the contiguous United States in the Pacific between Mexico and Hawaii. By some estimates, it contains an estimated 62 billion tons of nickel, copper and cobalt in bowling ball-sized nuggets that litter the seafloor. Because these are in international waters, the International Seabed Authority (ISA), a tiny U.N.-affiliated body with offices in Jamaica, is tasked with issuing licenses to explore these and other areas. Just in the past four years through 2015, the number of exploration license has jumped from 7 in 2006, to 27 in an area that encompasses 1.4 million square kilometers.

***"Right now, we don't know what will happen when mining starts. We do know the animals living at the sites that are mined will be eradicated but we don't know whether or how quickly those communities can become reestablished."***

Increasingly, companies backed by Russia, Japan, and China, as well as tiny island nations like Tonga and Kiribati, are taking out permits to explore huge sections of the area. One of the biggest private firms, UK Seabed Resources — a subsidiary of Lockheed Martin UK — is prospecting for minerals in a 22,300 square mile area of the Clarion Clipperton zone and says that could bring \$60 billion to the UK economy over a 30-year period. "What we have seen in the past few years is a huge explosion in activity," said Michael Lodge, the deputy to the ISA's secretary-general and legal counsel. "It shows an increasing interest in the sector and prospects for the sector. There are two or three things converging — developments in technology that makes it more realistic and the cost of traditional mineral projects is becoming more expensive and difficult to source," he said.

"You are reaching a point of equilibrium. Although seabed mining is terribly expensive and very high risk, it's competitive with the cost of setting up a source on land. Also, people are looking for long-term sources of very high grade minerals." For now, much of the action is on building the mining equipment in places like the United States and United Kingdom that has been adapted from technology already in use in the oil and gas, dredging and coal industries. Once it starts, the plans call for lowering several remote-controlled, robotic cutting machines to the seafloor. Mineral-laced rocks will be carved from the seafloor and sent up through riser pipes and lifting systems to a tanker-like ship waiting on the surface. The excess water from the ore will be returned to the sea bottom and the minerals sent to China's state-owned Tongling Nonferrous Metals Group.

## Global Distribution of Hydrothermal Vent Fields



Map of hydrothermal vents (S. Beaulieu, K. Joyce, and S.A. Soule (WHOI), 2010; funding from InterRidge and Morss Colloquium Program at WHOI)

### More than just minerals in the deep

Stace Beaulieu, a biological oceanographer at Woods Hole who has spent the past 20 years studying the biodiversity and abundance of life on the ocean's seafloor, has watched this growing interest in deep sea mining warily. "Right now, we don't know what will happen when mining starts," she said. "We do know the animals living at the sites that are mined will be eradicated but we don't know whether or how quickly those communities can become reestablished. That uncertainty is why a lot of deep-sea scientists have great concern about mining." Like the other scientists in Lauren Mullineaux's lab at Woods Hole who study the world's hydrothermal vents and other seafloor habitats, the wiry and energetic Beaulieu is passionate about the deep sea. If she isn't gearing up for a weeks-long journey on a research vessel, the avid runner and biker is hunkered down in her tiny, crowded lab. It's filled with mementos of past trips including nets and foot-long bottles containing red-tipped tube worms and dozens of preserved samples in ethanol. Just down the road from the lab is the tranquil, ocean-side community of Woods Hole, with its lobster shack, organic coffee shops, and a marina that looks out on Vineyard Sound.

Unlike other scientists who may study the seafloor's large creatures like clams, crabs, or tubeworms, Beaulieu and her lab-mates are more concerned with the macro fauna — the deep sea invertebrate communities including snails, smaller worms, and crustaceans. They are among the most diverse animals on the seafloor and play a critical role in the food web. "We want to find early life stages of animals that live on the sea floor," she said, holding up a pinky-sized tube containing samples that came from a 2010 trip to the Mariana Arc and the site of an erupting submarine volcano. "Now, they are mostly transparent and white. In life, they have beautiful colors. They are much more beautiful alive." When the first hydrothermal vents were discovered in 1977, scientists were shocked with what they saw. Instead of flat, featureless desert, they found vents teeming with tubeworms, mussels, clams, crabs, snails and shrimp. "The thing that caught everyone's attention when they first discovered the vents was the large numbers and large volumes and large biomass in the animals and communities," said Mullineaux, who has been on 30 cruises and made nearly 40 dives as part of her work studying the dispersal of larvae of benthic invertebrates and their return to the sea floor.





A researcher examining samples under a microscope taking from hydrothermal vents in Lauren Mullineaux's lab at Woods Hole. (Mike Casey)

"This was a huge surprise because, at that time, we thought deep sea communities were being fed by small particles that drifted down from the sea surface where they were produced by photosynthesis," she said. "Clearly, that production by photosynthesis was not sufficient to fuel these amazing robust communities that we found on the seafloor." Mullineaux said they realized something else entirely was happening — a process called chemosynthesis, where microbes convert chemicals dissolved in the vent fluids into usable energy. Since then, hundreds of vents have been discovered and thousands more are believed out there. Many are home to strange creatures that go to unusual lengths to thrive in these toxic environments. One of the strangest is a family of tubeworms called Siboglinidae that have no mouth or gut and "get all their sustenance by these endosymbiotic microbes that live inside them."

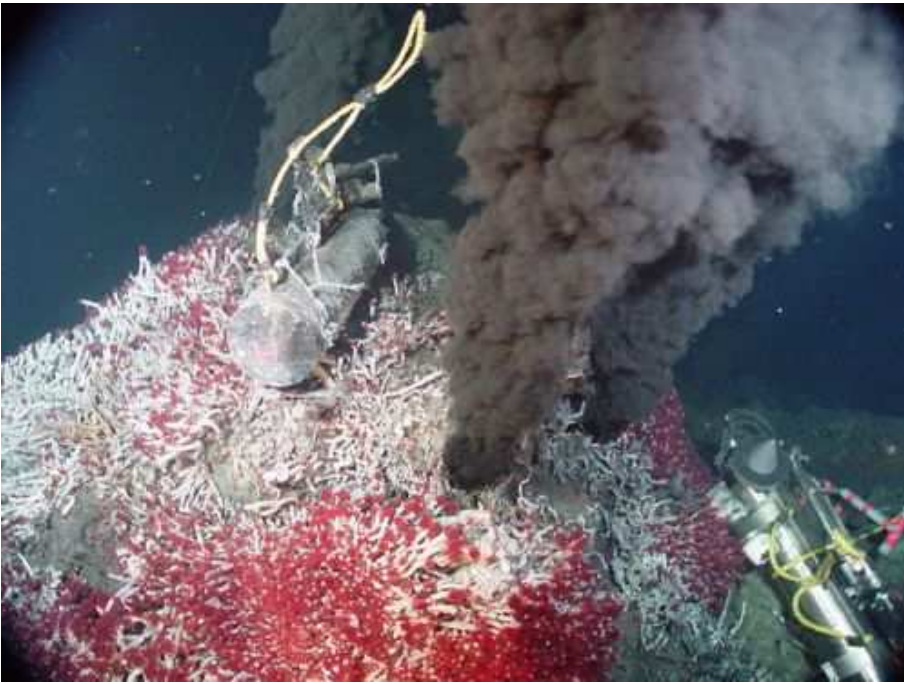
In the Clarion Clipperton zone, scientists are just beginning to explore its rolling seafloors which have higher diversity than vents, but are mostly dominated by tiny creatures living in the sediment. "I'm just working on the data now and the samples are some of the most diverse, have some of the highest species diversity of samples ever collected from the sea floor," Smith said, who is doing baseline surveys for UK Seabed Resources, noting that each of these quarter square meter samples contain upwards of 60 species of polychaete worms, crustaceans, mollusks and snails. "These are animals living in the sediment that you don't normally see," he said. "Every sample we bring up has dozens of new species. In fact, 80 percent to 90 percent of the animals, the species we bring up are new to science. People get all excited about the discovery of a new species in a terrestrial environment. We are bringing up hundreds of them on every cruise."

### **To mine or not to mine**

When he is not at sea, Smith is part of a group of scientists helping to shape environmental measures being drawn up by ISA. Unlike environmentalists who want an all-out ban on deep sea mining, Smith and others are more pragmatic, arguing mining will happen at some point, so they are trying to determine where it can and can't go. "I think slowing down is an excellent idea," said Lisa Levin, who is with the Scripps Institution of Oceanography and who co-founded the Deep Ocean Stewardship Initiative, which among other things advises on the use of resources in the deep ocean. "We should be slowing down and collecting relevant information that is needed to make a decision. In most cases, I don't think we have it. If a moratorium is a way to slow down, that works." What makes drawing up these regulations challenging, Levin said, is that each type of mining would take place in ecosystems that "operate on different time and space scales."



"Some are small and patchy. Some are heavily disturbed and recover quickly. Some are vast and processes are very slow. Some animals live for hundred or thousands of years and others live for 10 years," Levin said. "So each system requires a careful look at the dynamics and the composition and the vulnerability of those ecosystems to mining impacts." Duke University's Cindy Lee Van Dover and other scientists have suggested staggering the mining activity in a certain area, as well as limiting mining to inactive vents that could be easier to mine, but also less important environmentally. Companies should also consider setting aside areas within their sites so the mining impacts can be evaluated and relocating species deemed ecologically significant.



The Sully Vent in the Main Endeavour Vent Field of the northeastern Pacific Ocean. (NOAA)

But with no past experience to go on, it can be a struggle for scientists to know where to draw the line on where mining can take place. Nautilus, for example, may be starting with Solwara I, but it has far greater ambitions. It has more than 500,000 square kilometers (310,686 miles) of exploration acreage in the Western Pacific, including some 19 sites in the Bismarck. It also has sites in Tonga, Fiji, Vanuatu, Solomon Islands, as well as international waters in the eastern Pacific. "The cumulative impacts for any of the mining scenario is what is really critical," Van Dover said. "If Nautilus only mines one site, no big deal. If they mine two sites, we don't know. Three sites, we don't know where the tipping is, where does it matter in terms of the connectivity of the animals and when will you lose not just species diversity but ecosystem function and services."

Short of wiping out the tube worms, bivalves, and gastropods living around the Nautilus vents, even mining on a small scale has the potential for disaster. There also are concerns the project could change the chemistry near the vent sites and produce toxic plumes that could bury organisms and clog the feeding apparatus of sea creatures. "There is no way to know where the plume is going to go until they make it," said Van Dover, who has in the past studied the Nautilus site. "We haven't seen the mining tools in action. We don't know how much sediment they are going to move."

### **Islanders — Guinea pigs or pioneers?**

Opponents, who for several years have waged a global campaign against the Nautilus project, paint a far grimmer picture. In a series of detailed reports, they warn that storms, spills, or technical snafus could spark a disaster that would wipe out fisheries, destroy some of the world's most diverse coral reefs, and pollute the waters of coastal communities across the South Pacific. "People are

afraid because they know there will be damage on our reefs, affecting our marine life," said David Bekeman, a primary school teacher in Komalu, a village near the mine site. "Nautilus is telling us there will be no damage. We definitely know there will damage but we don't have the power to stop anyone from doing anything in the sea." While Nautilus is building latrines and handing out textbooks, a loose-knit and cash-strapped group of opponents that includes young activists, school teachers, church leaders, and a retired army colonel have tried to raise awareness in the international community and the impacted villages.



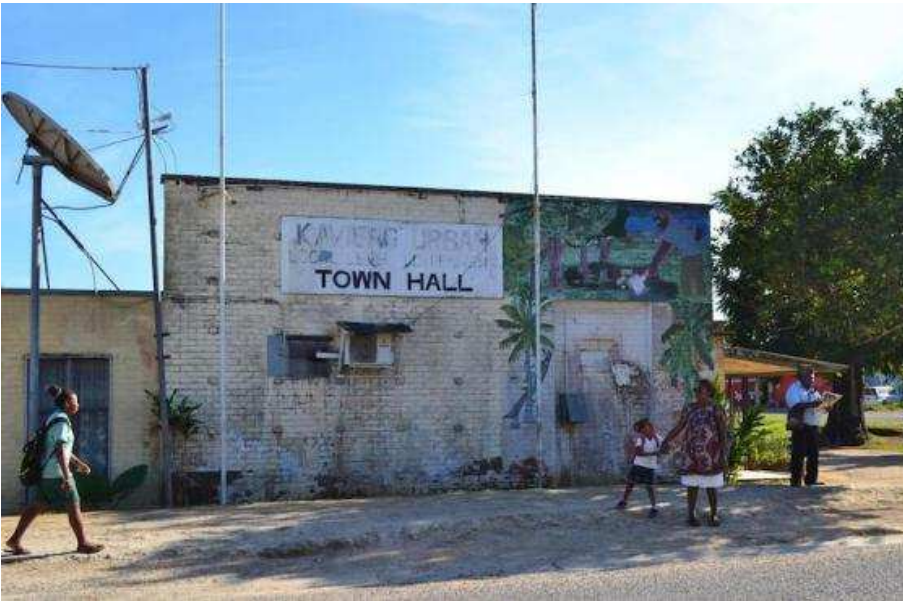
A young child in Komalu where villagers fear deep sea mining may disrupt traditional ways of life. (Mike Casey)

"We aren't anti-development but we are saying to the government it must act responsibly," said William Bartley, a retired colonel who opposed the project. "Papua New Guinea is not ready for this. They have not even told us what actions they would take supposing an environmental disaster does occur." Johnston dismisses the criticism from "outside groups" that "don't want this to happen" and insists his project will only cause harm to the fauna at the mine site. "I've heard a lot of that stuff and a lot of that is misinformation. I've heard the one about poisoning the water. I don't even know where that comes from," Johnston said.

"It makes me quite angry when I see outside NGOs telling villagers that is going to happen because the river is really important to them." In these villages of mostly bamboo huts surrounded by idyllic views of the rocky coastline, the villagers are left with competing versions of the future. Will mining activities bring development or destruction to their lands? The company is also a regular presence in the villages, conducting surveys and laying the groundwork for its first development projects. Like so many mining companies, they are often tasked with doing the job of the government — which appears to have largely left these remote villagers to fend for themselves. And with little investment until now, even the most basic things need the company's attention.

The schools, for example, lack textbooks, water and toilets — forcing children to relieve themselves in rivers and exposing girls to sexual harassment and even rape. The classrooms have almost nothing beyond a chalkboard. Any students must walk hours, if not an entire day, to reach them. The medical clinics — also hours away by foot — are often shuttered due to a lack of medicine. As a result, some of the most common causes of death in the villages are childbirth as well as treatable diseases like malaria and respiratory ailments, according to surveys done by Nautilus. In the villages, there are no shops or any commercial activity, since the mountain roads are often impassable during heavy rains.





A government office building in the Papua New Guinea town of Kavieng, the capital of New Ireland where the mining will take place. The capital, located on Balgai Bay, is several hours from the mining site. (Mike Casey)

The only sign of tourism is an abandoned guest house built by an Israeli adventurer. Most farmers, meanwhile, have abandoned cash crops like coconuts in favor of staples like yams, since it can be such a challenge to get them to markets. The talk from Nautilus of fighting diseases and easing hunger resonates with villagers like Jenny Gebo, who in her tattered blouse and skirt laments how it takes her all day just to gather enough vegetables to cook the evening meal. Standing over a smoky fire, she was preparing a traditional Papuan meal called mumu, in which the food is soaked in coconut, wrapped in banana leaves, and cooked over a pit. "We are finding it hard now to help our families," said Gebo, a mother of four from Komalu, one of the closest villages to the mining site. "The mining could help our families. But if the mining comes and the seas get polluted, we won't get the fresh fish."



Villager Henry Tabu hopes that improvements touted by Nautilus will help him and his family. (Mike Casey)

Out in the forest a few miles from the village, Henry Tabu was tending to fires he had lit to clear his land. As the flames reached several feet in the air and the smoke seared his eyes, Tabu, bare-chested and wearing a cross, recalled how he didn't earn enough money to send all his five children to school. He complained that his tiny plot barely was enough to feed his family. "We are trying our best to look after our family," Tabu said, as his children stoked the fire and a puppy whined in the background. "The project will come. It will help in some ways to make people live better. Maybe it will help me look after my family."

### **Nautilus: 'Solwara 1 seabed mine is an experiment'**

PNG Mine Watch, 24 May 2016

Nautilus Minerals has finally admitted it will use Solwara 1 as the test site for an expensive and potentially destructive experiment in which the potential victims are the rich marine environment of the Bismarck sea and the indigenous communities living along its coastline. In its 2015 [Annual Information Form](#) [pdf 1.2MB], submitted to Canadian regulators in March and available on the company website, Nautilus says it does not know if its plans for seabed mining are financially or technically feasible or what the environmental and social impacts will be. There are '*significant risks*' says the company and it can give 'no assurance', but rather than conducting further studies, it is pressing ahead with Solwara 1 to try and "demonstrate that seafloor resource development is commercially viable and environmentally sustainable". (p24) Nautilus warns 'there is significant risk with this approach and no assurance can be given that the system will successfully demonstrate commercial viability' .(p52) Nautilus admits:

- It is going ahead with the mine despite '*not having completed and not intending to complete any preliminary economic assessment, pre-feasibility study or feasibility study*' (p52)
- It does not know if its technology will work in the sub-sea conditions or if it will work with the materials to be mined or even if the different technologies will work together in a single application (p52)
- "*Performance, availability, reliability, maintenance, wear and life of equipment are unknown*" (p54)
- Its approach is '*to first test the operational viability of the whole production system at Solwara 1 in order to demonstrate if these technologies can cut and recover the minerals*' (p52)

Amazingly, even if the mining equipment does actually work, Nautilus still doesn't know if there are any commercial quantities of minerals to be recovered. In the Information Form, Nautilus admits it has not even drilled the seabed, the resource 'has only essentially been surface sampled'. Without proper testing by drilling, the published results "should be considered of low [sic] confidence" (p46). Perhaps even more damning, Nautilus admits it does not know what the actual impacts of the mining operations will be on the environment (p61). Given these startling and damning admissions, will the Papua New Guinea authorities now step in and stop this giant experiment with people's lives, livelihoods, culture and environment?

### **Nautilus: Progress of sea-floor production pleases CEO**

The National, May 18th, 2016

NAUTILUS Minerals chief executive Mike Johnston says he is satisfied with the progress of sea-floor production equipment. Johnston said this when the company released its unaudited consolidated financial statements for the first quarter of this year, together with management's discussion and analysis. Significant events to date include:


- Factory Acceptance Testing completed by Soil Machine Dynamics on the seafloor production tools;
- awarding of contract for equipment storage and wet testing of the seafloor production tools, which arrived safely at Duqm Port in Oman;
- completion of the assembly of the Subsea Slurry and Lift Pump;
- advanced construction of the Production Support Vessel;
- Completed rights offering; and,
- US\$47.5 million (K148 million) in cash and cash equivalents as at March 31 this year.

Johnston said: “It is very pleasing to see the progress that has been made on our seafloor production equipment this past quarter. “In particular, taking delivery of the three SPTs and sending them safely to Oman where they will undergo wet testing later this year. “In the coming months, we will remain focused on the building of the PSV and the delivery of the equipment to be integrated in it. The momentum continues to build as we work towards commencing seafloor operations at the Solwara One project site in quarter one, 2018.”

## Nautilus admits serious questions over Solwara 1 viability and future

Nautilus Minerals via PNG Mine Watch, May 16, 2016

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- We have made numerous assumptions about the material forward-looking statements contained herein, including assumptions relating to the future price of copper, gold, silver and zinc; that anticipated costs and expenditures will be as planned; that key components of the seafloor production system will be built on schedule and in accordance with Nautilus’ specifications; and our ability to achieve our goals. Even though our management believes that the assumptions made and the expectations represented by such statements are reasonable, there can be no assurance that the forward-looking statements will prove to be accurate. Accordingly you should not place undue reliance on forward-looking statements.
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- As discussed in the Company’s most recent Annual Information Form, the production decision for the Solwara 1 Project was not based on a feasibility study of mineral reserves demonstrating economic and technical viability. Accordingly, there is increased uncertainty and economic and technical risks of failure associated with this production decision. Production and economic variables may vary considerably due to the absence of a completed and detailed analysis as would be included in a feasibility study. The risks associated with this decision are set forth in the Company’s Annual Information Form under the heading “Risk Factors”.
- Nautilus requires significant additional funding to advance the Solwara 1 Project towards production. There can be no assurance that the Company will be able to obtain at all or on acceptable terms the remaining financing necessary to fund the completion of the build and the deployment of the Company’s seafloor production system.
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- Notes Regarding Technical Disclosure
  - Resource information for the Solwara project is derived from a technical report titled “Mineral Resource Estimate, Solwara Project, Bismarck Sea, PNG” dated and filed on SEDAR on March 23, 2012, and summarized in a news release dated November 25, 2011. Indicated resources of 74,000 tonnes of copper is based on 1.03 million tonnes at an average grade of 7.2%.
  - Resource information for the CCZ Project is derived from the technical report titled “Updated NI 43-101 Technical Report, Clarion-Clipperton Zone Project, Pacific Ocean” dated March 20, 2013 and filed on SEDAR on March 21, 2013, and summarized in a news release dated September 18, 2012, unless otherwise stated.

FORGING AHEAD
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June 2015
2

Nautilus is not talking publicly about the fine print

Nautilus Minerals says it still faces significant financial and technical uncertainties and may not proceed with its highly controversial Solwara 1 experimental seabed mining operation in Papua New Guinea. Publicly the Canadian company is very positive about its plans for world’s first seabed mine, claiming it will be ready to start mining in the narrow coastal waters of the Bismarck sea between New Ireland and East New Britain, in 2018. But a detailed study of company’s 2015 AGM



presentation reveals Nautilus does not know if the mine is commercially or technically viable and the company does not have the financial resources to start production. Nautilus President and CEO

Mike Johnston made the presentation titled '*Forging Ahead*' at the company AGM in June 2015, but didn't dwell on the fine print in which there are some alarming disclosures; "the production decision for the Solwara 1 Project was not based on a feasibility study of mineral reserves demonstrating economic and technical viability" as a result "there is increased uncertainty and economic and technical risks of failure associated with this production decision" That is correct! Nautilus says there is no study showing the mine is economically or technical feasible! Yet the PNG government has not only granted a mining licence it has given Nautilus \$100 million of taxpayers money! Perhaps the lack of a feasibility study explains why other investors are running scared and Nautilus is still suffering a dire lack of funding: "Nautilus requires significant additional funding to advance the Solwara 1 Project towards production. There can be no assurance that the Company will be able to obtain at all or on acceptable terms the remaining financing necessary"

That is right! Nautilus does not know if it will ever have enough money to start mining! Potential investors will hardly be reassured by Nautilus's further admission it would be foolish to rely on its predictions for the Solwara 1 mine and it has made numerous assumptions about its ability to achieve its goals: "We have made numerous assumptions about the material forward-looking statements, including assumptions relating to the future price of copper, gold, silver and zinc; that anticipated costs and expenditures will be as planned; that key components of the seafloor production system will be built on schedule and in accordance with Nautilus' specifications; and our ability to achieve our goals..., there can be no assurance that the forward-looking statements will prove to be accurate. Accordingly you should not place undue reliance on forward-looking statements.

Download the full AGM presentation [6.5MB]

<http://www.nautilusminerals.com/IRM/PDF/1562/AGMJune2015final>

## **Solwara: Landowners want to see benefits says leader**

Post-Courier, May 09, 2016

By Simon Keslep

THE Multi-million kina Solwara 1 project within the coastal region of New Ireland and East New Britain needs to be reviewed in terms of landowner benefits. Former president of Central New Ireland local level government Toligai Soka said last Friday with the 2018 locked in by Canadian Miner Nautilus that there were still a few issues that needed to be ironed out. Top of the list Mr Soka said were the equity share benefits for landowners within the projected Solwara 1 tenements and also the environmental aspects pertaining to the deep sea mine. "Mineral Resource Authority (MRA) and Nautilus need to explain also the shift of project location (tenements 154) and what benefits will Namatanai wards of one, two, three and four gain." Mr Soka added that procurement studies should also be carried out in terms of the project's environmental and social aspects of development for coastal communities located within the project extraction zones. He had claimed due process had not been followed in the issuance of the licence to the developer.

"Seabed mining is a totally different ball game and we understand the Land Mining Act was adopted and used in the issuance of the licence. This is whilst awaiting collation of draft policies. "It is really a slap in the face when landowners are denied their share of benefits and even being left neglected in terms of basic service deliveries like education, health and other socio-economic developments," said Mr Soka. "It is now becoming a common trend of establishing ghost created landowner groups in major economical townships which directly contributes to inadequate distribution of royalty payments for traditional landowners." he had added. Meanwhile Mr. Soka gave reference to the three main economic projects within New Ireland province which includes Simberi, Lihir and

now Nautilus. "There should be establishment community consultative organisations to deal with landowners' economic, social and environmental issues relating to the project," added Mr. Soka. Mr Soka's concerns is also in reference to a recent World Bank Report on immediate cautions in Deep Sea Mining in the Pacific region in which PNG has already granted a license for ocean floor mining through the Solwara 1 project.

### **World Bank warns of deep-sea mining**

The National, May 6th, 2016

A World Bank report has advised Pacific Island countries supporting or considering deep-sea mining activities to proceed with caution to avoid irreversible damage to the ecosystem. The report is titled "Pacific Possible: Precautionary Management of Deep Sea Mining Potential in Pacific Island Countries". It says countries need to ensure that appropriate social and environmental safeguards are in place as part of strong governance arrangements for the emerging deep-sea mining industry. The report says deep-sea exploration of minerals and resources was increasing globally. But its short and long-term impacts on the environment, economy and society in general remain largely unknown. The report, released for public comment, takes stock of what is known and unknown about deep sea mining – its costs, impacts and potential revenue.

It highlights the need to develop both the evidence base for informed decisions and appropriate governance structures. The report recommends that precautionary measures be applied and identified six alternative management responses including a no-development option, a set aside to be established, the use of technological innovation to minimise impacts and adaptive management. The report also notes that PNG is the only country in the Pacific to have granted a license for ocean-floor mining, through the Nautilus Minerals Solwara 1 project. Meanwhile Nautilus Minerals Inc chief executive officer Mike Johnston expressed his disappointment over the report saying it lacked credible information on some of the work currently being done and had already been done by countries such as PNG to address those issues raised. Johnston said it was disappointing that the World Bank and the authors of the report did not consult Nautilus or the relevant PNG authorities for facts on the operations. He said most of the things recommended by the report was being done by Papua New Guinea.

Link: <http://pubdocs.worldbank.org/pubdocs/publicdoc/2016/4/125321460949939983/Pacific-Possible-Deep-Sea-Mining.pdf>

### **Pacific urged to be cautious over seabed mining**

*A new report by the World Bank says Pacific Island countries should be cautious over any plans for mining of the seabed.* Radio New Zealand, 28 April 2016



Sampling copper under the sea Photo: Nautilus Minerals

Released today, the 'Precautionary Management of Deep Sea Mining Potential' report recommends that Pacific countries supporting or considering deep sea mining activities proceed with a high degree of caution to avoid irreversible damage to their ecosystems. It also stresses the need for strong governance arrangements to ensure that appropriate social and environmental safeguards are in place. Papua New Guinea, Fiji, Tonga, Vanuatu and Solomon Islands have all granted permits for deep sea mining exploration and the Cook Islands recently undertook a minerals exploration tender process.



Collecting machine. Photo: Nautilus Minerals

PNG is the only country in the region to have granted a license for ocean floor mining. It has given approval for the Canadian miner Nautilus minerals to launch its Solwara 1 Project in PNG waters in 2018. A recent report by the Pacific Community and the European Union said seabed mining could see [PNG reap economic benefits of US\\$80 million over two years](#). But the World Bank said not enough was known about the environmental and social impacts of the enterprise and likewise the appropriate fiscal regime and economic benefit to deep sea mining were not yet clearly understood.

### **Solwara Warriors want govt to ban experimental seabed mining**

BY: syagi, PNG Loop, April 27, 2016



The recently formed Alliance of Solwara Warriors is demanding the government of PNG to ban experimental seabed mining in PNG. Nautilus Minerals is scheduled to start its experimental seabed mining production in 2018. Since 2008, from Madang to New Ireland and East New Britain provinces, people have been calling on the government to stop experimental seabed mining in PNG. Because the government has ignored these concerns Nautilus Minerals has pushed ahead testing the

technologies which they plan to use. Nautilus Minerals is rushing to 2018 without addressing issues raised in various petitions through non-government organisations, the Evangelical Lutheran Church of PNG as well as the peoples of the West Coast of New Ireland and East New Britain Provinces. Speaking on behalf of the Alliance of Solwara Warriors, Melchoir Ware said: “We will not let the government continue to ignore us. The sea is our life. We exist because the sea exists. We will not continue to remain quiet and passive. We have a responsibility to those generations that come after us; to those yet unborn.” The Alliance of Solwara Warriors is calling on all PNGeans to stand up and defend the Bismarck Sea and all other seas under threat from seabed mining.

### **PNG community organisations unite against seabed mining**

Radio New Zealand, 26 April 2016

#### Transcript

Community-based organisations in the region surrounding Papua New Guinea's Bismarck Sea have united against seabed mining in the country. The PNG Solwara Warriors collective is made up of more than 20 organisations from Madang, New Britain, Manus and New Ireland. One of the front's leaders, Patrick Kaupun, told Koroï Hawkins the decision to unite came after numerous individual petitions to the government by the respective organisations fell on deaf ears.

**PATRICK KAUPUN:** We are actually asking the Papua New Guinea government to ban seabed mining. We totally disagree and don't want sea bed mining in the Bismarck Sea. So we are asking the Papua New Guinea government to totally ban sea bed mining in our waters, our seas.

**KOROÏ HAWKINS:** And how many groups are now involved in the Solwara Warriors Group?

**PK:** We are a total of 20 plus groups which are actually groups from within the Bismarck Area who are actually taking this stand.

**KH:** It seems amazing that despite this united sort of front against the mining operation or the proposed mining operation, the government continues to go ahead with it?

**PK:** Well it is quite interesting it is under the PNG government reform systems that we should have got this bottom up planning and people's free prior [and informed] consent. And all those things were not done and it was actually top down. That is why we actually, are standing for our rights, for our democracy and for our country.

**KH:** And is there any planned action that the PNG Solwara Warriors group is considering in the months and weeks ahead?

**PK:** Yes we have 20 months from now until 2018 and we are actually planning to come up with a petition that actually represents the overall landowners who live around the whole Bismarck area to come up with one petition and then we have other planned programmes in different provinces which we will use them as a venue to push against sea bed mining.

**KH:** And has there been any consultation at all from government or from the company itself, in terms of getting to the stage they have got? It seems to be at a rather advanced stage now.

**PK:** Well the company and the government actually they have, they are working with certain communities. Community groups, which these community groups have been listening to them for the past years during their awareness and all that but they are actually they were promising people and then it turned out that most recently. Early this year they actually declared that people will have no benefit in the sea bed mining. Which that happened in New Ireland. In other areas they actually did not know but this meeting actually got us to actually understand the language that the government and Nautilus were actually using in many different areas in and around the Bismarck Sea.

**KH:** So the actual benefits to the people in the areas to be mined are actually minimal?

**PK:** Yes definitely.

### **PNG community groups unite against seabed mining**

*Community-based organisations in the region surrounding Papua New Guinea's Bismarck Sea have united against seabed mining in the country.*

Radio New Zealand, 26 April 2016

The PNG Solwara Warriors collective is made up of more than 20 organisations from Madang, New Britain, Manus and New Ireland. One of the front's leaders, Patrick Kaupun, said the decision to unite came after numerous individual petitions by the respective organisations fell on deaf ears. The government and mining company, Nautilus, hope to start a world-first operation to mine the Bismarck seabed by 2018, despite vocal opposition from activists and some scientists. Mr Kaupun said a single united petition and major events across the region were being planned to voice their opposition. "It is under the PNG government reform systems that we should have got this bottom up planning and people's free, prior [and informed] consent, and all those things were not done," Mr Kaupun said. "And it was actually top down [approach] that is why we are actually standing for our rights, for our democracy and for our country."

### **Nautilus to fund New Ireland health projects**

The National, April 20th, 2016

THE New Ireland provincial government and Nautilus Minerals have entered into a public-private partnership to conduct health outreach programmes in the communities near the Solwara 1 project site. Under the partnership, Nautilus will fund annual health outreach programmes in the communities located nearest to its Solwara 1 project site. These programmes will be aligned with provincial and local level government plans. The aim is to achieve measurable improvements in community health outcomes, with a focus on maternal/infant health and infectious disease control. It came out of a workshop where stakeholders including officials from all levels of Government, non-government organisations, donor groups and health professionals discussed a health baseline study completed by Nautilus in 2015. Acting New Ireland provincial administrator Lamiller Pawut thanked Nautilus for helping the people of New Ireland to deliver health programmes. New Ireland health workers will work with experts and health professionals which Nautilus will engage to assist in the implementation of the programmes.

### **Cook Islands To Review Seabed Mining Laws**

*Passed in 2009, first in world SBMA needs updating*

By Rashneel Kumar

RAROTONGA, Cook Islands (Cook Islands News, April 12, 2016) – The Cook Islands Seabed Minerals Authority (SBMA) has taken a further step in its efforts to develop a sustainable world class regulatory framework for deep sea mineral activities in the massive Cook Islands Exclusive Economic Zone (EEZ). As the Authority awaits a bid for exploration activities for deep seabed minerals in the Cook Islands waters, it has already started a comprehensive legal review of its national 2009 Seabed Minerals Act (SBM Act) to improve the effectiveness and clarity of the future processes under the SBMA Act. Seabed Minerals Commissioner Paul Lynch said in 2009, the SBM Act was the first of its type passed in the world, to deal specifically with the wise management national seabed minerals resources. However, he said it had been acknowledged since back in 2012 that the SBM Act would benefit from a full review to ensure that it adopted the latest international best practices and remains user friendly to potential applicants, stakeholders and the SBMA.

"In 2015, we completed the needed Exploration Licencing Regulations. So now this current legal review of SBM Act would be mainly focused now on improving the Act as a whole, with an eye



regarding the controls needed even up to the possible extraction process taking place in the future," Lynch said. "This important legal review will also seek to adopt suitable parts of the new Secretariat of the Pacific Community-assisted, regional deep sea minerals law that has now been passed by Tonga and Nauru." The Authority did not receive any bid to explore the ocean floor for minerals in the country's EEZ from the 2015 tender it launched in August last year. The tender which closed in January was aimed at attracting applications for exploration licences over 10 blocks totalling about 100,000 square kilometres of the Cook Islands' 1.83 million square kilometre EEZ. Lynch said late-ly, however, they had received serious interest from a number of companies which were still considering exploring valuable seabed minerals in Cook Islands waters. One of the companies had even contracted a New Zealand scientist to analyse old Cook Islands seabed mineral samples stored with the National Institute of Water and Atmospheric Research (NIWA) in Wellington. Lynch said they would like to do the necessary preparatory exploration work over the next five years and then be ready for the next upturn in the cyclical global minerals market.

He added this was a long term sector and companies need to plan and invest for the long term, with sustainable benefits for all. Lynch said the legal review of the SBM Act aimed to prepare for every possible aspect related to a "good and effective" national seabed minerals sector, including the possible future extraction of the mineral resources in years to come. "Technical work on the current complex legal review is being funded externally by our national development partner, the Commonwealth Secretariat. It has contracted for the SBMA the services of expert legislative drafter, Paul Hibberd. "In 2015, under CITAF funding, Hibberd also drafted our national SBM Licencing Regulations and SBM Act amendment, which were passed unanimously in our Parliament in June 2015. "The results of drafting in this current 2016 legal review will again be shared with a wide range of local and overseas stakeholders for feedback and input."

In 2015, legal assistance on that on-going legal review work of the SBMA was also provided by the SPC EU DSM Project. SBMA were able to recruit short-term legal counsel Amelia Ponton to provide legal support, while local SBMA lawyer Alexandrya Herman went on a UN Seabed Minerals-related study opportunity. "That study is now completed. Both Ponton and Herman were former legal interns of the DSM project." Ponton, who is of English and Tuvaluan descent, graduated from Griffith University in Brisbane with Bachelor of Laws and a Bachelor of Arts Degree majoring in Cultural Sociology. Ponton is now employed in the legal sector in London. Lynch said Ponton was well able to assist the SBMA with legal advice and drafting assistance on relevant legislation, licensing regulations, negotiations and contracts.

### **Deep Sea Mining: PNG's Sensitive Marine Ecosystems**

By Simon Judd, Mining Monitor (Mineral Policy Institute), Vol. 6, March 2016, pp. 9-12

The integrity of marine ecosystems all over the world is threatened by human activities such as dumping of rubbish, disposal of chemical and radioactive waste, extraction of oil and gas, and fishing. Mining for sand and minerals in shallow waters has been conducted for decades, but the latest threat to ocean ecosystems comes from mining of the ocean seabed, otherwise known as deep sea mining (DSM) or seabed mining (SBM). Following the publication of an article by Boschen et al. *Seafloor massive sulphide deposits support unique megafaunal assemblages: Implications for seabed mining and conservation* in the scientific journal Marine Environmental Research, this article examines some of the implications of DSM for the ecology of the seabed. In the light of imminent DSM, it asks what conservation actions are required to identify significant risks and protect the biodiversity of ocean seafloor ecosystems. The first deep sea mine?

The Solwara 1 project being undertaken by Nautilus Minerals in Papua New Guinea (PNG) is the world's most developed commercial DSM project. It is located in the Bismarck Sea 30 km offshore

of New Britain Island at a depth of 1,600 metres. A mining lease was granted in January 2011 for a gold and copper project. After much delay, the project is scheduled to begin in 2018. If successful, Solwara 1 is likely to be the first of many DSM projects within the Pacific Islands Region. There are three main types of deep sea mineral deposits of commercial interest to industry and governments. In the case of Solwara 1, a Seafloor Massive Sulphide (SMS) deposit is to be exploited. SMS deposits are in deep sea (1,500 m – 5,000 m) hydrothermal vents along volcanically active areas of the ocean floor and typically contain commercially-attractive concentrations of copper, gold, silver, zinc, as well as other trace metals.

### **What are Seafloor Massive Sulphides?**

SMS deposits form through hydrothermal activity. When hot acidic water filters up through the seabed, it cools and releases dissolved minerals that can accumulate to form chimney and mound structures on the seafloor. These chimneys' structures can be either active or inactive, each type hosting a remarkably different group of plants, corals and animals. The ecology of seafloor systems is unlike any other marine or aquatic habitats. They are usually well below the level at which sunlight penetrates the ocean and consequently the organisms found there rely on chemosynthesis rather than photosynthesis. These deep and often remote systems make them one of rarest and least understood habitats on Earth.

There are about 165 recorded SMS deposits worldwide. Commercial interest is centred in international waters of the Indian Ocean, on the Mid-Atlantic Ridge and in waters of Papua New Guinea (PNG), Vanuatu, Palau, Niue, Fiji, Micronesia, Solomon Islands, Tonga, and New Zealand. New Zealand is particularly relevant here because Boschen's study compared the physical properties and biological assemblages (communities) of two supposedly similar SMS seafloor sites of the north-east coast of New Zealand.

### **SMS conservation strategies**

The main conservation strategy to counter threats to the marine environment has been to create marine protected areas or conservation reserves. This parallels the land-based approach in which a representative area of an ecosystem is designated for conservation. In theory, this area is considered to be both comprehensive and adequate; including all the species, communities and ecological processes of the ecosystem and being sufficiently large enough to persist into the future. These concepts have been applied to the marine environment despite the fact that the nature of physical or ecological boundaries and processes are markedly different in the marine environments. Unfortunately, globally marine protected areas account for a mere 3% of marine habitats and have largely been established in coastal areas to preserve species and habitats at risk from fishing. Given the general decline in ocean ecosystems and the lack of protection for the deep sea areas, DSM is a clear threat to marine biodiversity.

In an effort to mitigate against the destructive impacts of DSM on SMS ecosystems, a further distillation of the protected area methodology is used. Where DSM mining is proposed in an area of the seabed, a similar area is proposed as a conservation or reference area. The reference area is excluded from mining to ensure that a representative and stable seabed biological community is retained so that changes can be measured and assessed. Reference zones are intended to be physically and biologically identical to the area being mined and can be source areas for species to recolonise mined areas after mining. SMS deposits provide a variety of seafloor habitats. These include hydrothermally active areas, often with chimney and vent structures, inactive areas with relict structures and non hydrothermal areas with a hard bedrock structure such as lava flows. Studies have suggested that each of these habitats supports a different type of biological community with high degrees of regional endemism. SMS mining has a number of direct initial impacts including; the removal of the majority of the fauna, altered hydrothermal activity, habitat modification and subjecting surrounding habitats to the effects of suspended sediments.

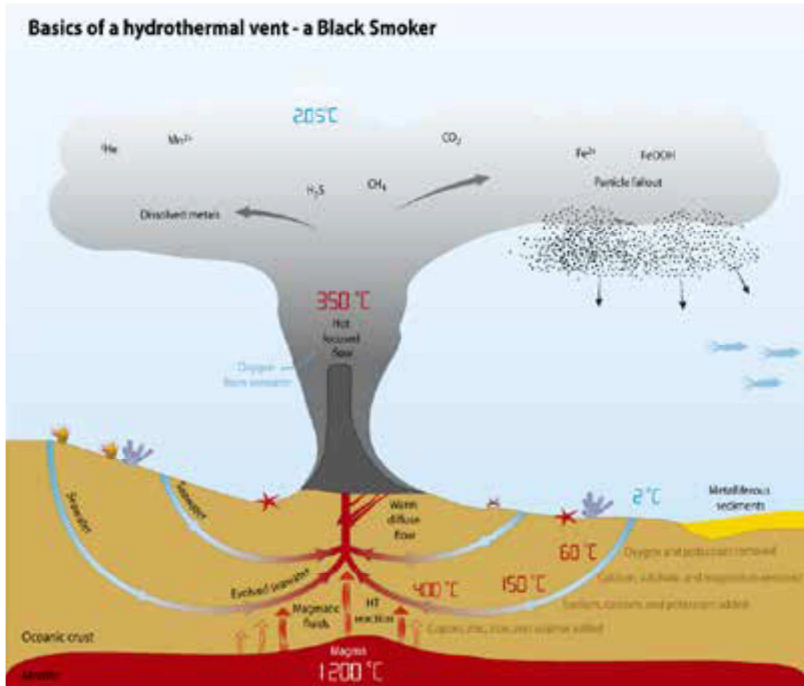
SMS deposits are not particularly stable environments and biological communities in hydrothermally active areas are subject to natural perturbations caused by changes hydrothermal activity. Active vent environments typically have a small number of specialised species which cannot exist away from such environments. Growth rates may be rapid enabling them to disperse and colonise new areas quickly in unstable environments, but species and their lifecycles are poorly understood. The fauna found in inactive vent habitats is remarkably different and is mostly sessile with many slow-growing suspension feeders.



Boschen's study looked at a potential SMS mine and reference site off the north-east coast of New Zealand. One of the sites was a known SMS deposit of commercial interest (Proteus 1) and the other a reference site 200 m away. The reference site was selected because of its similar size and perceived similar characteristics to Proteus 1. The study used remotely collected photographic and video data from between 1 and 6 m above the seabed. Biological and geomorphological data were analysed order to characterize the biological communities found at both the sites and to determine the physical characteristics of the habitats they inhabited. Gathering data in this way permits only a limited taxonomic determination of the species present. Comparisons of much of the data collected can only be made at the family level or obviously different morphological forms within the same family. The types of animals recorded are only those that are easily seen by remote data collection methods.

Despite the obvious limitations of remotely sampling at depth the study revealed some interesting patterns. Significant relationships were identified between assemblage structure and environmental conditions, including hydrothermal features. The authors suggested that small-scale changes in the physical and/or hydrothermal properties of the seabed result in measurable differences in biological assemblages over small areas. This has important ramifications for the design of impact assessments of both potential mine area and conservations areas, impact studies have to be at a scale small enough to detect these changes. The study also found that unique assemblages occurred at both active and inactive chimneys and strongly supported the inclusion of inactive SMS areas within conservation preservation reference zones.

Unique assemblages were found at Proteus 1, the potential mine area. These were considered to be at risk from mining activities since they had not been observed elsewhere in the region. Suspension feeding species were also considered potentially vulnerable to turbidity plumes created by mining. In non-active habitats the capacity of biological assemblages to recover after chimney removal was uncertain; once the inactive chimneys are removed suitable habitat may not be available for recolonisation. In the event that suitable inactive chimney habitat is available, it could take centuries to establish mature a substrate. The study concluded that the proposed protected area was insufficient to retain a comprehensive representation of the biodiversity patterns present at Proteus 1 and would therefore probably not on its own be a suitable preservation reference zone. The authors suggested that a network of sites developed in a regional context was required.

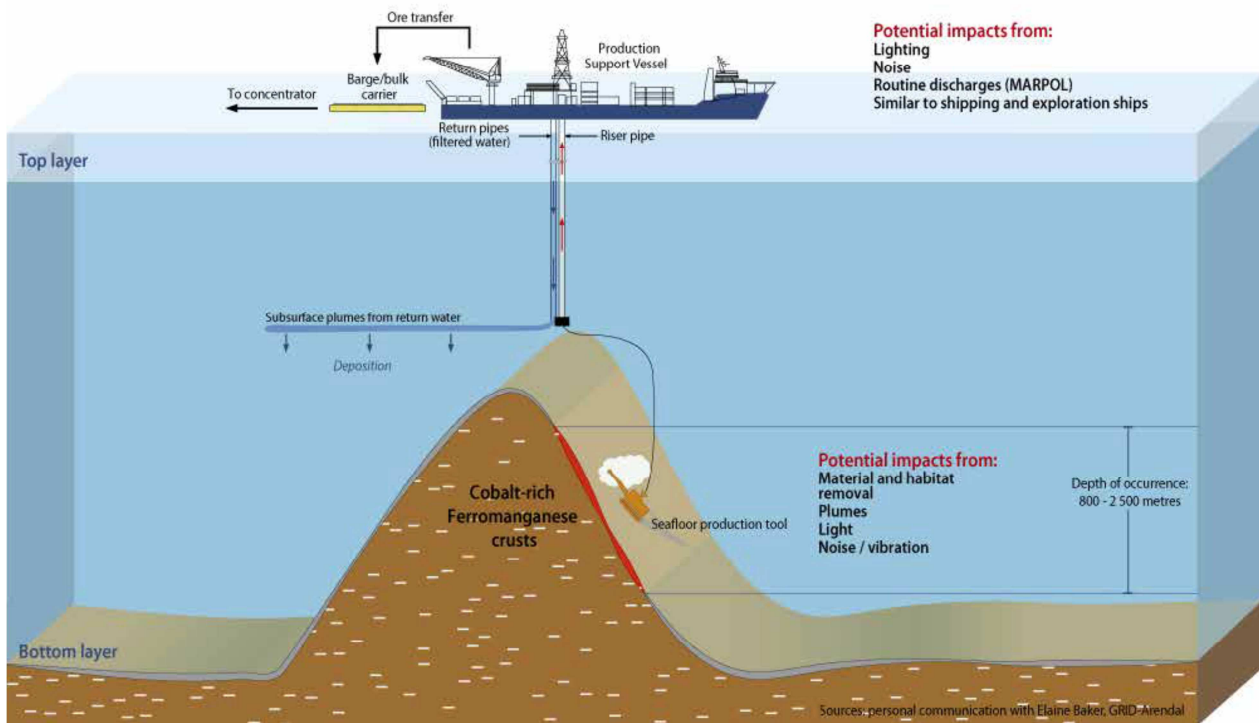


### Implications for Mining

So, as DSM is about to begin, what do we need to know to ensure that the environmental risks and impacts of deep sea mining – including seabed habitat degradation over vast ocean areas, species extinctions, reduced habitat complexity, slow and uncertain recovery, suspended sediment plumes, toxic plumes from surface ore dewatering, pelagic ecosystem impacts, undersea noise, ore and oil spills in transport – are to be avoided? At Solwara 1 the practise of designating a reference site has been implemented. Clearly, there are uncertainties as to whether this will provide a comprehensive representation of the Solwara 1 habitats. The study highlighted in this article and other studies emphasise the importance conducting ecological investigations at multiple spatial scales and which include a regional assessment of the biological assemblages involved. There is a clear need to undertake species identification to the lowest possible taxonomic resolution, to understand community ecology, species distribution and genetics, life histories, resettlement patterns, resilience to disturbance, and to have medium- to long-term continuous time series observations and to understand community dynamics of proposed mining sites over time.

An Environmental and Social Benchmarking Analysis produced by Earth Economics (Batker & Schmidt, 2015) for Nautilus Minerals in May 2015 suggests that “vent fauna is naturally more abundant at sites such as Solwara 1 that are actively venting, than at other deep seafloor areas where venting does not occur”. Clearly, this is a comparison of two different habitats, and is answering the wrong question. It is known that active and inactive areas of the seabed have different biological assemblages. The question is how different is the Solwara 1 site and the reference site, South Su, in a regional context and, in light of the previous study, how similar or different are they to each other.

Earth Resources also suggest that species density and diversity at both Solwara 1 and the reference site is low for all habitat zones when compared with other vent systems worldwide. This surely indicates a regional or local difference in assemblages that requires a scientific explanation. Furthermore, they go on to indicate remarkably high levels of genetic diversity amongst microorganisms found at the Solwara site, with few “dominant” species. They state that typical ranges for any given species are generally less than one metre. Species only a few metres away from each other might have little to no relation or shared genetic material. Rather than investigating life histories and dispersal characteristics of the organisms involved, the authors suggest that this is likely due to limited data.



Clearly, the data and ecological understanding of the SMS systems at Solwara 1 are not yet of the required standard. And, as the first operation of its kind, the requirement must be for the most comprehensive assessment possible. This requires the cooperation and resources of nation states, designing and funding multiple, replicable and all-encompassing independent monitoring systems to ensure we actually understand the direct and cumulative impacts of humanity’s latest foray into the oceans. Instead we have Nautilus Minerals, a small company, with no cash flow, implementing untested technologies in a country beset with governance issues. Replacing competence with confidence is unlikely to lead to success, no wonder local communities and marine experts are concerned about and opposed to such a development.

### More Deals in Readiness for Seabed Mining Boom

By Wendy Laursen, The Maritime Executive, 2016-03-30

The International Seabed Authority has signed its first exploration contract for seabed mining for 2016. The deal was signed with the U.K. Seabed Resources Limited (UKSRL) and involves a 15-year contract for the exploration of polymetallic nodules in the eastern part of the Clarion-Clipperton Fracture Zone in the Pacific Ocean west of Mexico. The area allocated to the contractor covers a total surface of 74,919 square kilometers (29,000 square miles). The Clarion-Clipperton Fracture Zone is roughly 80 percent the size of the contiguous United States, and exploration contracts have so far been granted for 25 percent of the area. This latest contract is the 14th contract for exploration for polymetallic nodules in the zone and the second contract for exploration for polymetallic



nodules by UKSRL. UKSRL signed its first exploration contract with the Authority in February 2013 for an area of approximately 116,000 square kilometers (45,000 square miles).



Secretary-General of the International Seabed Authority, Nii Allotey Odunton, and Linda Reiners, UKSRL Managing Director.

### **A growing number of contracts**

Last year, the Authority signed five new contracts bringing the total number of contracts for exploration around the world to 23 and another five are expected to be signed by July. Between 1984 and 2011, the Authority issued just six leases for mining exploration. In the last five years, it has granted 21. The permits allow for exploration only, but once certain conditions are met, the leases are expected to roll over into ones that allow commercial-scale mining. The new contracts signed in 2015 were for exploration for polymetallic nodules with Marawa Research and Exploration on January 19, and Ocean Mineral Singapore on January 22. Another was for exploration for polymetallic sulfides with the Federal Institute for Geosciences and Natural resources of Germany on May 6 and two for exploration for cobalt-rich ferromanganese crusts with the Ministry of Natural Resources and Environment of the Russian Federation on 10 March and with Companhia de Pesquisa de Recursos Minerais of Brazil on November 9.

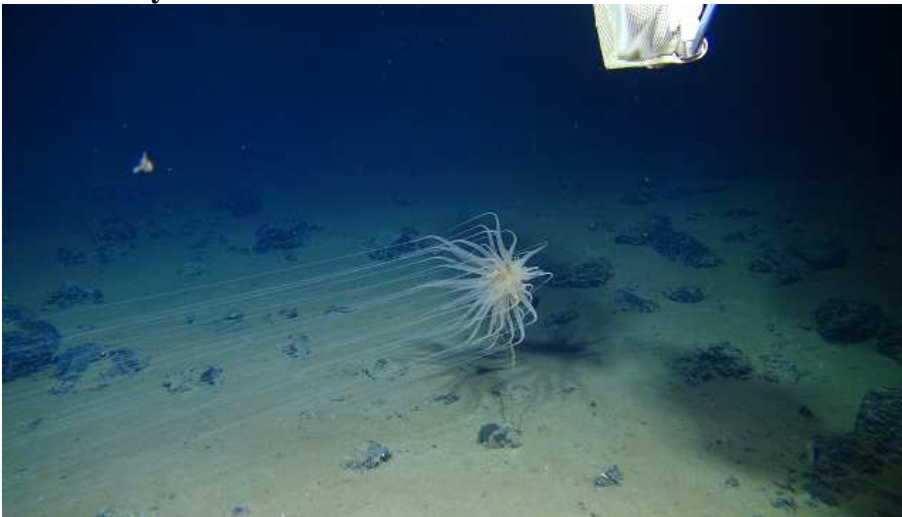


### Mining prospects

The first discovery of polymetallic nodules occurred in 1873 during a voyage by HMS Challenger. The vessel dredged up “several peculiar black oval bodies which were composed of almost pure manganese oxide.” In 1965, J. L. Mero studied the economic possibilities of manganese nodule mining and predicted that the manganese nodule mining should be a sound business proposition in about 20 years. Subsequently, it was discovered that the nodules cover vast areas of the ocean floor but are more abundant in areas off the west coast of Mexico, the Clarion-Clipperton Fracture Zone, in the Central Indian Ocean Basin and in the Peru basin. The nodules are composed mainly of manganese, iron, silicates and hydroxides. However, it is the trace metal contents such as nickel, copper, cobalt, molybdenum and rare earth elements that are attracting most interest.

The nodules vary in size from micro-nodules to about 20 centimeters (eight inches), the most common size being two to eight centimeters (one to three inches). They occur abundantly as two dimensional deposits at the unconsolidated sediment-water interface and sometime as scantily buried in sediments. The deposits of economic importance occur mostly at four to six thousand meters depths in areas of extremely low sedimentation rate. Sediment accumulates at the rate of a couple of centimeters every 1,000 years, and the modules can take a million years to grow by a few millimeters. The nodules require a nucleus to start forming. This nucleus could be anything, varying from a piece of pumice, a shark tooth, old nodule piece, basalt debris or even microfossils like radiolaria and foraminifera.

### Biodiversity



Relicanthus sp. - a new species from a new order of Cnidaria collected at 4,100 meters in the Clarion-Clipperton Fracture Zone that lives on sponge stalks attached to nodules. Credit: Craig Smith and Diva Amon, Abyssline Project.

Little is known about the marine life of the seafloor in the Clarion-Clipperton Fracture Zone. However, it is known that it contains ecosystems that are rarely perturbed. Under normal circumstances, the deep sea is one of the least changeable ecosystems on Earth.

The Abyssline research project (2013-2018) is currently gathering baseline ecosystem information at the abyssal seafloor of the manganese nodule province in the Zone. A paper published in the journal *Science* last year says that seabed mining may cause "serious, unpredictable, and potentially irreversible damage" to portions of the seafloor, and many scientists believe that marine protected areas may give the species the best chance of surviving the coming mining boom. Mining impacts could affect important environmental benefits that the deep sea provides, say the scientists from the Center for Ocean Solutions. For example, the deep sea is important to the Earth's carbon cycle, capturing a substantial amount of human-emitted carbon which impacts both weather and climate. Mining activities could disturb these deep-sea carbon sinks, releasing excess carbon back into the atmosphere. The deep sea also sustains economically important fisheries, and harbors microorgan-

isms which have proven valuable in a number of pharmaceutical, medical and industrial applications. The Authority is expected to decide this summer whether to accept protected areas proposed in 2013. The areas would nearly 1.7 million square kilometers (650,000 square miles) of the Zone.



A 26-year old test mining track (1.5 meters (five feet) wide) created at the seafloor of the CCZ illustrating the extremely slow recovery of these abyssal ecosystems from physical disturbance. Credit: Copyright Ifremer, Nodinaut cruise (2004).

### **Undersea Mountains**

Elsewhere in the ocean, mining companies are preparing to mine the mineral-rich structures that form around hydrothermal vents. The first such project, by Nautilus Minerals, will be in the territorial waters of Papua New Guinea and is expected to begin in 2018.

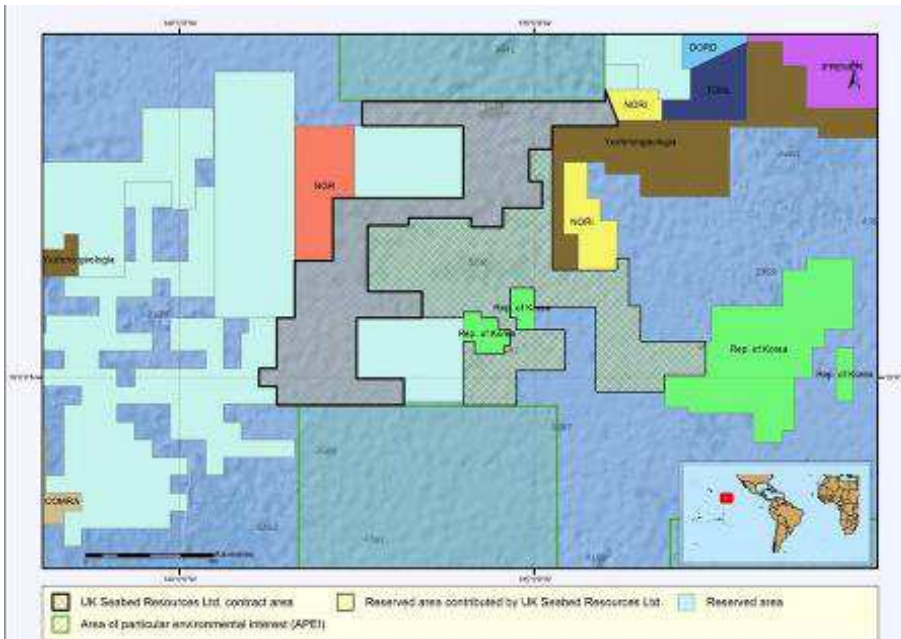
### **The Law of the Sea**

The Authority, which has its headquarters in Kingston, Jamaica, came into existence on 16 November 1994. The International Seabed Authority is an autonomous international organization established under the 1982 United Nations Convention on the Law of the Sea, and the Authority has been entrusted with the implementation of the “common heritage of mankind” which applies to mineral resources beyond the limits of national jurisdiction. This upholds a vision of sustainable development of mineral resources in the international seabed area and the sharing of benefits and responsibilities for all States, including the land-locked and geographically disadvantaged States.

### **The Clarion-Clipperton Fracture Zone**

The Clarion-Clipperton Fracture Zone is a geological submarine fracture zone of the Pacific Ocean, with a length of some 7,240 kilometers (4,500 miles). It is one of the five major lineations of the northern Pacific floor, south of the Clarion Fracture Zone, discovered by the Scripps Institution of Oceanography in 1950. The fracture, an unusually mountainous topographical feature, begins east-northeast of the Line Islands and ends in the Middle America Trench off the coast of Central America. It roughly forms a line on the same latitude as Kiribati and Clipperton Island.





UKSRL allocated area (outlined in black) covers a total surface of 74,919 square kilometers in the eastern part of the Clarion-Clipperton Fracture Zone.

## Jury still out on whether seabed mining is good for Pacific

Radio New Zealand, 29 March 2016

The Pacific Community says it is still not clear whether the potential economic benefits of sea bed mining will outweigh the negative effects on the environment and on local livelihoods. The comments come after the SPC's proposed legal and regulatory framework on sea bed mining was accused of neglecting indigenous and environmental safeguards. Koroï Hawkins looks at some of the pros and cons of the industry. According to the company involved, in 2018 Papua New Guinea's Bismarck Sea is set to host the first ever commercial deep water mine operation. The director of the Pacific Community's [SPC's] geoscience division, Mike Petersen, says Nautilus Minerals' Solwara 1 project will set the tone for the future of the industry.

**MIKE PETERSEN:** They will be the pilot everyone will be looking at them not only the people we are talking about here, you'll have the NGO's who may not wish this development to happen but also industry will be looking at it, government will be looking at it, environmentalists will be looking at it the fishing industry and others will be looking at it so it is under a lot of scrutiny actually. But an outspoken PNG opposition MP, Gary Juffa, who is the governor of Oro province, says the Solwara 1 project is being steam-rolled by the government without any consideration for relevant regulations or legislation.

**GARY JUFFA:** There is no legislation that would allow the government or the communities to have avenues by which they can review, monitor and take action if necessary or penalise etc, nothing at all. You know, here we are embarking on this project completely blind.

One regional NGO strongly opposed to the Solwara 1 project is the Pacific Network on Globalisation.

Its coordinator, Maureen Penjueli, says there are too many unknowns and seabed mining legislation in Pacific countries is either non-existent or insufficient.

**MAUREEN PENJUELI:** If you look at advanced jurisdictions like New Zealand and Australia it is very clear that when they apply the law in relation to sea bed mining it sets out very precisely. What it means for indigenous peoples what it means for environmental protection etc. So we believe very strongly that at this particular point in time in history the Pacific is not their yet to pursue seabed mining.

Mike Petersen says as a regional scientific body the SPC is neither pro- nor anti-seabed mining.

But he says as to the viability of the industry studies indicate seabed mining could be a profitable undertaking for Pacific countries and he suggests it has a comparable industry in the offshore oil sector.

MIKE PETERSEN: In the 1970s underwater petroleum extraction was considered to be science fiction and something which humans would never make money from or maybe could never achieve. If petroleum the petroleum industry can succeed then why not the mineral industry given technological advances, advances in robotics and so on and so forth.

PNG's Gary Juffa however says in the blind push to get the project up and running the views of local indigenous peoples have been ignored.

GARRY JUFFA: Are we to just sit back and despair and moan and groan and whine and there is the government no longer serving its people but serving corporate pirates. Is this the situation now that we must accept?. These are questions that people are asking, you know, the people of the Pacific. Other countries in the region interested in seabed mining are Tonga and the Cook Islands with the latter currently in direct talks with several companies after an open tender last year failed to get any bids.

### **Nautilus makes good progress: CEO**

Post-Courier, March 24, 2016

SIGNIFICANT gains were made by Canadian Miner Nautilus Minerals in 2015 mainly in its technical preparations for the world's first deep sea mine. The consolidation has enabled it to meet its first production target to commence in 2018. Nautilus' chief executive officer, Mike Johnston, hailed the progress as "a milestone year for Nautilus." "By year end, work on the seafloor production equipment had significantly progressed, while we had also recommenced targeted exploration on our tenements in the Solomon Islands and the Clarion Clipperton Zone (CCZ), as we build a pipeline of resources. "There is a real sense of momentum building as we work towards commencing seafloor operations at the Solwara 1 project site in Quarter One in 2018." The miner says it had in 2015:

- Advanced the Solwara 1 project (seafloor production tools (SPTs) assembled and commenced factory acceptance testing (FAT));
- Advanced production support vessel construction (all major long lead time orders placed, design underway, steel cutting commenced and block fabrication started);
- Conducted targeted exploration programs in the Solomon Islands and CCZ;
- Released Earth Economics' independent Environmental and Social Benchmarking Analysis. The report had concluded that seafloor mining can significantly reduce the social and environmental impacts of copper mining;
- Signed a new offtake agreement for Solwara 1 with Tongling Nonferrous Metals Group Co. Limited (Tongling), with improved payment terms and lower operating costs;
- The State nominee elected not to exercise its option to take up an additional 15 per cent equity;
- US\$56.5 million in cash and cash equivalents as at December 31, 2015

As a result of these achievements it had:

- Awarded contract for equipment storage and wet testing of the SPTs;
- Seen its SPTs arrive safely at Duqm Port in Oman
- Completed assembly of the subsea slurry and lift pump and commenced FAT and announced rights offering to raise C\$103m.



## Pacific Community Defends Seabed Law Review

*Document 'just a starting point'*

WELLINGTON, New Zealand (Radio New Zealand International, March 23, 2016) – The Director of Geoscience at the Pacific Community has fended off criticism of the organisation's framework for seabed mining legislation, saying the document is just a starting point. The NGO, Pacific Network on Globalisation, carried out an assessment of the framework with Blue Ocean Law and said it lacked indigenous and environmental safeguards. But the SPC's Michael Petersen said the authors could have consulted the SPC and found the framework, which was first published in 2012, was currently being overhauled. "For a 57 page document personally I think we do cover some of the areas which the criticism is alleging that we don't cover. We probably can improve, of course we can. But I think it is unfair to say that we haven't at least given this significant treatment in the document itself." Michael Petersen said there were some valid points raised in the review but it was mostly too harsh on the framework, which was designed as a starting point and not a bench-mark for seabed mining legislation in the region.

## Meeresbergbau: Raubbau in der Tiefsee

*Am Meeresgrund liefert sich Deutschland mit Russland und China einen Wettlauf um die wertvollsten Ressourcen. Ein Forschungsprojekt zeigt: Der Mensch kann in der Tiefsee ungeahnte Schäden anrichten.* Von Christopher Schrader, Süddeutsche Zeitung, 23. März 2016

Im Sommer 2015 brach das deutsche Forschungsschiff *Sonne* von Ecuador nach Westen auf, in Richtung auf das offene Meer. Ziel war ein Fleck im Pazifik: 7 Grad 4 Minuten Süd, 88 Grad 28 Minuten West, weit und breit nichts als Wasser. Was diese Stelle im sogenannten Peru-Becken auszeichnet, lag vier Kilometer unter dem Kiel in der Tiefe: ein Areal von zehn Quadratkilometern Meeresboden, das deutsche Forscher 1989 umgepflügt hatten. Das bis heute einzigartige Projekt namens "Discol" sollte untersuchen, was Tiefseebergbau in der fragilen Lebensgemeinschaft dort unten anrichten könnte.



Mysteriöse Tiefsee: ein Viperfisch, fotografiert im Pazifik in einer Tiefe von über 1000 Metern (Foto: AFP)

Als die Forscher am 30. Juli 2015 mit der *Sonne* ankamen, hatte seit einer letzten Kontrolle 20 Jahre zuvor kein Mensch mehr die Pflugspuren angesehen. Im vergangenen Jahr tauchten Roboter in die Tiefe, kartierten den vernarbten Boden, erhellten die Dunkelheit mit Scheinwerfern, nahmen Proben und schickten Filme nach oben. "Eigentlich sah es noch genauso aus wie 1996", erzählt Gerd

Schriever von der Firma Biolab, der damals wissenschaftlicher Leiter mehrerer Expeditionen war und diesmal als Berater mitfuhr. "Damals hatte die Wiederbesiedlung erst begonnen, und viel ist seither auf den ersten Blick nicht passiert. Die Spuren des Pfluges waren so gut zu erkennen wie zuvor."



Roter Tintenfisch, gesichtet vor Australien (Foto: AFP)

### **Das 1989 umgegrabene Sediment ist immer noch viel heller als der Untergrund**

Auch Antje Boetius kannte die Pflugspuren in der Tiefe schon. Die Meeresbiologin hatte auf einer früheren Fahrt ins Peru-Becken Daten für ihre Diplomarbeit gesammelt. Heute ist sie Professorin und teilt ihre Zeit zwischen dem Alfred-Wegener-Institut in Bremerhaven und dem Max-Planck-Institut für marine Mikrobiologie in Bremen auf. Sie hat eine von zwei Expeditionen der Sonne zum Peru-Becken im vergangenen Sommer geleitet - und staunte: "Wo damals der Boden aufgekratzt wurde, sind manche Arten auch nach 26 Jahren nicht zurückgekehrt. Nicht einmal Bakterien haben die Pflugspuren wieder vollständig besiedelt." Meeresboden in 4150 Meter Tiefe ist schließlich ein nährstoffarmer, kalter und finsterner Lebensraum unter enormen Druck. Und noch etwas fiel Boetius auf: Noch immer könne man das helle Sediment erkennen, das der Pflug aus 20 Zentimeter Tiefe emporgeschaufelt und auf die dunklere Oberfläche geworfen hatte. "Warum ist das eigentlich noch nicht nachgedunkelt?", fragt sie.

Es gibt viele solche unbeantworteten Fragen über die Tiefsee, und bei der Suche nach Antworten stehen die Wissenschaftler in einem Wettlauf mit der Industrie. Tiefseebergbau gilt für rohstoffarme Industrieländer wie Japan, Südkorea und auch Deutschland als ein Weg, sich beispielsweise von Metallimporten weniger abhängig zu machen. Die Südseestaaten Tonga und Nauru sehen darin die Route zum Wohlstand. Angesichts der gestiegenen Marktpreise erkunden aber auch Nationen wie China und Russland, die heute mit Rohstoffexporten viel Geld verdienen, die Bodenschätze am Meeresgrund.

Besonders Manganknollen faszinieren die Experten. Die kartoffelgroßen Metallknubbel enthalten neben dem in der Stahlindustrie begehrten Mangan, von dem es auch an Land viel gibt, Kupfer, Kobalt und Nickel sowie Spuren von selteneren Elementen wie Tellur oder Molybdän. Unmengen der Knollen liegen zum Beispiel auf dem vier bis fünf Kilometer tiefen Meeresboden der sogenannten Clarion-Clipperton-Zone (CCZ), die sich im Pazifik von Mexiko aus Tausende Kilometer nach Westen erstreckt. Die Internationale Meeresbodenbehörde ISA in Kingston auf Jamaika hat dort 13 Erkundungslizenzen an verschiedene Nationen und Konsortien vergeben.

Für Deutschland hat sich die Bundesanstalt für Geowissenschaften und Rohstoffe (BGR) in Hannover einen Claim von insgesamt 75 000 Quadratkilometern gesichert, das ist mehr als die Fläche Bayerns. Dass in den kommenden fünf Jahren die industrielle Förderung von Manganknollen beginnt, hält man zwar bei der BGR derzeit für ausgeschlossen. Aber ernst wird der Meeresbergbau durchaus genommen: Es gibt Pläne für einen riesigen Kollektor, der die Knollen vom Meeresboden erntet. Das Wirtschaftsministerium lässt prüfen, was ein Pilotversuch kosten würde. Und die Ende 2014 in Dienst genommene *Sonne* hat 2015 volle fünf Monate mit der Erkundung von Manganknollen verbracht: Von Mitte März bis Mitte Juni war das Schiff in der CCZ, August und September im Peru-Becken. Es geht um viel Geld, der geschätzte Wert des Metalls allein in den beiden wirtschaftlich interessantesten Teilen des deutschen Lizenzgebiets liegt nach heutigen Weltmarktpreisen bei mindestens neun Milliarden Dollar.

Um das mögliche deutsche Tiefsee-Bergwerk vor Mexiko zu erkunden, war Carsten Rühlemann von der BGR seit 2008 siebenmal dort; im April geht es wieder los. "Wir möchten ein Teilstück für einen Test auswählen, mit dem man die Umweltfolgen des Abbaus abschätzen kann. Und es so detailliert erkunden, dass ein künftiger Tiefseebergbau dort beginnen könnte", sagt er. Dazu sammeln die Forscher neben Manganknollen auch Daten über all die Wesen, die im oder auf dem Boden leben. Spuren menschlicher Eingriffe gibt es auch in der CCZ bereits. 1978 hatte eine US-Firma mit einer Art Baggerschaufel Streifen in den Meeresboden gezogen. Mit vier Zentimetern Sediment hatte das Gerät auch die Manganknollen eingesammelt. 2004 haben Wissenschaftler an der Stelle zum Beispiel Fadenwürmer untersucht: Wo die Schaufel gegraben hatte, gab es 26 Jahre später deutlich weniger Würmer und deutlich weniger Artenvielfalt.

### **Neben Plastiktüten und Coladosen fand sich ein Tiefsee-Tintenfisch, der jahrelang Eier ausbrütet**

Das deutsche Discol-Projekt von 1989 war jedoch das größte derartige Experiment, und das einzige außerhalb der CCZ. Damals hatten die Forscher einen acht Meter breiten Pflug kreuz und quer umhergezogen und etwa ein Fünftel des Untergrunds umgegraben. Die Manganknollen blieben zwar im Boden, wurden aber verschoben oder verschüttet, und die aufgewirbelten Sedimente senkten sich auf unberührte Flächen. "Bei einer vollständigen Simulation des Abbaus würden die Knollen entfernt und hinterher der Abfall, metallische Schlämme, wieder eingeleitet - auf riesigen Flächen", sagt Antje Boetius. Das ist auch deshalb problematisch, weil auf den Knollen viele Lebewesen den einzigen sicheren Halt finden. Werden die Metallbatzen aus dem Sediment gezogen, haftet an ihnen ähnlich viel Untergrund wie am Wurzelballen einer Gartenpflanze.



Als die Wissenschaftler von der *Sonne* aus jetzt im Peru-Becken nachschauten, fielen ihnen neben Plastiktüten, einigen alten Bierflaschen und Coladosen die großen kriechenden oder schwimmenden

Tiere auf. Diesen war die Rückkehr noch am leichtesten gefallen. Viele sind trotz der Dunkelheit, in der sie leben, sehr bunt: orange Seeanemonen, Seesterne in Pink, Seegurken grün und stachelig, violett und glatt oder schneeweiß mit Tentakeln. Auch einen kalkweißen Tintenfisch fanden die Forscher. Die Art klebt ihre daumennagelgroßen Eier an die Stiele von Seelilien und schlingt den Körper um das Gelege. "Vier bis sechs Jahre brüten sie, und wenn die Jungen schlüpfen, stirbt das Elterntier", sagt Boetius. Viel mehr weiß man noch nicht über diese Spezies.

Klar ist immerhin, dass sie die Seelilien zur Fortpflanzung braucht und diese nur auf Manganknollen Halt finden. Wer also die Metallknubbel wegräumt, nimmt auch den rätselhaften Tintenfischen den Lebensraum. Zwar sieht die Meeresbodenbehörde ISA vor, dass neben jeder künftigen Mine unberührte Areale bleiben, aus denen das Leben in die zerfrästen Gebiete zurückkehren kann. Doch wie lange das dauert und ob es überhaupt gelingt, weiß noch niemand. "Wir können ja noch nicht einmal genau definieren, welche Funktionen der Meeresboden wieder erfüllen muss, damit wir von einer Heilung sprechen können", sagt Boetius.

Vorhersagen über die Umweltfolgen von Bergbau in der CCZ werden auch dadurch erschwert, dass der Untergrund dort anders ist als im Peru-Becken. "In unserem Lizenzgebiet", sagt Carsten Rühlemann, "ist der Boden bis in einige Meter Tiefe von Sauerstoff durchdrungen." Im Peru-Becken reiche der Sauerstoff nur zehn Zentimeter tief. Werde der Boden dort aufgewirbelt, gelangten vermutlich gelöste Metalle ins Bodenwasser; diese Gefahr drohe in der CCZ eher nicht. Allerdings sehen die Bergbaupläne vor, die Manganknollen in der Tiefe zu zerkleinern und die Bruchstücke an die Oberfläche zu pumpen. Der Knollenstaub in dem Wasser, das dann zurück in die Tiefe geleitet wird, könnte wegen der Metalle auch dort zur Gefahr für Lebewesen werden. Um solche Effekte zu studieren, haben Mitglieder von Boetius' Expedition Seegurken mit dem Roboter in Käfige gesetzt und mit Metallschlamm berieselt. Die Seegurken versuchten zu fliehen.

"Nach dem, was wir bislang wissen, halte ich einen Tiefseebergbau durchaus für vertretbar", sagt Carsten Rühlemann. "Es wird aber vermutlich eine öffentliche Debatte darüber geben müssen, wenn die Ergebnisse der Umweltstudien vorliegen." Eigentlich hat diese längst begonnen: Die Organisation Brot für die Welt lehnt Tiefseebergbau ab, die Umweltgruppe WWF betont die Risiken, der Bundesverband der Industrie hingegen die Chancen. Im Sommer 2015 forderten US-Forscher im Magazin *Science*, die weitgehend unbekannte Tiefsee schleunigst ausreichend vor kommerzieller Nutzung zu schützen. Antje Boetius teilt die Forderung. "Wir könnten doch die Investitionen umleiten und zuerst das Recycling der Metalle an Land deutlich verbessern", schlägt sie vor. "Damit gewinnen wir ein paar Jahrzehnte Zeit, um die Lebensgemeinschaften der Tiefsee besser zu verstehen und Schutzkonzepte zu entwickeln." Vielleicht zeigen sich bis dahin auch in dem 1989 umgepflügten Versuchsfeld Erholungseffekte.

URL: <http://www.sueddeutsche.de/wissen/umweltschutz-narben-am-grund-1.2918500>

### **Nautilus: Seafloor Production Tools safely delivered in Oman**

Post-Courier, March 23, 2016

THE three seafloor production tools to be used to mine Solwara One in New Ireland have arrived safely at Duqm Port in Oman for further extensive testing. Canadian miner Nautilus, on behalf of the Solwara 1 joint venture (comprising Nautilus 85% and Eda Kopa (Solwara) Limited 15%, a subsidiary of Petromin Holdings PNG) announced that the three SPTs are scheduled to undergo extensive wettesting there. The testing is one of the next major steps in the progression towards seafloor production, and will involve submerged testing of:

- Control systems operations and feedback;
- Hydraulic functions;

- Collection system functions; and
- Survey and visualization systems.

The wet testing program is being undertaken by the Solwara 1 JV production team and representatives of Soil Machine Dynamics, with further logistics and engineering support from United Engineering Services Ltd. The preparatory works for the program will commence in April with initial testing operations scheduled to occur shortly thereafter. The SPTs were designed and assembled in Newcastle upon Tyne by Soil Machine Dynamics, and the company ultimately plans to use the SPTs to cut and extract high grade copper and gold from the seafloor at the Solwara 1 JV's project site in the Bismarck Sea. Initial seafloor production operations are planned to commence at the Solwara 1 project site in Q1 2018. Nautilus' CEO, Mike Johnston said: "The Solwara 1 JV partners are delighted that the SPTs have made it safely to Duqm Port. We look forward to commencing our wet testing program with the support of UES and Soil Machine Dynamics (UK), and I look forward to reporting the results to our shareholders and the market in general."

### **Report Finds Pacific Deep Sea Mining Framework Lacking**

*Needs more indigenous and environmental safeguards*

WELLINGTON, New Zealand (Radio New Zealand International, March 21, 2016) – An independent assessment of a proposed framework for sea bed mining has found it lacks indigenous and environmental safeguards. The Pacific Community's legislative and regulatory framework for deep sea minerals exploration and exploitation is supposed to be the standard for Pacific countries to aspire to when drafting their own laws. But Blue Ocean Law's Julian Augon said the document only pays lip service to the protection of indigenous peoples and the environment. He said from an international law perspective it leaves a lot to be desired. "So what is really necessary now is that because this document does purport to be a model framework that it actually lives up to its task and it becomes a model framework and actually better incorporates free prior and informed consent as a international legal norm." Julian Augon said Blue Ocean Law, in collaboration with the Pacific Network on Globalisation, wants to meet with the Pacific Community to discuss the findings.

### **Oversight liabilities**

Monika Singh, The Fiji Times Online, March 19, 2016

THE oversights in the SPC-EU funded Regional Legislative and Regulatory Framework for Deep Sea Minerals (DSM) Exploration and Exploitation could expose individual countries to liability including compensation claims under established international law for harms resulting from DSM that take place from activities under their control, both within and beyond domestic waters. Pacific Network on Globalisation (PANG)co-ordinator Maureen Penjueli said while they appreciated the attempt to provide a model legal framework for the Pacific region, they urged SPC to supplement the framework with comprehensive provisions that properly enshrine both free, prior and informed consent. Ms Penjueli says the assessment of the framework should act as signposts for Fiji and other Pacific Islands in terms of safeguarding the human rights and environmental protection of their land. She says Fiji is reviewing its legislation on the issue which was a positive move.

"The Pacific Network on Globalisation and our collective partners — Pacific Conference of Churches, DAWN (Development Alternatives for Women in a New Era), BRG (Bismark Ramu Group), Act Now! PNG — have been closely following the issue of seabed mining in the region since 2010, which coincided with the SPC-EU funded project looking at seabed mining in the region. "At that time we were gravely concerned by the lack of scientific knowledge particularly around potential and or actual impacts of seabed mining from an environmental, social, and cultural



perspective. "There was also a significant lack of knowledge about the technology and its potential impact. "This is an industry that has never been tried, tested anywhere in the world. The Pacific is ground zero, a testing ground, new frontier. "We were concerned that there was an overt emphasis on the purported benefits of seabed mining which was purely an economic benefit, including jobs for island nations. "In our view at that time it was very clear that there was insufficient information for informed policy-making at the regional level and national level.

"We knew that international law (environmental law precautionary principle, human rights law particularly around indigenous rights) offered clear best practice that the region could seek to incorporate in such a situation." "The launch of the SPC-EU funded Regional Legislative Framework for DSM Exploration and Exploitation in 2012, in our view, sent a clear signal to the world that the Pacific was ready for seabed mining. We saw a correlation between the launch of the SPC-EU funded framework and a race to divide up the last remaining territory — ocean floor." She said a significant number of exploration and exploitation licences were issued across the Pacific and by 2014, a total of 4,323,000 square kilometres of ocean floor were under contract between mining companies and island nations. Many Pacific Island governments rushed to enact legislation and policies after many had already issued exploration and exploitation licences, creating a sense of inevitability that seabed mining is going to take place in the Pacific Ocean. "Any opposition to, or attempts to caution, resist or halt was considered unrealistic, anti-development, anti-progress which is simply not true.

"We had over 30,000 signatures to present to leaders to call for a moratorium on seabed mining in 2012 the Cook Islands," Ms Penjueli said. "Indigenous communities who are at the forefront particularly in PNG were already opposed to seabed mining. This created an environment in which the burden of proof shifted from transnational mining companies to indigenous communities, civil society organisations to prove the need for caution and prudence. "In this regard we sought the technical expertise — legal, scientific, social, cultural even the artistic community to respond to this; which brings us to the collaboration between Blue Ocean Law and the Pacific Network on Globalisation. "It is a recognition of the significance of the SPC framework to establish a comprehensive framework for deep sea mining, which governments can consider and adopt through corresponding implementing legislation." Ms Penjueli said the culmination of their collaboration was the analysis of the SPC-EU funded framework, which was launched to the public to be part of their tool kits in responding to the issue of seabed mining in the region. Blue Ocean Law will elaborate on the specific omissions in the framework and recommendations on how to bring it into full compliance with international environmental and indigenous safeguards.

### **Legal analysis calls for greater safeguards in SPC framework for experimental seabed mining** PNG Mine Watch, March 18, 2016

International law firm Blue Ocean Law (BOL), together with Fiji-based regional non-governmental organisation, Pacific Network on Globalisation (PANG), have released "*An Assessment of the SPC Regional Legislative and Regulatory Framework (RLRF) for Deep Sea Minerals Exploration and Exploitation.*" The report is an independent analysis of the RLRF, the legal framework produced by the Secretariat of the Pacific Community (SPC), funded by the European Union (EU). "Our assessment analyzes the RLRF from an international law perspective, focusing on problematic aspects of the SPC-EU framework," says Attorney Julian Aguon of BOL. The framework, says Aguon, is striking in its omission of any serious discussion of the right of indigenous peoples to free, prior, and informed consent (FPIC), inasmuch as large-scale development activities such as experimental deep sea mining trigger protections under international law.



The SPC framework is striking in its omission of any serious discussion of the right of indigenous peoples says international law firm BOL

These include the right to be meaningfully consulted throughout every stage of the development process, and the right of affected indigenous communities to give or withhold their consent to these activities. Also troubling, say PANG and BOL, is the fact that the SPC-EU framework undercuts established environmental law tenets such as the precautionary approach and the avoidance of transboundary harm by emphasizing the purported benefits of seabed mining while minimizing both the risks and adverse impacts of seabed mining. In addition to creating an overly positive picture of deep sea mining, the framework appears to prioritise creating a climate favorable to industry operators over the economic, cultural, and environmental rights of indigenous peoples.

“While we appreciate the attempt to provide a model legal framework for the Pacific region, we urge the SPC to supplement the RLRf with comprehensive provisions that properly enshrine both FPIC and the precautionary and transboundary harm principles,” says PANG Coordinator Maureen Penjueli. This is critical because some of our island nations will likely adopt this framework with all of its problematic aspects. Only by properly embedding these norms can the framework be brought into conformity with international best practices respecting environmental protection and the rights of indigenous peoples. The BOL-PANG report has been published by the University of South Pacific. It is anticipated that the report will serve as a useful tool for many indigenous communities and civil society organizations currently at the forefront of these activities.

**[Download: An Assessment of the SPC Regional Legislative and Regulatory Framework \(RLRF\) for Deep Sea Minerals exploration and exploitation - FINAL Report](#)**

### **European consortium launches seabed mining project**

David Foxwell, Offshore Support Journal, 17 March 2016

February saw a European consortium launch a new Horizon 2020 project known as Blue Nodules. The project addresses the challenge of creating a viable and sustainable value chain to retrieve polymetallic nodules from the seabed. It will develop and test new highly-automated and sustainable technologies for deep-sea mining with minimal environmental pressures. The technical side of the project is dedicated to subsea harvesting equipment in addition to the in-situ seafloor and sea surface processing of polymetallic nodules. The operational aspect focuses on sea operations and logistics, including compliance with, and development of, rules and regulations, and the business case. The independent, environmental part of the initiative will focus on environmental pressures and on an environmental impact assessment. In all areas, Blue Nodules will build on the results of the European FP7 projects, MIDAS and Blue Mining and the EcoMining pilot action funded by the JPI Oceans initiative of the European science foundations.

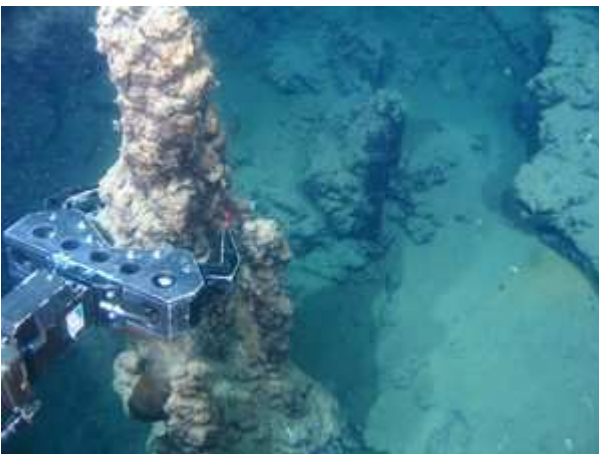


Blue Nodules is one of a growing number of projects focusing on technical solutions for extracting resources from the seabed

Rodney Norman, director at IHC Mining, part of Royal IHC, which is co-ordinating the project, explained that Blue Nodules is significant because it allows the European consortium to expand technological development beyond the vertical transportation system of Blue Mining to the seafloor mining vehicle and other components of the system. On 9 and 10 February, IHC Mining, which is the coordinator of the project, hosted a Blue Nodules kick-off meeting at its premises in Kinderdijk. “The partners are excited to launch the project and start working together to achieve its objectives,” they said in a statement. “Stakeholder expectations will be taken into account by way of a stakeholder group and an advisory board. An independent ethics advisor will safeguard the ethics standards of the project.”

### **Pacific region: Deep sea mining hyped by vested interests, but serious concerns remain**

By Duncan Roden, Green Left Weekly, March 14, 2016



A cost-benefit analysis released by the Secretariat of Pacific Communities (SPC) and the European Union on potential deep sea mining (DSM) projects in three Pacific countries found that the projects can be viable. But other research suggests there remain serious concerns about the new, untested DSM industry. DSM involves mining rich deposits of minerals on the sea floor. Some deposits exist as nodules that can be vacuumed up. Others form from hydrothermal vents that spew out minerals over thousands of years, creating rich beds of deposits. These vents sustain unique deep sea ecosystems that rely on the venting chemicals for survival. DSM puts such ecosystems at risk. The SPC-EU report looked at specific deposits of seafloor massive sulphides in Papua New Guinea, manganese nodules in Cook Islands and cobalt-rich crusts in the Marshall Islands. It found that mining the deposits in PNG and Cook Islands would yield net benefits, but that the Marshall Islands deposit would not be economically viable.

But Papua New Guinea Mine Watch said the report:

1. Fails to put a monetary value on many of the potential environmental costs;
2. Fails to deal with the fact that billions of dollars in mining revenues have already failed to improve the lives of ordinary people in PNG;
3. Fails to acknowledge the past failure of PNG authorities to manage land based mining and its terrible social and environmental impacts; and
4. Assumes, totally against the evidence, that any environmental damage will be fixed by the mining company.

DSM has been identified as a possible economic “game changer” for Pacific Island countries, the SPC said. The potentially huge increase to GDP for these small nations, which mostly rely on agriculture, fishing and tourism, could end their dependence on foreign aid. But the future of the industry is uncertain, due to the falling price of resources and untested new technologies. The Cook Islands, for instance, is struggling to attract investors for its deep sea minerals. Cook Islands finance minister Mark Brown said: “The current economic climate I guess is not conducive to investment in this particular area right now.” There are also many uncertainties about the environmental and socioeconomic risks that DSM might have on Pacific island environments, economies, societies and cultures. The SPC is running the Deep Sea Project, a €4.4 million joint initiative with the EU active since 2011. Its stated goal is “helping Pacific Island countries to improve the governance and management of their deep sea minerals resources in accordance with international law, with particular attention to the protection of the marine environment and securing equitable financial arrangements for Pacific Island countries and their people”.

The project has aided some Pacific nations with developing deep sea mining laws, which are virtually non-existent around the world. Recently, China joined that short list, passing a DSM law on February 26. China has indicated its interest in a DSM pilot project in Antarctica — despite a treaty that bans mining there — and a joint expedition with Russia to the Arctic Ocean. The positive findings of the SPC-EU cost-benefit analysis have fuelled concerns of DSM activists that the EU has other motives. The European Commission is funding a DSM project to develop and test new DSM technologies. One of the project's industrial partners is DEME. Its subsidiary Global Sea Mineral Resources has exclusive rights for exploration over 76,728km<sup>2</sup> of seabed in the eastern part of the Central Pacific Ocean. Despite potential conflicts of interest, the SPC has had to heed the concerns of Pacific civil society. During the DSM Project several countries and other stakeholders have raised concerns about the potential impacts on fisheries “given the extremely high importance of fisheries, including commercial, artisanal and subsistence fisheries, to Pacific Island economies, societies and cultural identities”.

The SPC plans to start an independent assessment of the impact of DSM on Pacific Island fisheries, expected to be completed later this year. But there are many other concerns besides fisheries, such as biodiversity. A [study](#) published in *Marine Environmental Research* found that hydrothermal vents have unique combinations of species that can vary from one vent to another. The ecological communities at active vents also differ from those at inactive vents. The study concludes that a mining operation would need a network of protected areas to ensure that the biological diversity can bounce back after mining has stopped. This is at odds with current mining proposals that have single or very few protected areas. <http://www.deepseaminingoutofourdepth.org/wp-content/uploads/accountabil...> The Deep Sea Mining Campaign's report [Accountability Zero](#) critiqued Canadian company Nautilus' Environmental and Social Benchmarking Analysis (ESBA) of its Solwara 1 DSM pilot project off the coast of PNG. It found that the ESBA lacked a cost-benefit analysis, which makes it effectively useless to policymakers. It also:

- rated Solwara 1 against assets, ecosystem services and values that relate to terrestrial mining sites rather than deep sea. For example, it rated Solwara 1 favourably in terms of ground and fresh water



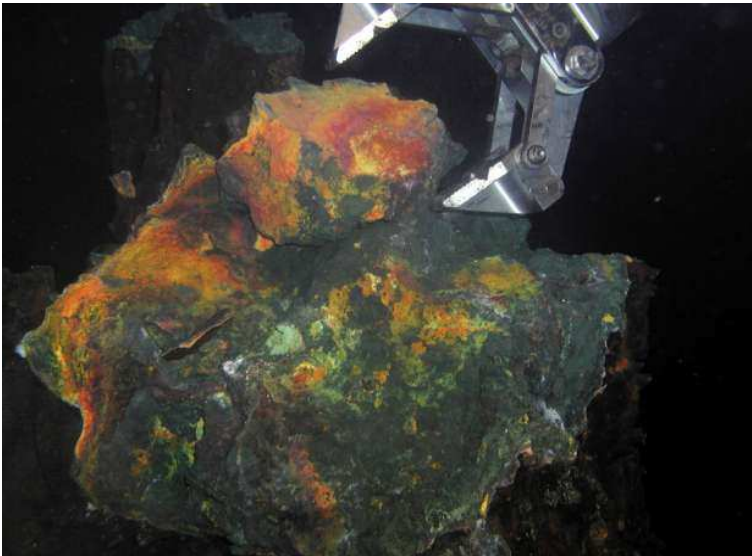
quality, air quality, pollination, soil formation and retention, recreational activities such as hiking and bike riding, and loss of agricultural land;

- failed to account for social, cultural and economic values of oceans;
- failed to account for the cumulative impacts of the several deep sea mines Nautilus intends to operate in the Bismarck Sea;
- used a questionable comparison with selected mines on land; and
- rests its case entirely on copper production and omits the analysis of gold production, which Nautilus expects will make up 40% of revenue.

Mining companies are understandably eager to get their hands on the potential profits from DSM. But it is clear there is a lack of understanding of the effects the industry might have, especially on the already vulnerable Pacific Island countries.

### **PDAC 2016: Conversation starting to change on Nautilus and seafloor mining**

Peter Koven, Financial Post, March 8, 2016



Nautilus. A "hand" of a remote operated vehicle picks up a piece of rich gold-copper ore recovered from the seafloor in 1,700m of water in the Bismarck Sea offshore Papua New Guinea.

Seafloor mining is one of those things that a lot of investors won't believe in until it is actually proven to work. But there is a growing acknowledgement that it could well happen soon. As Nautilus Minerals Inc., the pioneer of this business, inches closer and closer to a planned start of operations in 2018, chief executive Mike Johnston said the conversation around Nautilus is changing. In general, people no longer doubt this company will ever put its mining plan into action. Instead, they simply question whether it will work the way Nautilus hopes.

"This project is pretty binary to people — you either like it or you don't," he said in an interview. He said investor confidence is building each time Nautilus reaches another milestone. Last month, the company took delivery of seafloor production tools. Johnston said the preparation of the 230-metre-long vessel is also going well and it should leave the dock in the middle of next year. Nautilus still needs more capital to initiate production at its Solwara 1 project in Papua New Guinea. The company wants to raise another \$125 million to \$175 million, which is bigger than its current market capitalization (about \$94 million). Johnston maintained he is confident Nautilus will be able to raise those funds, which could come from a combination of sources such as strategic investors, debt, equipment financing and a royalty. The company has spent about \$225 million to date.



## **Cooks' Tongareva Rejects Sea Bed Mining, Fishing Development**

*Government plans for fishing hub a no-go for Penrhyn*

By Cameron Scott

RAROTONGA, Cook Islands (Cook Islands News, March 7, 2016) – Tongareva (Penrhyn) has issued a firm "no" to sea bed mining, purse-seining and fishing hub proposal – and even the idea of a police patrol boat base on the island. The rejection of purse seining and the development of an ambitious harbour and service facilities for local and foreign fishing boats is a blow for development venture Merchants of Paradise – and for government, which was said to support the idea of a fishing base on the island. A government delegation led by Prime Minister Henry Puna and including Minister of Finance Mark Brown and three MPs made a controversial tour of the northern islands last week and claimed they had received plenty of support for rejection of an anti-purse seining petition presented to parliament last year. However in his weekly article for CI News today, columnist Wilkie Rasumssen says at the group's meeting on Tongareva, things quickly went wrong for the delegation. "Without any reservations, the verdict was "no" to the fishing hub idea, the trans-shipment facility. No to any fishing boats coming to the island and no, people do not even want the new patrol boat to be based there."

Wilkie says that at the Tongareva meeting, Puna played on the issue that the people opposing the delegations ideas were being emotional and that he and his delegation based their arguments on facts." Plans to establish a fishing base on the island were first revealed in CI News by former Penrhyn MP Wilkie Rasmussen, who said at the time that he and all other Penrhyn Islanders in the Cook Islands would firmly oppose the project. Government, through prime minister's media man Trevor Pitt, quickly denied that there were any official plans to develop the island, a claim that was soon countered by Tepaki, who revealed that at his group's meetings with the Ministry of Marine Resources, secretary Ben Ponia had claimed government was very interested in the idea. Tepaki said government wanted to take the harbour development idea even further than the Merchants of Paradise plans, with berths for more fishing boats and even floating docks. Pitt later admitted that the idea that government was interested in developing a base on the island may have been the result of Ponia getting "a little bit carried away" during his discussions with Merchants of Paradise.

## **PNG could see US\$80m benefits from seabed mining**

*A new report says seabed mining could see Papua New Guinea reap economic benefits of US\$80 million over two years.* Radio New Zealand, 3 March 2016

The cost benefit analysis report, commissioned by the Pacific Community (formerly the Secretariat of the Pacific Community) and the European Union, aimed to provide information to Pacific countries about the impacts of seabed mining. The report looked into mining in three countries - seafloor massive sulphides in PNG, maganese nodules in the Cook Islands and cobalt-rich crusts in the Marshall Islands. The SPC's deep sea minerals project manager, Akuila Tawake, said the benefits of seabed mining in PNG and the Cooks would outweigh the costs, but not in the Marshall Islands. "Based on the report - the main net social benefit for mining in PNG for two years, around US\$80 million, and for mining maganese nodules in the Cook Islands for 20 years will bring a mean social benefit of around US\$500 million for the govenment," Mr Tawake said. The report said if proper steps were taken to manage environmental risk, there would be a higher possibility of social benefits outweighing social costs in all three countries.

## EU and SPC peddling dangerous misinformation

PNG Mine Watch, 1 March 2016



The European Union and SPC have published a new report [see below] claiming the money to be made from experimental seabed mining in PNG far outweighs the costs. Unfortunately the expensive report:

1. Fails to put a monetary value on many of the potential environmental costs
2. Fails to deal with the fact billions of dollars in mining revenues have already FAILED to improve the lives of ordinary people in PNG
3. Fails to acknowledge the past failure of PNG authorities to manage land based mining and its terrible social and environmental impacts
4. Assumes, totally against the evidence, that any environmental damage will be fixed by the mining company

The Report has been written by Cardno, an Australian firm who also work for the Mining Industry, including Newcrest and Harmony Gold in PNG, and AusAID!

Good to see no potential conflicts of interest there!

Report [4.4 MB]: <https://ramumine.files.wordpress.com/2016/03/cardno-seabed-mining-report.pdf>

### Cost benefit analysis of deep sea mining in Pacific released

SPC-EU Deep Sea Minerals Project, 29 February 2016

Various scenarios for mining deep sea minerals in the waters of three Pacific Island countries are assessed in a cost benefit analysis report commissioned by the Pacific Community (SPC) and the European Union. The report aims to assist Pacific Island countries with their decision making concerning deep sea minerals and provide information about the potential magnitude of the impacts of deep sea mining. The assessment, conducted by Cardno between February and October 2015, offers decision-makers insights into the potential constraints and challenges to achieving positive net benefits if deep sea minerals mining were to occur under current circumstances.

It is part of the European Union-supported Deep Sea Minerals Project, implemented by SPC, aimed at improving the governance and management of the deep-sea minerals resources of 15 Pacific states. Based on the resource potential of three countries, the analysis considers the monetary value of all aspects of mining Seafloor Massive Sulphides in Papua New Guinea; Manganese Nodules in

Cook Islands; and Cobalt-rich Crusts in Republic of the Marshall Islands. “This cost-benefit analysis was initiated in consultation with Pacific Island nations to provide a better understanding of the costs and benefits likely to be associated with deep sea mining,” SPC’s Deep Sea Minerals Project Manager, Akuila Tawake, said. “It’s all about helping Pacific nations make informed decisions should they wish to engage in this new industry,” he said.

Notably, the report found that seafloor massive sulphide mining in Papua New Guinea has benefits that significantly outweigh the costs. Also, it revealed that a mining scenario in the Cook Islands (where four metals are recovered and the miner owns the operation and the processing facility in a country other than Cook Islands) has the highest net benefits. However, the report states that crust-mining in the Marshall Islands, under the two scenarios considered, is currently not economically viable due to present metal prices, expected ore recovery, and the cost of technology. The report concludes that as long as proper steps are taken to manage the wealth in the long-term and to transfer the environmental risk from the people of the host country to the mining company, there is a higher possibility of the social benefits outweighing the social costs. Despite the study’s limited focus on three countries, it provides important findings and considerations that are applicable to other Pacific nations with similar deep sea mineral resources, Mr Tawake said.

### **China Passes Seafloor Mining Law**

The Maritime Executive, 2016-02-27

On Friday, China passed the country's first law on deep seafloor mining. The law is designed to protect the maritime environment and ensure sustainable exploitation of its mineral resources. Xinhua reports that the law stipulates that exploration and development should be peaceful and cooperative, in addition to protecting the maritime environment and safeguarding the common interests of mankind. Prospectors must submit their plans to a Chinese maritime watchdog and must include environmental impact assessments in those plans. Only after the regulator approves the plans can application be made to the International Seabed Authority. Deep sea project operators must have an emergency response mechanism and report immediately to authorities if an emergency occurs. If their activities result in pollution, they can be fined up to one million yuan (\$153,000). Operators are also required to take measures to preserve maritime ecosystems and biodiversity. The new legislation will come into force on May 1, and it also mandates the government to formulate plans and promote research and surveys of resources.

### **Seafloor massive sulfide deposits support unique megafaunal assemblages: Implications for seabed mining and conservation**

Open Channels via PNG Mine Watch, February 24, 2016

Authors: Rachel Boschen, Ashley Rowden, Malcolm Clark, Arne Pallentin, Jonathan Gardner

Mining of seafloor massive sulfides (SMS) is imminent, but the ecology of assemblages at SMS deposits is poorly known. Proposed conservation strategies include protected areas to preserve biodiversity at risk from mining impacts. Determining site suitability requires biological characterisation of the mine site and protected area(s). Video survey of a proposed mine site and protected area off New Zealand revealed unique megafaunal assemblages at the mine site. Significant relationships were identified between assemblage structure and environmental conditions, including hydrothermal features. Unique assemblages occurred at both active and inactive chimneys and are particularly at risk from mining-related impacts. The occurrence of unique assemblages at the mine site suggests that the proposed protected area is insufficient alone and should instead form part of a network. These results provide support for including hydrothermally active and inactive features with-

in networks of protected areas and emphasise the need for quantitative survey data of proposed sites.

PDF File [2.7MB] [Seafloor massive sulfide deposits support unique megafaunal assemblages Implications for seabed mining and conservation.pdf](#)

### **Cooks to take more direct approach to seabed mining**

*The Cook Islands government says it will consider a more direct approach to find investors to mine its sea floor after a five month open tender process failed to register a single bid.*

Radio New Zealand, 23 February 2016



Cook Islands Finance Minister Mark Brown Photo: Phillipa Webb / Cook Islands News

The country's finance minister said he was not surprised by the lack of interest in the open tender process given the depressed state of global minerals markets and the high risk, high cost nature of deep sea mining. Mark Brown said while the Cook Islands was reviewing its tender process, negotiations were already underway with various international companies from Europe, America and Canada. "One of them we are engaged in discussions in a partnership arrangement also in the international seabed authority area in the northern Pacific in the Clarion Clipperton Zone." "And the others we are in discussions with are looking at options for exploration in our own EEZ." The Cook Islands open tender process was launched in August last Year and expired last month. The Cook Islands Seabed Minerals Authority said it received enquiries from companies in Japan, Korea, China, the US, UK and Germany but no formal applications were lodged.

### **Regional research project shows dangerous folly of PNG seabed mining experiment**

by PNG Mine Watch, February 15, 2016

PNG is playing a dangerous game with people's livelihoods, environment and culture by embarking on experimental seabed mining without understanding the potential impacts on the regions fish and fisheries, according to a South Pacific Community research proposal. The major research project will look at the potential impacts of seabed mining on fisheries across all the 15 island states of Polynesia, Melanesia (including PNG) and Micronesia. "There are still many uncertainties about the environmental, socioeconomic and technical risks and potential impacts that DSM might have on Pacific island environments, economies, societies and cultures", says the SPC. In particular there are, "significant concerns about the potential impacts of DSM [Deep Sea Mining] on fisheries and fishery resources". This is particularly worrying, says the SPC, "given the extremely high im-

portance of fisheries, including commercial, artisanal and subsistence fisheries, to Pacific Island economies, societies and cultural identities".



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#### REQUEST FOR PROPOSAL

RFP No. : RFP16/017  
DATE : 9<sup>th</sup> February 2016

**SUBJECT :** **REQUEST FOR PROPOSAL –**  
**Independent Assessment of the Potential Impacts of Deep Seabed Mining on Pacific Island Fisheries**

But while the Pacific Community will be investigating the impact experimental seabed mining could have on vital fish stocks, Papua New Guinea has already licensed the first seabed mine and poured K110 million of tax payers money into building the mining machines. How could a responsible government sanction an experimental new form of mining when its potential impacts on a vital resource are still unknown? Clearly PNG is playing a dangerous game allowing mining to go ahead while all these risks are unquantified. The SPC also states: "Pacific Island countries have limited governance and institutional capacity to assess, regulate and manage proposals for DSM". This is very clearly the case in PNG, given its history of failure in managing its terrestrial mines and the environmental catastrophes such as Ok Tedi, Panguna, Porgera, Tolukuma and Sinivit.

If PNG can't control the impacts of mining on the land, and clearly has very limited governance and institutional capacity, how can it possibly hope to manage the unknown impacts of mining 1500 metres below the surface of the sea? The SPC study will include all the potential environmental, ecological, operational, economic, social and cultural impacts of exploration and mining on fisheries and fisheries resources. The study lists the emissions and discharges from mining and explorations activities that could affect fish and fish stocks as 'underwater noise, solid liquid and gaseous wastes, pollution, effluent, light emissions and turbidity and sedimentation'. The study is expected to take six months and should be completed later this year.





## **Deep Sea Miner commences equipment tests**

Post-Courier, February 10, 2016

THE factory acceptance test (FAT) for the subsea slurry and lift pump (SSLP), required for the first ever deep sea mine in the country, has commenced in a factory in Huston, USA. This was revealed by Canadian Miner Nautilus Minerals in its market report released last week. "Nautilus announces that the Joint Venture (comprising 85 per cent Nautilus and Eda Kopa (Solwara) Limited has been advised that the FAT on the SSLP has commenced at the GE Oil and Gas manufacturing facility in Huston, USA). Nautilus chief executive officer Mike Johnston said "the SSLP is a key element of the Solwara-1 joint venture's sea floor production systems, enabling us to transfer the mineralised material as a slurry from the sea floor to the Production Support Vessel (PSV) with no interaction with the overlying water column.

"We look forward to successfully completing the FAT on the SSLP and taking delivery of the pump later this year," Mr Johnston said. The company in its market report explained that the SSLP and riser system is key in transferring the mineralised material as slurry from the deep sea ocean up onto the PSV where the mineralised solids are removed. The return water is then filtered to eight microns and transferred back down to the pump via the auxillary riser pipes where it will be released back into the same environment from where it originally came from. It said GE Oil and Gas produces positive displacement pumps like the SSLP for the offshore oil and gas industry where among other things they are used to help limit the environmental impacts of drill and cutting in deep water drilling operations by helping recover the cuttings for eventual storage on land. "Nautilus is proud to have GE Oil and Gas as a key service provider to the Solwara-1 project," Mr Johnston said.

## **Solwara 1 gets three sea floor production tools**

Post-Courier, February 10, 2016

THE SOLWARA 1 joint venture has taken delivery of the three production sea floor production tools from Soil Machine Dynamics Limited facility in New Castle, United Kingdom. The joint venture comprises of 85 per cent Nautilus and 15 per cent Eda Kopa (Solwara) limited. The Canadian miner in its report to the Toronto Stock Exchange said the three SPT's were en-route to Oman where they are expected to undergo extensive wet testing at the Dqum Port. Nautilus said it plans on using the SPT's to cut and extract high grade copper and gold from the Solwara 1 JV's project site in the Bismark sea of PNG with sea floor production operations planned to commence in 2018. Nautilus's chief executive officer Mike Johnston said "the Solwara-1 JV partners are delighted to have achieved this major milestone and we are looking forward to undertaking an extensive wet testing program as planned.

"Whilst the SPT's are the product of an extensive collaboration with a wide range of industry leading groups, I would like to make special mention of SMD. "SMD's world leading expertise in the design, operation and maintenance of deep sea water robotics, cutting and trenching equipment has been instrumental in the development of the SPT's. "We look forward to continuing our relationship with SMD during the wet testing program and into the production phase of the Solwara-1 project," Mr Johnston said. SMD's CEO Andrew Hodgson had also hailed the partnership. "It has been an exciting time for us to have designed, built and now delivered these industry leading tools to Nautilus and its partner. "SMD together with our parent company China Railway Rolling Stock Corporation Limited are leading the way in construction of remote mining and deep sea excavation technology. "We look forward to working with Nautilus on the continued development of these and subsequent tools," he said.

## E.U. Deepsea Mining Project Launched

By The Maritime Executive, 2016-02-05



polymetallic nodules

The European Commission is funding a deepsea mining project involving an international European consortium of industry and research organizations. The Blue Nodules project, launched on February 1, is part of the Horizon 2020 program, which is helping to accelerate innovations that ensure secure and sustainable deepsea harvesting and processing of polymetallic nodules. Polymetallic nodules occur on the seabed in most oceans around the world and contain large quantities of critical raw materials, such as nickel, copper, cobalt and manganese, as well as gallium and rare earth elements. They are vital for Europe's innovative technologies, for manufacturing crucial alloys and for new and innovative products like batteries for electric cars, photovoltaic systems and devices for wind turbines. The project is part of E.U. recognition of the strategic importance of a sustainable supply of these raw materials.

The extreme conditions found on the ocean floor raise specific technical and environmental challenges, which are demanding and entirely different from land-based mining. To meet those challenges, the project will develop the seafloor and surface processes and equipment for sustainable deepsea harvesting of the nodules. This project addresses the challenge of creating a viable and sustainable value chain to retrieve polymetallic nodules from the ocean floor. It will develop and test new highly-automated and sustainable technologies for deep-sea mining with minimal environmental pressures. The technical side of the project is dedicated to subsea harvesting equipment in addition to the insitu seafloor and sea surface processing of polymetallic nodules. The operational aspect focuses on sea operations and logistics, including compliance with, and development of, rules and regulations, and the business case.

The independent, dedicated environmental part will focus on environmental pressures and on an Environmental Impact Assessment. In all areas, Blue Nodules will build on the results of the European FP7 projects, MIDAS and Blue Mining and the EcoMining pilot action funded by the JPI Oceans initiative of the European science foundations. Rodney Norman, Director at IHC Mining, which is coordinating the project, explains that Blue Nodules is significant because it allows the European consortium to expand technological development beyond the vertical transportation system of the earlier Blue Mining project to the seafloor mining vehicle and other components of the system. DEME, through Dredging International, is one of the industrial partners. On January 14, 2013, the International Seabed Authority signed a 15-year contract with DEME's subsidiary Global Sea Mineral Resources (GSR) for the prospecting and exploration of polymetallic nodules. Under the contract, GSR has exclusive rights for exploration over 76,728 square kilometers of seabed in

the eastern part of the Central Pacific Ocean. Blue nodules is the third E.U. initiative that DEME has participated in, in addition to the Midas and Blue Mining projects. Other project partners include:

Continental AG, United Kingdom & Hungary; IHC MTI, The Netherlands; De Regt Marine Cables, The Netherlands; Uniresearch, The Netherlands; Seascope Consultants Ltd., United Kingdom; GSR, Belgium; Bureau Veritas, France; NIOZ, The Netherlands; RWTH Aachen, Germany; NTNU, Norway; Aarhus University, Denmark; UPC, Spain

### **Nautilus Minerals gets seafloor mining tools for Solwara 1 project in Papua New Guinea.** Mining Technology, 2 February 2016



Image: The SPTs will undergo wet testing at Duqm Port in Oman. Photo: courtesy of Nautilus Minerals Inc.

Nautilus Minerals has received three seafloor production tools (SPTs) from Soil Machine Dynamics's (SMD) facility in Newcastle-upon-Tyne, UK, for its underwater Solwara 1 mining project in the territorial waters of Papua New Guinea (PNG). The Solwara 1 joint venture consists of Nautilus with 85% and Eda Kopa (Solwara) with 15%. The SPTs are set to undergo wet testing at Duqm Port in Oman and will be stored at United Engineering Services' (UES) facilities in Duqm for preservation and maintenance. Later on, they will be integrated on UES's production support vessel (PSV), which is expected to occur in 2017. Nautilus plans to use the SPTs to cut and extract copper and gold from the seafloor at the Solwara 1 JV's project site in the Bismarck Sea, Papua New Guinea.

Seafloor production operations are planned to begin in the first quarter of 2018. Nautilus Minerals CEO Mike Johnston said: "The Solwara 1 JV partners are delighted to have achieved this major milestone and we are looking forward to undertaking the extensive wet testing programme that we have planned. "We look forward to continuing our relationship with SMD during the wet testing programme and into the production phase of the Solwara 1 project." SMD CEO Andrew Hodgson said: "SMD, together with our parent company China Railway Rolling Stock, are leading the way in the construction of remote mining and deepsea excavation technology." The Solwara 1 project development includes the recovery of high-grade seabed sulphide deposits from the floor of the Bismarck Sea, a major resource of base metal sulphides, gold and silver.

### **Nautilus to wet test sea apparatus**

Post-Courier, January 26, 2016

NAUTILUS Minerals Inc has signed agreements with United Engineering Services LLC to provide support services associated with wet testing the company's seafloor production equipment and storing the equipment as it is delivered from various suppliers prior to integration onto the company's

production support vessel. The Canadian miner in its market report said the first of the equipment to be tested will be the three seafloor production tools. The SPTs are due for delivery from the Soil Machine Dynamics facility in Newcastle upon Tyne early in 2016. Each machine is undergoing rigorous commissioning and factory acceptance testing which has been conducted in dry conditions on land. Once delivered, the SPTs will undergo extensive wet testing at Duqm Port in Oman which is designed to provide a submerged demonstration of the fully assembled SPTs and will involve submerged testing of:

- Control systems operations and feedback;
- Hydraulic functions;
- Collection system functions; and
- Survey and visualisation systems.

On completion of the wet testing, the SPTs will be stored at UES facilities in Duqm, Oman, for preservation and maintenance until integration on the PSV which is expected to occur in 2017. The company's chief executive officer Mike Johnston said: "It is very exciting to have the SPTs all fully assembled as we prepare for wet testing. "We appreciate the ongoing support from our largest shareholder, MB Holding Company LLC, who is assisting us with the wet testing and provision of storage facilities in Oman. "We look forward to the next phase of development to wet test our equipment as we work towards commencing our seafloor operations in Q1 2018," he said. UES is a wholly-owned subsidiary of MB Holding Company LLC which holds, directly or indirectly, approximately 27 per cent of the company's issued and outstanding shares and has two nominee directors sitting on the company's board namely-Mohammed Al Barwani and Tariq Al Barwani. In addition to catering to the fields of oil & gas and power generation and water, UES has successfully integrated into the fields of mining, marine and defence. UES has operations in over 22 countries worldwide and over 6000 employees.

### **New Zealand Green's objection to seabed mining**

By Andrew Campbell, SunLive, 15 Jan, 2016

*A combination of soft markets, mining companies' lack of environmental knowledge and local opposition will stop a seabed exploration application from going ahead, says Green Party MP Catherine Delahunty. Commenting on Pacific Offshore Mining's application for a five-year permit to explore for ilmenite – titanium ore, within 12,000 hectares off Waihi Beach, Catherine says one of the main hurdles facing seabed mining is the mining companies lack of knowledge about the effect mining operations will have on the seabed.*



*Pacific Offshore Mining has applied for exploration permit to mine an area of seabed off Waihi Beach, something Catherine Delahunty says should not happen.*

“The real problem with exploration for minerals on the seabed is the potentially quite damaging processes to find samples. “If they found what could be minable samples, we would be in real trouble - I mean digging up the seabed and not just scraping along the top of it. “It's bad enough what's happening to the sea bed in terms of trawling but if you actually dig it up, we don't even know what is there that we are destroying. “We have got so little real understanding of the intricacies of what's in the seabed, then to destroy it to create the potential risk, it's just not worth even considering,” says Catherine. “Given that this area is so important for recreational use and for future generations, we should just leave it alone and protect the environment. This coastal area is such an important area to so many people, I really think the company is wasting their time.”

As well as ilmenite, the permit is seeking rights to iron sands, gold and silver deposits in same area of the seabed at depths of 20-50 metres. Ilmenite and ironsand deposits were previously been explored in the area in the 1970s and 1990s. An exploration licence would give Pacific Offshore Mining the right to identify mineral deposits and evaluate the feasibility of mining any deposits that may be found. Methods may include seafloor sampling, geophysical surveys, including magnetic surveys - either airborne or from a vessel - shallow drilling on average 10m beneath the seafloor, and bulk sampling with each sample being up to two tonnes. Because the area is within New Zealand territorial waters, Pacific Offshore Mining Limited requires the exploration permit from New Zealand Petroleum & Minerals, and a separate, resource consent from the Bay of Plenty Regional Council under the Resource Management Act before exploration can begin.

Other undersea mining applications on both the Chatham Rise and off the North Island east coast near Patea, both failed because the mining companies concerned were unable to supply information to the level required, says Catherine. In the Taranaki decision, the Environmental Protection Agency panel wasn't satisfied the life-supporting capacity of the environment would be safeguarded by the ironsand mining operation, or that the adverse effects of the proposal could be avoided, remedied or mitigated, given the uncertainty and inadequacy of the information presented. "They don't know enough and they expect to be given permits to do exploration and potentially bulk sampling without even knowing what's there, and it's just completely unacceptable," says Catherine. “Even if they did know what was there, I think any environmental protection agency would have concerns, because it's a fragile food chain out there. You can't replace it. It's hard enough on land to restore land after mining. It's impossible under the water.

“There's no way you can do this stuff without doing damage, and that's probably why they couldn't provide sufficient information to the EPA, and why the other companies have been turned down.” The mining industry is in decline world-wide at the moment, says Catherine. Prices are not high and the cost of exploration is enormous. “All the big companies, like Petrobras, have all pulled out of New Zealand – it's not happening,” says Catherine. “The government tried to do these tender offers for all this offshore stuff and they have tried to promote it because it is their only economic plan. “But all the big companies have actually pulled out because it costs so much money to be able to even explore in deep water like we have off New Zealand, in rough water, and there is so much opposition that really it's not worth the time.”

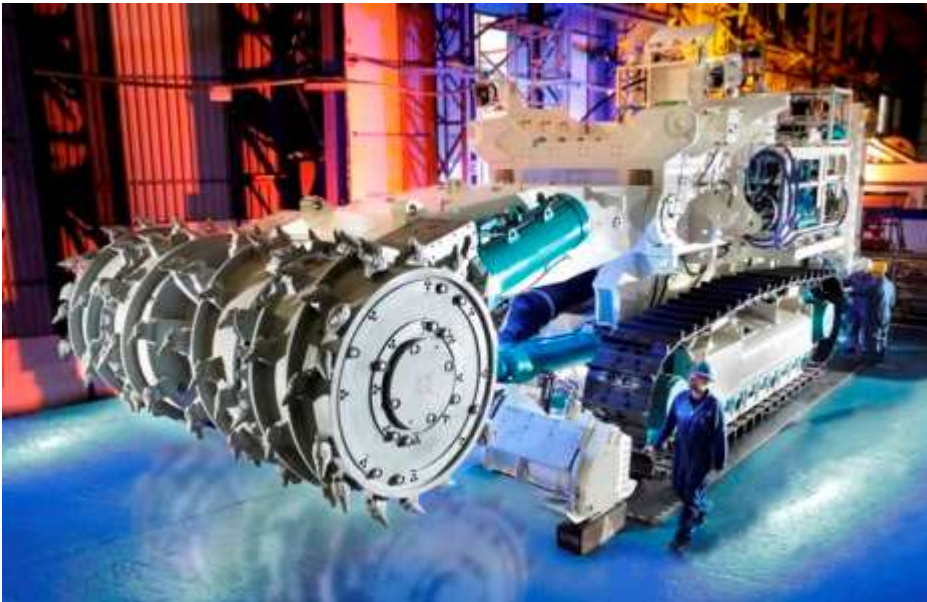
From a peak of about \$US1800 an ounce in July 2011, gold has steadily declined in price and is currently about \$US1000 an ounce. Ilmenite is a titanium mineral generally used in pigment production. Ilmenite prices trebled during 2011 from levels of about US\$100 per tonne at the start of that year. Currently ilmenite prices are in the range US \$100 – US\$120/t. The ABC reported in October 2015 that a ground-based ilmenite mine in south-east Queensland laid off 18 workers as a price crash threatened the project. Canadian miner, Melior Resources, recommissioned the defunct Goondicum Mine at Monto North Burnett in April 2015, after it was mothballed by previous owners in 2013. The price had been falling for 18 months. Mine management admitted the company was wrong in its expectation that the price had bottomed out.



## Seabed-Mining Robots to Be Tested

Engineering360 News Desk, 13 January 2016

Nautilus Minerals plans to begin testing of sea-mining robots in the first half of 2016 that will ultimately be used to dig for copper and gold from the ocean floor off Papua New Guinea. The company has commissioned a Bulk Cutter, Collecting Machine and Auxiliary Cutter and now awaits completion of a production support vessel that will act as operational base for the mining of the Solwara 1 site, expected to begin in 2018.



Nautilus Minerals' Bulk Cutter. Image credit: Nautilus Minerals.

Nautilus has developed a production system using technologies adapted from the offshore oil and gas, dredging and mining industries to enable extraction of minerals at the site off New Guinea. The company says the site contains copper and gold of significantly higher grades than those typically found on land. Rock will be dug up on the seafloor by two large robotic machines that excavate material by a continuous-cutting process, not unlike those used for coal or other bulk continuous-mining operations on land. The Auxiliary Cutter (AC) is a preparatory machine that deals with rough terrain and creates benches for the other machines to work. It will operate on tracks and has a boom-mounted cutting head for flexibility. The second machine, the Bulk Cutter, has higher cutting capacity but will be limited to working on flatter areas and benches created by the AC. Both machines leave cut material in temporary positions on the seafloor for collection by the third machine, the Collecting Machine (CM).

The CM, also a large robotic vehicle, will collect the cut material by drawing it in as seawater slurry with internal pumps and pushing it through a flexible pipe to the Riser and Lifting System (RALS). The RALS comprises a large pump and rigid riser pipe supported from the vessel that delivers the slurry to the surface. The pump is supported on a solid vertical (riser) pipe suspended beneath the support vessel. On the deck of the Production Support Vessel (PSV), the slurry is dewatered. The dewatered solid material is stored temporarily in the PSV's hull and then discharged to a transportation vessel moored alongside. Filtered seawater is pumped back to the seafloor through the riser pipes and provides hydraulic power to operate the RALS pump. Discharge of the return water at the seafloor eliminates mixing of the water column and is designed to minimize the operation's environmental impact.

According to Nautilus, the Solwara 1 deposit, which sits on the seafloor at a depth of 1,600 meters, boasts a copper grade of approximately 7%. That compares with land-based copper mines, where

the copper grade averages 0.6%. Gold grades of over 20 g/metric ton have been recorded in some intercepts at Solwara 1, which compare with an average grade on land of approximately 6 g/ton. The PSV is under construction in China. When completed, it will measure 227 meters in length and 40 meters in width, generate approximately 31 megawatts of power and be able to accommodate up to 180 people. All the below-deck mining equipment will be installed in the PSV during the build process to minimize the work required following its delivery.

### **Nautilus first ore shipment in 2018**

Post-Courier, January 04, 2016

CANADIAN miner Nautilus Minerals Inc is set to deliver its first shipment of ore to China from Solwara 1 project in New Ireland in 2018. The company's December market report confirmed finalisation of the first sale with Tongling Nonferrous Metal Group Co Limited from its deep sea mine. The deal was first entered into on April 21, 2012, with the signing of the heads of agreement for the sale of the product extracted from the Solwara 1 deposit. Following detailed negotiations the terms of the HOA will now be replaced with the Master Ores Sales and Processing Agreement just signed off on. Nautilus chief executive officer Mike Johnston said: "This new agreement provides improved terms for both Nautilus and Tongling and can be truly described as a win-win outcome.

"The MOSPA gives greater flexibility to Tongling with respect to its operations, while providing Nautilus with certainty and an improved net smelter return. "I am delighted to be continuing our relationship with Tongling as a key business partner supporting the development of the world's first seafloor massive sulphide mining project." Vice-President of Tongling Nonferrous Metals Group Co. Ltd Zhan Deguog also hailed the signing. "Tongling Nonferrous Metals Group has a long history of technological innovation, and is committed to the green economy where waste streams are minimised and value is realised on all components of the material. Our modern world class processing facilities will allow us to extract maximum value making this win-win agreement possible. "We are very proud to support Nautilus in the development of Solwara 1, a ground breaking project which signals a new era in the mining industry," he said.

### **PM: Cook Islands Can Be Richest Country In The World**

*Puna touts benefits of fisheries, seabed mineral exploitation*

By Florence Syme-Buchanan

RAROTONGA, Cook Islands (Cook Islands News, Dec. 30, 2015) – Prime Minister Henry Puna ended his working year with assurances that Cook Islanders can become amongst the richest people in the world per capita from harvesting of the country's fisheries and seabed minerals resources. In a ministerial statement delivered on the last day of Parliament this year, Puna focused on the country's fisheries resource, touting the financial benefits and advocating adherence to sustainability guided by 'best possible science'. "Every step we take should be guided by precaution and science. This is our shared destiny and the future of our children. "We should not squander this opportunity for political gain, or be blinded by the lack of vision from emotional stories," said Puna. However, political commentators point to Puna and Finance Minister Mark Brown constantly making reference to revenue from selling more fishing licenses which would make possible increases in the old age pension, child benefit.

In an effort to convince the public that this approach is the right one, they have also said increased revenue would pay for improved education and health services. Puna said he wanted it recorded that contrary to news items, "and all the emotional outbursts that followed," his government hasn't en-

tered into a fisheries agreement with the European Union that would initially licence four of the biggest purse seiners to fish here. "Government is, however, adhering to a robust process of policy considerations that will support our fisheries interests into the future. There is no agreement because this process is allowing us to look closely at a number of points that would inform and support any negotiations." While the formal EU agreement may not be signed yet says Te Ipukarea Society technical director Kelvin Passfield, the fact that every page has been initialled, and based on the PM's words in this ministerial statement, it is very clear that the intention is to sign a deal. Passfield's comments are supported by formal statements issued by the Spanish government that the "permanence" of its purse seiners in eastern Pacific waters is assured with the initialisation of the agreement with the Cook Islands in October.

If the government does press on with signing the agreement it would go against the wishes of over 4000 Cook Islanders who signed a petition to ban purse seining here. Passfield says it's hard to swallow Puna's comments that "public consultation will be important" and "discussions should not be emotionally driven but informed by the best available science." "Given the previous three deals with two Korean companies and New Zealand were concluded in privacy with no public consultation at all." Says Passfield: "The only reason the EU deal is so public is because it is a requirement of the European Union process (for which one must give them credit). Otherwise it would already be signed, as were the previous agreements". The Cook Islands has the 20th largest EEZ in the world and vast quantities of fisheries and seabed minerals, and Puna says if these are "wisely and sustainably harvested," our people stand to become amongst the wealthiest of the world's citizens per capita.

In an apparent reference to the EU purse seining agreements, Puna added the country had a window of opportunity in front of it right now to achieve this. However, Passfield says this opportunity should not on any terms be seized for short term financial gain. The environmentalist goes on to discredit other statements by Puna including the claim that the Western and Central Pacific Fisheries Commission was formed by the United Nations to decide how much tuna overall can be sustainably caught in the region and how much each Pacific nation is entitled to catch in their EEZ. "It wasn't formed to decide how much each nation is allowed to catch in its EEZ. It was formed for conservation and management of highly migratory fish stocks. Note the first word is 'conservation'. But it is not working, especially for bigeye tuna."

Passfield says Puna's claim that less than one per cent of the Pacific's tuna is caught by purse seiners in the northern Cook Islands doesn't wash, because since then deals have been signed with Korea and the US fleet has increased its fishing effort. To Puna's statement that skipjack tuna targeted by purse seiners "...has proven to be almost impossible to overfish," Passfield says the same has been said in the past about other fisheries in the world which have long since collapsed. Meanwhile questions sent to Marine Resources' public relations unit three weeks ago regarding the number of purse seining and long lining licences that are currently being operated, the capacity of the licensed vessels and the countries involved, have not received a response.

### **Seabed-Mining Robots Will Dig for Gold in Hydrothermal Vents Nautilus Minerals will test its gear on the ocean floor in 2016**

By Peter Fairley, Spectrum, 22 Dec 2015

For decades, futurists have predicted that commercial miners would one day tap the unimaginable mineral wealth of the world's ocean floor. Soon, that subsea gold rush could finally begin: The world's first deep-sea mining robots are poised to rip into rich deposits of copper, gold, and silver 1,600 meters down at the bottom of the Bismarck Sea, near Papua New Guinea. The massive ma-

chines, which are to be tested sometime in 2016, are part of a high-stakes gamble for the Toronto-based mining company Nautilus Minerals.

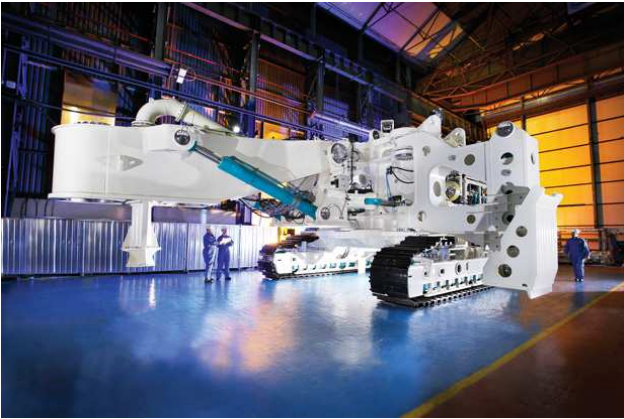


Photo: Nautilus Minerals Like a Tank: The heavy-duty equipment for mining the ocean floor, like the partially assembled machine shown here, is built to withstand punishing conditions 1,600 meters below the waves.

Nautilus's machines have been ready to go since 2012, when a dispute between the firm and the Papua New Guinean government stalled the project. What broke the impasse was the company's offer, in 2014, to provide Papua New Guinea with certain intellectual property from the mining project. The deal enabled Nautilus to get financing to build a €127 million ship, the first of its kind, which will deploy the subsea mining robots and process the ore they recover. This 227-meter-long production vessel is now being built in a Chinese shipyard and is scheduled to depart for Papua New Guinea in early 2018. The mining robots were built for Nautilus by Soil Machine Dynamics, based in the United Kingdom, which supplies construction equipment for laying undersea cables, servicing offshore oil platforms, and other heavy-duty deep-sea jobs. The main robots are a pair of tractor-trailer-size excavators.





Photos: Nautilus Minerals I, Robot Miner: Three different types of remotely operated machines will be used: a “bulk cutter” [top], a “collecting machine” [center], and an “auxiliary cutter” [see photo “Like A Tank,” above]. Clenched in a manipulator arm is a sample of the kind of metal-rich rock these robots will retrieve from the ocean floor [bottom].

One uses 4-meter-wide counterrotating heads studded with tungsten carbide picks to chew through the metal-rich chimneys that form around superhot water spewing from sulfurous vents in the seafloor. Its partner adds brute strength, using a studded drum that is 2.5 meters in diameter and 4 meters wide to pulverize rock walls. Dredge pumps built into these machines will push the smashed ore back to a central pile on the seafloor, where a third Nautilus robot will feed a slurry of crushed rock and water up a pipe dangling from the production vessel. There the water will be wrung out from the ore, which will be loaded on another ship and carried to China for processing.

**Matter of Fact:** A ship called the *Hughes Glomar Explorer* was constructed in the 1970s, ostensibly for deep-sea mining, although it was in fact used to recover a sunken Soviet submarine.

As 2015 drew to a close, Nautilus was still negotiating for access to a shallow-water site for an initial subsea test of these machines, which it hoped to begin in mid-2016. The plan is to do some rock cutting, though in an interview Nautilus’s CEO, Michael Johnston, says it is “difficult getting materials that are a good proxy for the materials we’ll be mining.” If time allows, the machines will also get a deep-sea trial before they are integrated with the production vessel, Johnston adds. Barring that, they will have to prove their stuff at Nautilus’s first mining site, called Solwara 1, which is located some 30 kilometers from shore in Papua New Guinea’s New Ireland province. Assuming all goes well, the robotic diggers will spend 30 months scouring the Solwara 1 site, bringing up 2.5 million metric tons of ore containing metals worth more than US \$1.5 billion at today’s prices. Next, the robots will likely set to work on one of Nautilus’s 18 other prospects in the Bismarck Sea or one of its 19 discoveries off the shores of the Polynesian archipelago of Tonga.

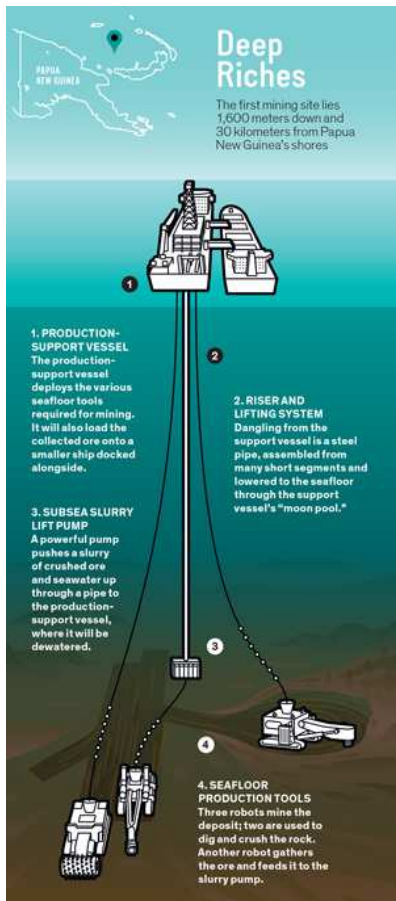


Illustration: James Provost



Competitors are staking out deep-sea mining sites of their own, with much of the development activity focused on rich deposits of polymetallic nodules in a vast region southeast of Hawaii known as the Clarion-Clipperton Fracture Zone. The potato-size nodules, found in waters more than 4 km deep, contain manganese along with nickel, cobalt, and other metals. But some marine biologists warn that deep-sea mining interests are outpacing the readiness of scientists and governments to assess and manage the environmental impact. Verena Tunnicliffe, a specialist in deep-sea vent ecosystems at the University of Victoria, in British Columbia, Canada, says robo-miners will strip away deep-sea ecosystems that are as unique as they are poorly understood. Johnston points out that Nautilus is taking pains to study these ecosystems and will protect them to the extent possible. A refuge zone within the leased area, for example, will provide a source of local fauna for recolonization of the company's deep-sea strip mine.

Tunnicliffe worries that this vision for recolonization could prove wildly optimistic: "The habitat is going to be pulverized, and the energy flow of the system will be completely altered. I do not believe recolonization of these types of populations is going to happen." Other marine biologists are more sanguine, however. With luck, the mining will prove no more devastating to these vent communities over the long term than the frequent earthquakes and outpourings of lava that these amazing deep-sea creatures are somehow able to survive. *This article originally appeared in print as "Robot Miners of the Briny Deep."*

### **Nautilus Minerals Signs Deal To Sell Ore From Undersea Mining**

*Operation to mine PNG's Bismarck seafloor*

WELLINGTON, New Zealand (Radio New Zealand International, Dec. 16, 2015) – Nautilus Minerals says it has signed a deal to sell ore from the undersea deposits it intends mining in Papua New Guinea's Bismarck Sea. It says China's Tongling Nonferrous Metals group will take some of the output from what would be the world's first ocean floor mine, its Solwara 1 deposit. Under the agreement, Tongling will buy copper, gold and silver, with the first delivery expected in the first half of 2018. Nautilus' chief executive Mike Johnston says Tongling will also build parts of the operation which will employ new technology.

### **Environmentalists warn against seabed mining in South Africa**

*Say marine phosphate mining off SA's shores poses threat to marine ecosystems and commercial fishing.* Prinesha Naidoo, Mineweb, 10 December 2015

JOHANNESBURG – South African environmentalists have added to the growing global dissent against seabed mining, calling for a moratorium on exploration related to bulk marine sediment mining in local waters. According to Saul Roux, a legal campaigner at the Centre for Environmental Rights, bulk sediment marine mining is "equivalent to strip mining in the ocean". This, as the process involves using a trailing suction hopper dredger (a ship with powerful suction pumps that run to the seabed) to dredge the seabed up to a depth of about three metres in order to remove marine sediment. This sediment is then transferred to the shore where minerals are extracted before excess sediment and water is released back into the ocean.

Since 2012, the Department of Mineral Resources (DMR) has granted three prospecting rights to Diamond Fields International and Green Flash Trading to use trailing suction hopper dredgers to mine approximately 150 000km<sup>2</sup> of the Western Cape seabed for phosphates, macro-nutrients used to fertilise agricultural crops. While companies used concerns about food security to motivate for these rights, given South Africa's vast terrestrial reserves Roux believes any phosphates mined in local waters would be for export. "It seems completely irrational, they would essentially be destroy-

ing one form of food security on arguments around another,” he said, citing threats to the country’s commercial fishing industry as well as to communities which rely on fishing for their livelihoods.

According to research by The Safeguard our Seabed Coalition, the country’s commercial fisheries directly employs 27 000 people with an additional 100 000 people working in fishery-related enterprises. Bulk marine sediment mining does not fall under Operation Phakisa, through which government aims to “unlock the economic potential of South Africa’s ocean” by creating multi-billion rand industries and around 1 million jobs in industries such as marine transport and manufacture, offshore oil and gas, aquaculture and marine protection services. Neither Diamond Fields International nor Green Flash Trading’s applications for exploration rights quantified the potential socio-economic impacts of the marine phosphate mining. But the feasibility study of a similar project, proposed in Namibian Waters, stated that 400 to 500 people would be employed, most during the development phase.

As a result of opposition by environmental groups and the country’s fishing industry, in September 2013 the Namibian government placed an 18-month moratorium on marine phosphate mining. It also commissioned independent scoping studies and environmental impact assessment research on its maritime zone. While the country has long benefitted from marine diamond mining, in which either hoses or diameter drills are used to bring diamond bearing gravel from the ocean-floor to the surface, opponents argued that bulk marine sediment mining is more disruptive. Writing for the South African Institute of International Affairs, Alex Benkenstein said among the concerns raised was “the release of concentrations of hydrogen sulphide and reduced phosphorous compounds in sediment, which are toxic and could lead to low oxygen levels in the water. The release of heavy metals from seabed sediments could also lead to these elements being absorbed in the food chain and ultimately impacting fisheries products”.

The Centre for Environmental Rights is hopeful that the Namibian Moratorium could put the DMR under pressure as the Benguela Current Convention, of which South Africa is a signatory, requires the responsible management of shared resources. “As with the moratorium on fracking, government should not proceed with seabed mining, until at the very least, a strategic environmental assessment has been undertaken,” Roux said. The DMR and the Department of International Relations and Cooperation have recently announced plans to develop a seabed mining roadmap. According to Roux, there is no mention of seabed mining in the draft Mineral and Petroleum Resources Development Act, “The DMR has no capacity for monitoring seabed mining. The cumulative impact of an unregulated industry would be disastrous”.

Thus far only one country, Papua New Guinea, appears to have signed-off on commercial seafloor mining in its waters. It has leased an off-shore site called Solwara 1 to Toronto-listed firm Nautilus Minerals, in which Anglo American has a 5.99% stake. According to CNBC, Nautilus plans to begin copper production at the site in the first quarter of 2018. Rights for mining in the high seas are dependent upon the International Seabed Authority, created by the United Nations Convention on the Law of the Sea, which provides the legal framework for the world’s oceans and seas.

### **Trans-Tasman Resources apply for new permit to mine iron ore from seabed**

David Burroughs, Stuff NZ, November 30, 2015

Trans-Tasman Resources are reapplying to mine iron ore from the seabed off the Taranaki coast. The company which last year lost an application to mine iron ore from the South Taranaki seabed is applying for a new permit. Trans-Tasman Resources (TTR) confirmed it is preparing a new consent application for the Environmental Protection Authority (EPA) and had spent millions in scientific and environmental studies to understand the effects of the project on the South Taranaki Bight since

its failed attempt. The company said it had also "taken onboard the criticisms levelled at it in the previous application and addressed the areas of uncertainty". In mid-2013, TTR applied for a permit to mine 50 million tonnes of sand each year - taking 5 million tonnes of iron out and returning the rest of the sand to the sea floor - across 65.76 square kilometres. The application received 4702 submissions, with only eight fully supporting the proposal and in June last year, following a hearing by the Environmental Protection Authority (EPA), it was denied. In its report the EPA said there was "uncertainties in the scope and significance of the adverse environmental effects and those on existing interests, such as the fishing interests and the iwi".



Andy Jackson/Fairfax NZ

"Overall the DMC (decision making committee) found that the application did not meet the sustainable management purpose of EEZ (economic exclusion zone) Act, including that it was not satisfied that the life-supporting capacity of the environment would be safeguarded or that the adverse effects of the proposal could be avoided, remedied or mitigated, given the uncertainty and inadequacy of the information presented," the report said. The application then moved on to the High Court, where TTR filed an appeal in early July, but dropped it in December. However, on Monday TTR said it had commenced a programme of stakeholder engagement, undertaken further scientific studies on operations and had the models updated for those results, for the new consent. "TTR also engaged economists to assess the economic benefit at a regional level, rather than just the legislatively required New Zealand benefit. This information addresses the areas identified as gaps in our previous application."

### **Solwara One project to begin in 2018**

The National, November 27th, 2015

By GEDION TIMOTHY LAPAN

THE developer of the Solwara 1 project, Nautilus Minerals, says the project is to begin operation in early 2018. Nautilus Minerals country manager for Papua New Guinea, Mel Togolo, told the Mining and Petroleum conference in Port Moresby that the project had the support of Government agencies and landowners to commercialise the first deep-sea mining operation in the try. "Contrary to what many people are saying, we have strong Government and local support," Togolo said. He said when the mining started extraction, there would not be any tailing as the ore would be exported to China to be processed. Solwara 1 project is located between the provinces of New Ireland and East New Britain," he said. "It is 30 kilometres away from the nearest land point on the west coast of Namantani in New Ireland. "And it is about 50 or 60 kilometres from the port of Rabaul. "We are being watched by big countries (such as) the United Kingdom, United States of

America, Germany, China, Japan. “Once we can get it going, I think it would be a wonderful contribution to the rest of the world.” Nautilus Mineral had been granted the Environment Permit and Mining Lease required for resource development for the project.

### **Industry has strong link to economy, official says**

The National, November 27th, 2015

THE Mining and the Petroleum industry has a strong link to the economic development and wellbeing of the people, a mining executive says. Mel Togolo, the Papua New Guinea country manager for the Nautilus Mineral Niugini, made the statement during the PNG Mining and Petroleum conference in Port Moresby this week. He said conflicts and disagreement in the mining and petroleum sectors were inevitable but “they must be managed and controlled”. Togolo said like most other developments, mining brought about changes, which always created conflict. He said Papua New Guinea had to move away from the idea “that argument is bad and peace is good”. He said the mining and the petroleum industry in Papua New Guinea contributed to the socio-economic wellbeing of its people. “The concept of consultation facilitated through the development forum is aimed at solving conflicts. “More importantly, it needs to be pointed out that the development forum process puts into practice the intentions and the spirits of the fifth goal of the preamble of the (PNG) constitution,” he said. Nautilus Minerals is the developer for copper-gold project Solwara 1. The company had been granted the Environment Permit and Mining Lease required for resource development for the project.

### **The Next Gold Rush Is Unfolding 5,000 Feet Under the Sea**

By Brian Merchant, Motherboard, Vice, November 17, 2015



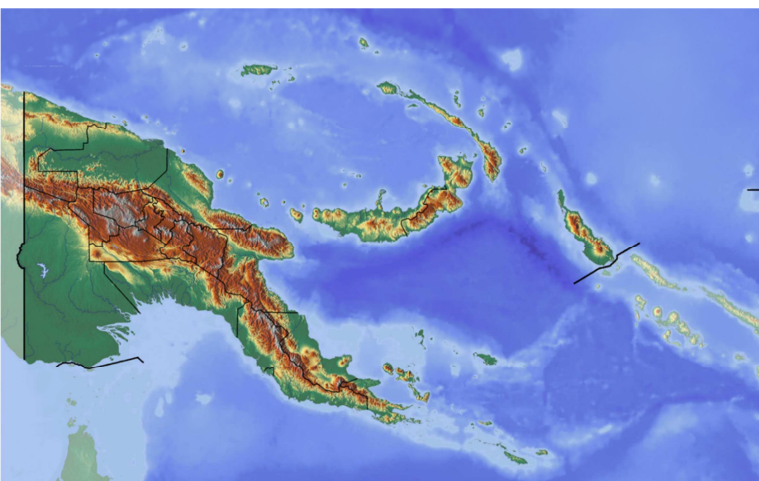
Rabaul, a township on the northern tip of Papua New Guinea’s New Britain island, is still covered in the ash of a volcano that exploded decades ago. Eruptions have twice decimated the city, once in 1937, and once in 1994. Both times, locals rebuilt and soldiered on. Today, if you’re driving across Rabaul, you’ll pass long stretches where ash is still piled on the shoulder and even on the middle of the road; it’s so thick you’ll want to close the windows to keep the dust from filling the car. That volcano violently decimated the island’s then-major industry—tourism has yet to fully recover, over 20 years later—but it may yet become the bedrock of another one. The only issue is, that industry doesn’t actually exist yet. And some environmentalists, scientists and activists hope it never does. That’s because here in Papua New Guinea, one well-financed, first-mover company is about to pioneer deep sea mining. And that will mean dispatching a fleet of giant remote-operated robotic miners 5,000 feet below the surface to harvest the riches scattered across ocean floor.

These mammoth underwater vehicles look like they've been hauled off the set of a sci-fi film—think *Avatar* meets *The Abyss*. And they'll be dredging up copper, gold, and other valuable minerals, far beneath the gaze of human eyes. It's a little-watched but fast-approaching milestone that raises serious questions about the future of consumption in our rapidly modernizing, mineral-hungry world: How deep are we willing to dive to get the materials that make our electronics run? The idea of razing the barely-studied deep sea floor has many anxious—from locals who worry about an accident, to scientists who fear we may be destroying an ecosystem we don't yet understand. But as crucial materials like copper grow scarcer, might mining the deep, far away from human populations, be a reasonable endeavor? Or should the mere fact that we're poised to roll over the ocean floor with robotic harvesters be cause enough to take pause and reassess the sustainability of our thirst for the metals that shape modern life? Regardless, the first deep sea mine is slated to begin operations in just over two years, at a site called Solwara-1, leased from the Papua New Guinean government. It's just off the coast of Rabaul, at the watery foot of that active volcano.



Eruption on the Rabaul caldera. Image: Wikimedia / Richard Bartz

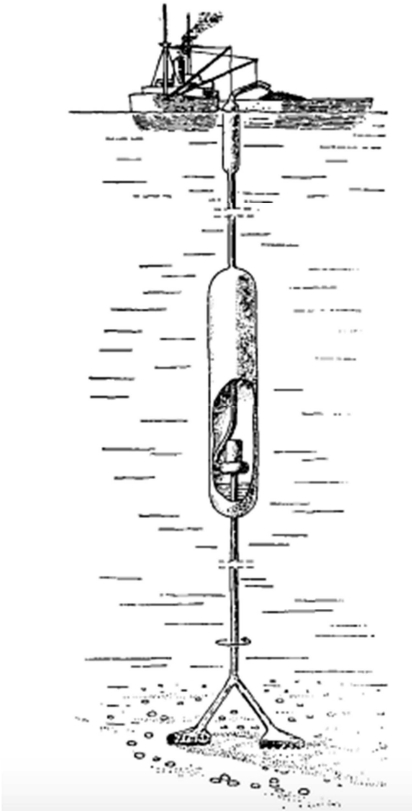
Like, say, nuclear fusion, seafloor mining is a high-tech promise that has been attracting serious investment, winning sporadic headlines, and lingering on the cusp of becoming a reality for about half a century. But in 2018, a Canadian company called Nautilus claims it will begin to do what no one else has been able to: Actually mine the deep. “Seafloor mining is a major game changer in the global mining industry,” Nautilus CEO Mike Johnston told me. “There are an enormous number of high grade deposits on the seafloor. Seafloor massive sulphide systems, such as at Solwara-1, exist all over the world along hydrothermal vents which are extremely rich in minerals such as copper, gold, silver and zinc.”



The Rabaul caldera. Image: Wikimedia



Johnston is hinting at nothing short of a deep sea gold rush, and he's far from the first. In fact, the original spree commenced almost exactly half a century ago. The quest to mine the ocean floor began in earnest in 1965, when John L. Mero, a shipyard consultant formerly with UC Berkeley's Institute of Marine Resources, published *Mineral Resources of the Sea*. In that volume, Mero wrote that "the sea is a major storehouse for the minerals that serve as the foundations of an industrial society" and claimed riches like nickel, cobalt, and copper lay on the bottom of the ocean in manganese nodules—metal-rich clumps—awaiting extraction in near-limitless supply. Mero proposed dropping a "deep-sea hydraulic dredge" down to depths of 10,000 feet, which would essentially act as "a giant vacuum cleaner designed to gather a thin surficial layer of material."



A deep-sea hydraulic dredge. *Mineral Resources of the Sea*.

Following the publication of *Mineral Resources*, nations including the United States, France, and Germany set out to explore the deep in search of these clusters of oceanic riches. Over the subsequent decades, these countries sunk hundreds of millions of dollars into deep ocean mining, to little avail. A 2000 study published in *Science* found that a total of \$650 million had been invested in the enterprise, much of it before metal prices collapsed during the recession caused by the 1973 oil crisis, and before deep sea scientists realized that Mero's projections of abundant riches were hopelessly optimistic. For decades, deep sea mining was mostly abandoned, and the dream of scooping riches out of the ocean depths lay idle. In recent years, however, two trends have converged to help renew interest in the concept: Growing global demand for the recoverable metals, especially copper, has upped the profit potential for deep sea mining. Copper is crucial to modern life; it's both malleable and a great conductor, so it's found in consumer electronics, cables, cars, refrigerators and beyond—and its value is exploding as major economies like China and India industrialize.

The undersea regions that would play host to the mines bear loads of other minerals essential to modernity, too, including nickel, silver, gold and cobalt. Meanwhile, new technologies—like remote-operated underwater mining robots—have placed seafloor mining within reach. "Once I got the chance to start looking at the technology back in 2004," Johnston told me, "it became clear to me that there had been rapid changes, so big that what seemed almost impossible back in the 1970s

was now actually pretty simple from an engineering point of view.” Finally, a better understanding of deep sea geology has spurred new-wave prospectors to shift their focus from the manganese nodules of yore to another target: Sulfide deposits that form near hydrothermal vents. Nautilus is just one of the outfits hoping to take advantage of the trends pushing deep sea mining closer to reality—both Japan and Korea are actively exploring the idea, and developing tech to mine in their waters. Another private company, [Neptune](#), has staked out some major leases to do the same in the Western Pacific.



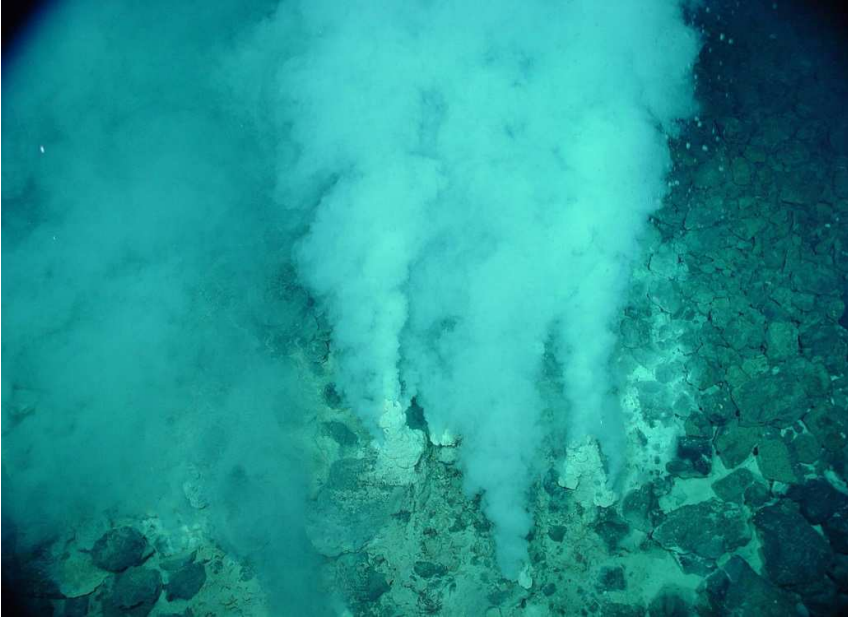
Seafloor massive sulfides. Image: University of Washington

However, as the idea has grown closer to fruition, it's also attracted its fair share of worry. In 2007, the major journal *Science* published an article called the "Danger of Deep Sea Mining," which voiced concerns that the huge, swirling sediment plumes stirred up by underwater mining could disturb habitats, and that the process could have a toxic effect on the water column. It concluded that "Plans for deep-sea mining could pose a serious threat to marine ecosystems." Meanwhile, those hydrothermal vents are one of the most alien and intriguing ecosystems on earth. Hydrothermal vents are found in on seabeds near active volcanoes, like the one that forms the atoll around Solwara-1, and the one that Rabaul sits atop. Some scientists have posited that life itself may have originated near their exhaust, where heated, mineral-rich seawater blasts out of the oceans crust into the stark, cold waters of the deep. But here's why miners are so interested in them: They are constantly, if very slowly, creating what geologists call seafloor massive sulfides.

“These deposits form at or near the seafloor where circulating hydrothermal fluids driven by magmatic heat are quenched through mixing with bottom waters or pore-waters in near-seafloor lithologies,” the US Geological Survey explains. The deposits occur in broad, flat, lens-like bodies that lay parallel to the volcanic bedding. “Massive sulfide lenses vary widely in shape and size and may be podlike or sheetlike,” the USGS notes. These deposits are often rich in valuable minerals like copper and gold, and happen to be easier to find than Mero's nodules, too. Nautilus plans to harvest the spots where these materials accumulate—while avoiding the vents themselves—to bring the minerals to the surface en masse, and, of course, sell them for profit.

“The seafloor massive sulfides are copper-rich, and they have higher copper content than what remains on land in known reserves, so they’re attractive in that sense,” Cindy van Dover tells me. Van Dover is a deep sea scientist with Duke University, and has served as a science advisor for Nautilus—she is not a paid consultant. Van Dover was recently invited down to Papua New Guinea by TED, the “ideas worth spreading” nonprofit, which had organized a seafaring expedition to tackle

ocean issues. She was asked to give a talk about deep sea mining aboard the *National Geographic Orion*, as it cruised over the tropical waters soon to be worked by Nautilus. The consummate scientist, Van Dover is methodical and cautious in her thinking about the subject. She's soft-spoken but easy to smile, has graying, close-cropped hair, and, over the course of our talks aboard the boat, she exuded a quiet ambivalence over the mining question. Which makes sense, because she's spent her entire three-decade career studying the deep sea ecosystems it threatens to transform.



Hydrothermal vents. Image: [NOAA](#)

“I started studying these hydrothermal vents in 1982,” she told me, while the boat’s gently rocking deck churned my stomach. “They were discovered in 1979. So yeah, hearing someone was going to rip them up? Cut them up and destroy them?” she added, shaking her head. Of course she was concerned. “There are animals living at these active hot springs,” she says. “So, we’re really interested in seeing what the impact on those communities will be.” Life that gathers around hydrothermal vents is often surprisingly vibrant; it can include tube worms, sea snails, blind shrimp, and deep-water fish. Out the window of our cabin on the *Orion*, pillars of smoke rise in the distance, a product of the region’s slash-and-burn agriculture practices—a constant reminder that Papua New Guinea is poor, and that mineral royalties could go a long way.

Van Dover takes pains to note that Nautilus isn’t about to swiftly and surreptitiously mine an out-of-the-way environment under the cover of darkness. Quite the opposite, she says. The company came to her and asked for her expertise, and has since been unusually transparent and proactive. “They would ask very direct questions: So what are you concerned about?” she said. “If we take this one site away [ie, destroy Solwara-1], won’t [life] come back?” And that is exactly what Van Dover is concerned about: The ecosystems poised for destruction. Here’s another interesting thing about those habitats, and the animals that live in them—they get destroyed, fairly routinely, already. “The sites are overrun by volcanic eruptions, at intervals,” van Dover explains.

“I think about the East Pacific Rise, [another basin] where the eruptions happen every decade or so, and the animals really are adapted, and within months the animals are coming back in. In a couple years, you can’t even tell there was an eruption.” Unlike East Pacific Rise, however, Solwara-1 is a longer-lived site, meaning volcanic flows come much less often, and don’t destroy the habitats on the seafloor as regularly. These are the creatures that risk getting wiped out by Nautilus, too. At Solwara-1, some scientists worry that the animals might not have time to recover. Other scientists point out that this complex ecosystem is simply still poorly understood—we might have little idea what to expect if they’re mined.

Nautilus, meanwhile, says that it would proceed responsibly, and emphasizes the serious economic case for mining. “Solwara-1, for example, has 7 percent copper and 6 grams to metric tons of gold on average—more than 10 times higher than average grades on land. There is more copper on the seafloor than all known reserves on land,” Nautilus CEO Johnston says. (On land, the average grade of copper ore is below 0.6 percent, and gold yields fell to 1.2 grams to tons of gold in 2014.) “One of the primary determinants in a mine’s profitability is the grade of the resource, and so when you have seafloor grades that are 10 times higher than what’s found terrestrially, that is a major advantage for seafloor mining.” Furthermore, aside from the fact that the targeted mining grounds lay 5,000 feet below sea level, there are parts of the deep sea mining process that are actually *easier* than on-land mining. Hold tight: We’re going to get wonky with some mining jargon for a second.

“The seafloor massive sulfides that Nautilus is interested in are sit proud on the seafloor so they have no soil or sediment overburden—the overburden is water,” van Dover says. Overburden is the layer of rock or soil overlying a mineral deposit, and “sit proud” means, in mining speak, to “sit on top of.” That means there’s no obtrusive layer of land to peel away before you can start collecting your valuables; they’re sitting right there on the surface, ripe for the picking. Of course, that surface is the ocean floor, thousands of feet below sea level, which means Nautilus will need an elaborate, high-tech system to efficiently extract its prizes. And here’s where things start to get sci-fi.

“The mining itself involves using a surface ship from which remotely operated vehicles are lowered down onto the seafloor, and the material is ground up, and the ore is brought up to the surface, dewatered, and the dewatering fluid, the seawater, is put back down on the seafloor,” Van Dover says. “When the ship’s done mining one place it will move to the next place,” she says, “so there’s no roads, no infrastructure. So there are some good arguments for why, in a relative sense, that the environmental impact is less than what you’d see on land.” (How deep sea mining works, video. [Longer version here](#)) According to its public blueprints, the Nautilus plan involves three separate robotic, remotely-operated vehicles working in tandem to prepare, mine, and collect the minerals from the deep. Each clocks in at about 50 feet long, 15-20 feet wide, and weigh up to 310 tons. Built by the English remote vehicle manufacturer SMD, with US heavy machinery maker Caterpillar, together, three of the drilling robots are worth \$100 million. Each of them will be deployed from a giant ship, the Production Support Vessel, that will float above the mining operation like an oil rig.

## **Duke of York islands ignored in seabed mining debate**

Act Now! November 17, 2015



Kabakon Island, Duke of York Islands, Papua New Guinea



The stunningly beautiful Duke of York islands are the closest small islands to the site of the proposed Solwara 1 experimental mine in Papua New Guinea, yet the islanders say they have been completely ignored in the mine development process.



The 13 Duke of York islands sit offshore from Kokopo, in the narrow St George's Channel between New Britain and New Ireland. They lie directly south-east of where the seabed mining is scheduled to begin in 2017. The islanders are already facing the impacts of climate change with the rising sea level affecting food security on the low lying atolls. In 1999 the islanders collected signatures on a petition stating their overwhelming opposition to the proposed mining. The petition was presented to the East New Britain Provincial Government but, fifteen years later, the islanders are still waiting for a response. The islanders, through the Ramuaina Integral Development Forum and their spokesperson Philip Tokam, say nobody from the government or Nautilus Minerals, the Canadian company who will do the mining, have visited the islands to obtain their views or consent to the proposed mining.

This is despite the fact the entire economy of the islands is dependent on the sea and it provides the people with their only source of protein. Nearly every family on the islands is involved in fishing to provide food on their plates and cash incomes from sales of fresh and dried fish in Kokopo market. The mining operation will involve three giant 250 tone machines strip mining the ocean floor creating large plumes of sand, dust and crushed rock which people fear will disturb fish stocks. Once the crushed rock has been pumped to the surface and the valuable ores separated the unwanted waste will be dumped back into sea.

The giant machines will also create huge amounts of noise which will travel vast distances in the undersea environment, potentially disrupting species like whales, dolphins and sharks that rely on their own undersea sonar. Any leaks from the hydraulic systems on the machines will spill oil directly into the ocean. New Zealand has recently rejected two seabed mining applications because authorities say the potential negative impacts cannot be quantified or controlled. The Duke of York islanders fear they will be the first victims of their government's failure to take a similar precautionary approach.

### **Tahiti Opposition Leader Lashes Out At French Seabed Policies**

*Temaru: Paris 'raping Mahoi people's right to sovereignty'*

WELLINGTON, New Zealand (Radio New Zealand International, Nov. 12, 2015) – French Polynesia's opposition pro-independence leader, Oscar Temaru, has sharply criticised France, saying it was



raping the Maohi people's rights to sovereignty. Mr Temaru lashed out at Paris for retaining the rights to the territory's seabed and continental shelves, which are believed to be rich in rare earths. His comment comes as the President of the territorial assembly, who belongs to the anti-independence party, tabled a resolution, which asks France to cede these rights to French Polynesia. Mr Temaru says the rival camp's move and support is belated and hypocritical because its politicians had been collaborators with France and allowed Paris to seize these rights. His party colleague, Antony Geros, says France keeps refusing to recognise the decolonisation process approved by the United Nations two years ago. He says whenever the Tahiti question is raised at the UN, France walks out to have a smoke.

### **250-tonne underwater gold mining vehicles unveiled on Tyneside**

*Vehicles built for Nautilus Minerals have finally been completed by Wallsend's SMD following five years of engineering works.* By Tom Keighley, ChronicleLive, 11 Nov 2015

A trio of Tyneside-built undersea mining vehicles have been unveiled after a five-year, multi-million pound development project that has shown off the best of North East engineering. Wallsend engineers SMD and representatives from Canada's Nautilus Minerals were on hand yesterday to give a live demonstration of the three Nautilus vehicles, each weighing around 250 tonnes. Delivery of the vehicles is the culmination of a \$100m phase in Nautilus' project to mine high grade iron ore nodules and gold from the sea floor. The three pieces of kit – a bulk cutter, an auxiliary cutter and a collection machine – are now due to be taken to an unnamed location for testing in shallow waters before they loaded onto a specially built vessel and deployed in the Pacific Ocean. All three will operate at depths of around 1,500m in temperatures of 2.6 degrees celsius, controlled remotely by teams on board the vessel using sonar and mapping technologies. Ultimately a crew of around 130 will help to deploy and operate the machines from Nautilus' vessel.

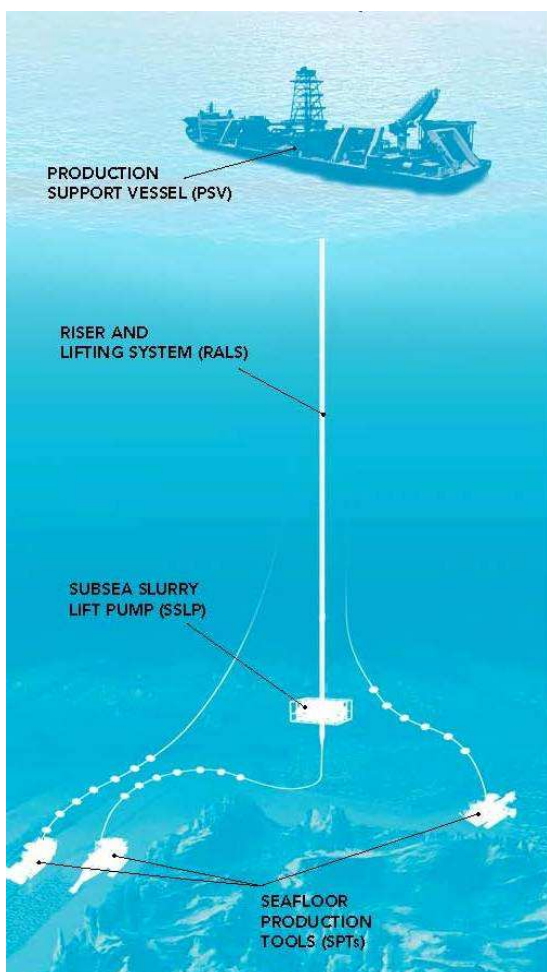
At SMD's Wallsend yard, international media were treated to a live demonstration of the machines, which feature components made by the likes of Caterpillar and North East neighbours Pearson Engineering. Workers explained that Nautilus machines are designed to break rock with much greater forces than their land-based counterparts and can only be operated on land at low temperatures for fear of overheating. Nautilus Mineral's chief executive Mike Johnston flew to Tyneside for the unveiling. He said: "We're opening up a huge potential for seabed minerals which requires the sort of expertise that SMD has. "Before we started this project we ran a design challenge and SMD were always in the top two companies, and they won it comprehensively. Everybody in the oil and gas space knows about their prowess. "On the vessel side of the operation we've got some of the world's best companies involved, including the likes of Siemens and Rolls Royce, so it only natural that we ended up with SMD."



Nautilus Mineral's Auxiliary Cutter

North East-based engineers will now follow the Nautilus machines to China where they go through testing before mining is expected to begin in 2017. As the first project of its kind, international eyes are now on the Nautilus project to see if seabed mining can be commercially viable. Mike Jones, deputy chief executive officer at SMD, said: “It’s very much been a joint effort combining Nautilus’ expertise in mining and SMD’s expertise in subsea equipment. There’s still quite a lot to do in order to put these machines to work. We’ll work together in the testing phase, which comes next, and the initial working phase. “From there it’s a case of learning. These machines are the first of their type and we’ll work with Nautilus to build future generations of the technology.” Nautilus – a company listed on the Toronto Stock Exchange – have been given the go-ahead to mine at their first site off the coast of Papua New Guinea, and also hold licences for other sites which will require environmental permits before operations can begin.

The firm has faced opposition from environmental groups and non-governmental organisations who fear the mining processes will cause irrevocable damage to the deep sea ecosystem. Mr Johnston added: “There’s a lot of stuff said about seafloor mining which just isn’t true. It’s going to be very hard for some of these people to stand on the sidelines, when we’re operational, and see that these things just aren’t happening. “We’re now talking to other governments where we hold licences in order to progress them. Next year the International Seabed Authority is set to publish the first set of regulations on the exploitation of seabed nodules, and that will set the ball rolling for permits in international waters – which we are keen to do.”



First, a robot called the Bulk Cutter will be dispatched to prepare the way. It will be dropped to the Solwara-1, 5,000 feet down. It will then use its boom-mounted cutting head to dig “benches” in the sea floor for the next wave of robots to work upon. Second comes the Auxiliary Cutter, which is larger, and capable of higher cutting capacity, but can only work in the trenches carved by the AC.

The rock will be disaggregated on the seafloor by the continuous cutting of both massive machines, Nautilus explains on the company website, vehicles it says are “not unlike coal or other bulk continuous mining machines on land.” After the material has been extracted, the Collecting Machine is sent in.

That machine “will collect the cut material by drawing it in as seawater slurry with internal pumps and push it through a flexible pipe to the riser and lifting system,” which will in turn pump that slurry to the surface. Onboard, the slurry is dewatered and the desirable solids are stored in the hull, where they await transport from yet another vessel. Each of these robots can be remotely operated from above the surface, and are built to withstand the immense pressure of the deep. But as Nautilus notes, they’re mostly adapted variations of extraction tech currently used on land to clear land away for coal and ore. Just underwater—deep, deep underwater.

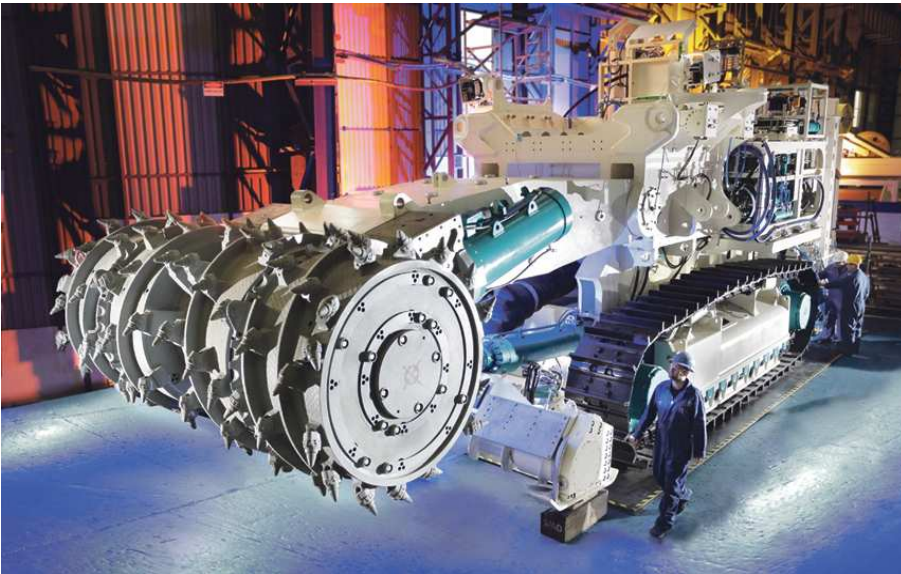


Image: Nautilus

All told, it’s a complex, high-tech, and high-risk undertaking. The process is carried out in an extreme environment, and if those robots break down, repairs will be costly, as sending down a submersible to such depths would no doubt pose a challenge. And an accident, in such a high-stakes situation, stands to pollute the local environment and attract a lot of unwelcome attention. As such, Nautilus has made a lot of people nervous.



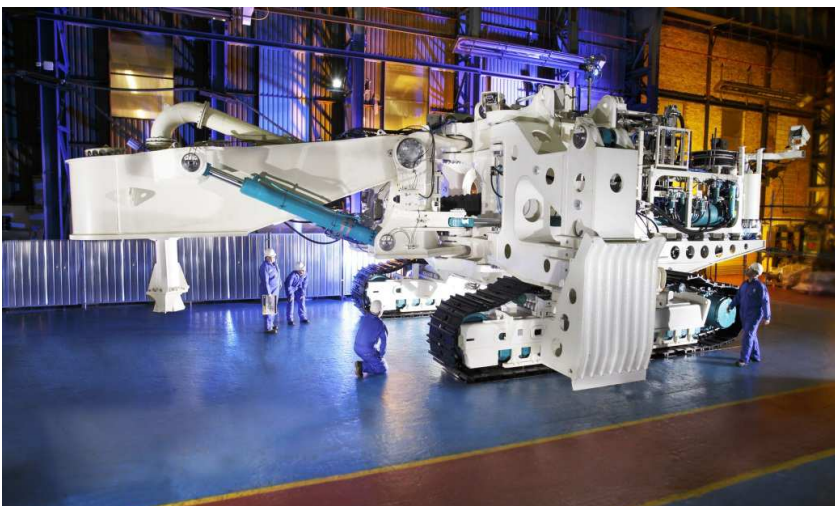
Image: Papua New Guinea Mine Watch



Local protests against the mine have been rising up in Rabaul, led by concerned New Guineans, van Dover tells me. Concerns range from the noise and light generated by the offshore operation, as well as environmental damage. As we're driving through the city's ash-pocked roads in a bus, she asks a local tour guide if she's seen the protests. "Oh yes," the woman mumbles, and looks out the window. A bit later, she told me that many of the locals "are unhappy" but didn't want to elaborate; she seemed nervous about casting Rabaul in a negative light. Tourism collapsed here following the eruption, and it appeared that foreigners were still a relatively uncommon sight on the island. Whenever we drove, people would smile, wave, even sometimes call out at the sight of us. Though Nautilus has yet to attract the international-scale attention of other trailblazing extraction projects, it's already plenty divisive. Locals may be concerned about foreign operations entering PNG waters and the threat to its environment, but environmentalists worldwide are beginning to organize around the issue, too. Protests against the Solwara-1 have already been amplified by a nascent global movement seeking to halt deepwater mining outright.

One opponent of the project is Richard Steiner, a marine conservation biologist who formerly taught with the University of Alaska. Steiner has studied marine disasters ever since the Exxon Valdez unfolded in his backyard. I first met him years ago: He was one of the first experts to arrive on the scene of the BP spill in 2010, where he helped monitor and analyze the fallout of the disaster. Today he spearheads a nonprofit called Oasis Earth, and lends his expertise to various conservation efforts. The Deep Sea Mining Campaign, which he supports, was organized to slow the drive towards mining the deep, and, in particular, its highest-profile poster project. "The idea of destroying the biological communities at the Solwara-1 hydrothermal vent system is contrary to everything marine conservation stands for," Steiner tells me in an email. "Mining will destroy a deep sea biological community that isn't even well understood scientifically, and will likely cause extinctions of species that have yet to be identified."

"That alone is an ethical line we cannot condone," he adds. "It will cause severe and long lasting impacts to this vent field, and for minerals we simply don't need (particularly gold). This project is a spectacularly bad idea." The full impact the project will have on the deep sea environment is difficult to discern. Nautilus commissioned a US environmental consulting nonprofit, Earth Economics, to carry out an environmental assessment of Solwara, which cast it in relatively favorable light. But Steiner and other critics have called its subsequent report misleading, and charged that it fails to take into account myriad ecosystem services and marine life vulnerabilities. Nautilus, of course, insists that its plans are not only safe, but even safer than the alternative. On-land mines are major polluters; leaching and runoff can contaminate watersheds and soil, create sinkholes, and encourage logging and development. The pollution can endanger the health of those living nearby, too. With deep water mining, that's less of a problem.



Auxiliary cutter. Image: Nautilus

“There’s no society—there’s no civilization, no human beings living on the seafloor, obviously,” van Dover says. “So that makes it a little bit simpler in terms of the societal impacts, unlike on land, where people are involved.” Still, conservationists argue there are other ways to obtain copper without succumbing to the deep. “Deep sea mining proponents seldom mention the vast resources still available on land, or the need to dramatically increase the efficiency of metal use in the global economy, cradle-to-cradle design, and landfill mining,” Steiner tells me. “We have to break the ‘economy of waste’—mining raw minerals, using them once or twice, discarding them, thus creating more demand for mining.” The biggest question, of course, isn’t just the dangers of Solwara-1. It’s whether this project may kickstart a wider industry, in places not as thoroughly vetted. “Korea and Japan are both active, a company called Neptune is also an active player right now,” van Dover says. (source: <http://motherboard.vice.com/read/deep-sea-gold-rush>)

### **SOS – The world’s Oceans facing emergency Singapore Summit set to worsen the crisis** PNG Mine Watch, November 6, 2015



Civil society organisations from across the globe are highly critical of an international oceans conference to be held in Singapore next week. Mis-named the Sustainable Ocean Summit, the conference is touted as providing a platform to advance industry-driven solutions to ocean sustainability challenges. Indeed, the world’s oceans are in dire straits largely due to industrial activity. Catastrophic extinctions are forecasted over the next two decades if pollution, resource extraction and climate change are not mitigated[1]. In apparent ignorance of this, the Summit’s program maps a way forward based on maintaining existing forms of ocean exploitation and facilitating new ones, such as seabed mining.

“What the world’s oceans need are community and government driven solutions to the crisis created by industrial capitalism”, says Riaan Eksteen of the Namibian based Swakopmund Matters.

“Our national Government in Namibia respected the concerns of its citizens about the unknown risks of seabed mining and has established a moratorium on this industry. Where are the voices of civil society at this summit on ocean sustainability?” Mr Eksteen continued, “As highlighted in the Pope’s recent Encyclical on the Environment[2], we pursue at the planet’s peril the relentless exploitation and destruction of the environment in the name of profits, excessive faith in technology, and political short sightedness. This conference looks set to reinforce all of these destructive elements.” Namibia is not the only country to lead the way with a precautionary approach to seabed mining.

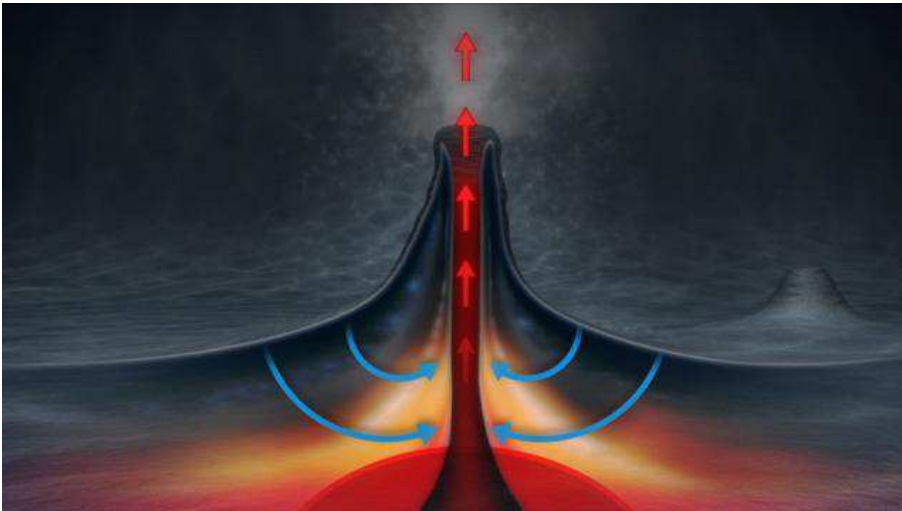
A moratorium has also been declared in Northern Australia[3] and in New Zealand the Environmental Protection Authority set a global precedent by declining[4] the country’s first two seabed mining applications over the last eighteen months. Phil McCabe of Kiwis Against Seabed Mining notes, “With 99% of public submissions opposed to the first sea bed mining application, it’s clear that there is no social licence for an industry that promises little but further degradation of the marine environment. It’s ironic that the acronym for the Summit is SOS as this does accurately de-



scribe the state that industry has left our oceans in.” Dr. Helen Rosenbaum of the Deep Sea Mining Campaign states, “there is no place for the promotion of deep sea mining at a conference purporting to be about ocean sustainability. The world’s oceans are already under intense pressure.

To discuss deep sea mining in the same breath as corporate responsibility is an oxymoron[5]. This conference is not about the sustainability of our oceans but about securing industry access to marine resources. This is incredibly short sighted even from the narrow point of view of industry self interest: once marine ecosystems collapse so will industry profits as will local, national and regional economies.” According to Dr. Catherine Coumans of MiningWatch Canada, “Changing operating environments from terrestrial to marine doesn’t change the nature of the mining industry itself. Communities all around the world bear testimony to the devastation caused by mining in the name of profits. Now the same industry and the same investors with the same profit motives are seeking to plunder the oceans. This Summit’s attempt to dress this up in the language of sustainability will not enable the leopard to change its spots.”

### **Global Opposition Is Mounting Against the Latest Environmental Abuse – Deep Sea Mining** Occupy.com, 4 November 2015, by Tom Lawson



The world's oceans are in a bad way, to put it mildly. Decades of overfishing, industrial pollution, plastic waste and threats to basic ecological stability posed by climate change all demonstrate how "humanity is collectively mismanaging the ocean to the brink of collapse," according to the World Wildlife Fund's [Living Blue Planet Report](#) released in September. Now another threat is emerging: deep sea mining. Seabed minerals were discovered as far back as 1873. But it's only within the last decade, as demand has grown for items such as smartphones – and as the depletion of inland resources has pushed mining exploration to further extremes – that technology has made the exaction of copper, zinc, manganese, nickel, cobalt and gold from under the sea possible. Now, the world's first-ever commercial deep sea mining (DSM) project is due to start in under two years time – and environmentalists and scientists are worried. "We currently have very poor understanding of deep sea ecosystems, few protected areas, and management regimes that are rudimentary at best," said marine conservation biologist Rick Steiner. "Thus, the potential for irreversible ecological damage due to DSM is high. We need a ten-year continuous time series of research before we will have even a vague understanding of the environmental impact." Some action is being taken in the face of these uncertainties. In February, a team of researchers from 25 European institutions began a three-year study on the potential ecological effects of DSM. But it could be too little too late.

### **Mining in the Pacific**

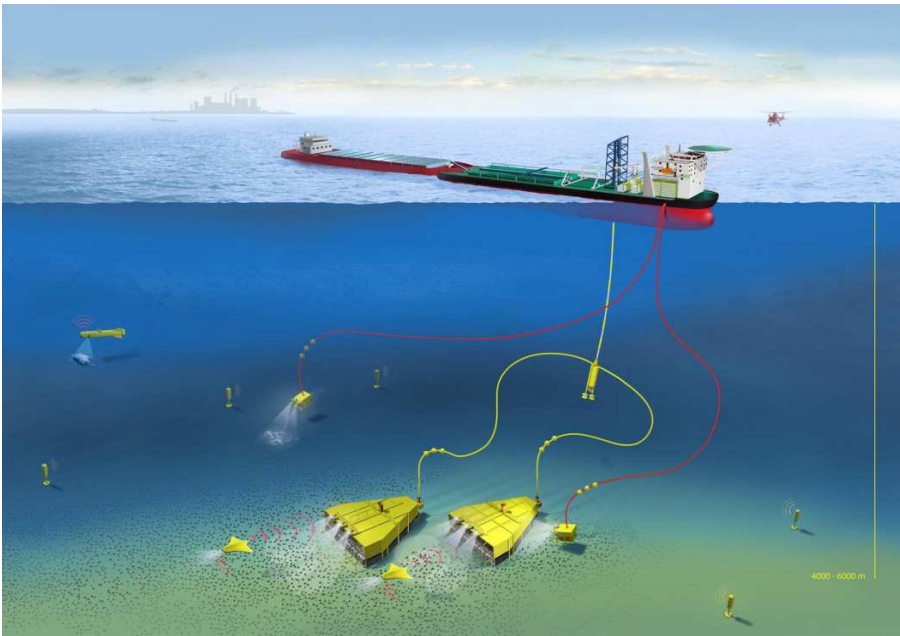
The Solwara 1 deep sea mine, located 19 miles off Papua New Guinea in the Pacific Ocean, is the first project in the world to be granted a commercial DSM extraction license. The application for the joint venture between Canadian mining company Nautilus Minerals and the Papua New Guinea government was submitted in 2008. But due to an undisclosed equity dispute, the 20-year extraction license didn't get approval until last April. Production is now expected to start in early 2018, and the company plans to mine deposits of copper, zinc and gold worth hundreds of millions of dollars. Responding to concerns about ocean health, Nautilus claims mining the seabed will have less of an impact than terrestrial mining due to the smaller scale of its operation – with DSM, minerals are found in concentrated nodules associated with volcanic activity – and the fact that no roads or infrastructure would be required to gain access. However, independent science-based reports released in 2009, 2011 and 2012 detail deficiencies in the science and modelling used by Nautilus. The reports claim that DSM could cause irreversible ecological damage to sites that could contain hundreds of species previously unknown to science. It also says the mining activity would introduce light and noise pollution in pristine areas, and could produce sediment plumes introducing toxic metals into the food chain – harming tuna, dolphins and potentially humans.



### Opposition is Growing

The latest challenge to Solwara 1 has come from the Deep Sea Mining Campaign, which published a report in September entitled *Accountability Zero* that was endorsed by economists, scientists and NGOs including Greenpeace Australia and Earthworks. The group analyzed the results of an environment conducted by the American consultancy firm Earth Economics, and commissioned by Nautilus, which compared the potential impacts of Solwara 1 to existing land-based copper mining. *Accountability Zero* claims the report failed to account for the unique social, cultural and economic values of oceans. And it's not just oceanographers and NGOs that are concerned.

Despite Papua New Guinea's government ignoring a 24,000-strong petition that calls for a stop to experimental seabed mining, opposition to DSM from the country's citizens continues to grow. In 2008, the Bismarck Solomon Seas Indigenous Peoples Council was formed with the specific aim of opposing Solwara 1. Papua New Guinea Mine Watch is also calling for Pacific Ocean mining to stop, and there is an ongoing petition urging Pacific leaders to take a cautious approach to DSM. "Never before in Papua New Guinea's history has a development proposal galvanized such wide-ranging opposition," said Dr. Helen Rosenbaum, coordinator of the Deep Sea Mining Campaign, "from students and church leaders – in 2013 the Pacific Conference of Churches passed a resolution to stop all forms of experimental seabed mining in the Pacific – to NGOs, academics, and national and provincial parliamentarians."



### Setting a Precedent

Solwara 1 is currently the only DSM project with a commercial operating license, but many others are waiting to follow in its footsteps. The number of companies seeking to mine in international waters has tripled in the last four years, and the U.S., UK, Russia, China, Japan, Brazil, Germany and South Korea all have exploration projects underway. Most of these are in the Pacific, while others are in the Atlantic Ocean, Indian Ocean and the Red Sea. Separate projects have also been proposed in the national waters of Fiji, the Cook Islands, Tonga and New Zealand. The process regulating DSM is distinct. Permits to explore for minerals are issued by governments within their territorial waters – 200 nautical miles from shore – or by the International Seabed Authority (ISA) in international waters. Formed in 1994, the ISA was established by the UN to regulate international waters, described as “common heritage of mankind” and not subject to direct claims by sovereign states. But a major criticism of the ISA has been the issuance of exploration permits without having first approved environmental standards.



Despite issuing mining permits since its inception, it wasn't until July that the ISA finally brought together representatives from its 170 member states to begin drafting a framework on environmental standards and regulations, which is expected to be finalized late this year at the earliest. In the lead-up to July's meeting, a policy paper published in *Science* called for the ISA to cease issuing permits until environmental controls are in place. Written by researchers from the Center for Ocean Solutions and co-authors from leading global institutions, the report proposes a strategy for balancing commercial extraction with protection for seabed habitats. But despite the paper's warnings, the ISA went ahead and authorized the latest Pacific exploration contract to China Minmetals. Altogether, the ISA has issued 27 permits for mineral exploration covering around 1.2 million square miles of seabed. All but eight have been issued within the last four years.



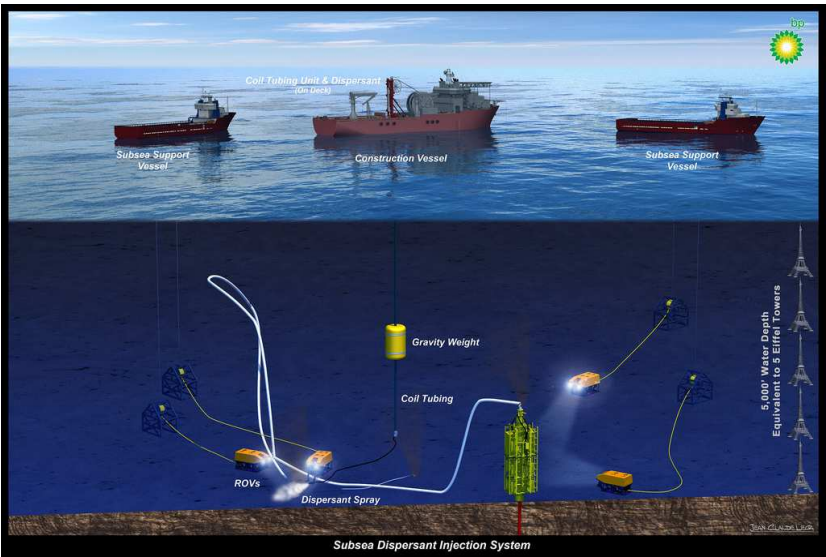
### Building International Support

With the surge in exploration permits has come a gradual but growing international movement against DSM. At the 2012 Rio+20 conference in Brazil, a Fiji-based women's NGO marched with an anti-DSM message, and in 2013 the Namibian government issued a moratorium on all deep sea exploration within its waters until a long-term impact assessment is made. International campaign groups including Greenpeace and the Yes to Life, No to Mining movement have issued statements against DSM. In the U.S., the Center for Biological Diversity is going further and taking legal action. In May, the organization launched a lawsuit against the government over its approval of the first-ever large-scale DSM exploration project between Hawaii and Mexico, claiming it lacked the required environmental assessment.

New Zealand is another country where anti-DSM campaigning has been strong due to the government's 2004 Foreshore and Seabed legislation, which created a series of prospecting permits for companies seeking to exploit the iron sand reserves in the west coast seabed. As a result, the community-based action group Kiwis Against Seabed Mining (KASM) was established in 2005 to protest DSM, and its biggest victory to date came against Trans Tasman Resources in December of last year. TTR wanted to mine 50 million tons of iron sand from the seabed, but was rejected by the country's Environment Protection Authority. The company planned to appeal, but withdrew following an overwhelming response from people opposed to the proposal, including 5,000 submissions from local citizens. The victory showed that DSM projects could be overcome. But in New Zealand and elsewhere, many see the public and civil society response still lacking.

"To date seabed mining has been very much under the radar but it absolutely warrants a lot more attention," said Phil McCabe, chairman of KASM. "Greenpeace has stated that seabed mining has

the potential to have the largest areal impact on the planet of any human activity – it’s akin to deforestation on a massive scale, and we need to turn people on to [what it is].” An Avaaz petition calling for a moratorium on seabed mining prior to the ISA’s July meeting failed to reach its target, falling 7,000 signatures short of its 80,000 signature goal. But it demonstrated how close the anti-DSM movement could be to galvanizing widespread awareness and support. The question is: with so many mining proposals already underway and a lack of legislation protecting the deep sea, will the opposition come too late?





## **How a small office in Jamaica might be our best hope for regulating deep sea mining**

Aline Jaeckel, *The Conversation*, October 22, 2015.

Mining the deep oceans for minerals may soon become a reality. The deep seabed holds untapped deposits of minerals such as gold, copper, cobalt, and rare earth elements. Although mining has not yet started, exploration work for these deposits is underway across the world's oceans, and we are seeing momentum towards the development of a new industry with the first Asia-Pacific Deep Sea Mining Summit held in Singapore in September. While this emerging industry could provide access to important raw materials, the risks involved are many. Mining up to 6 km below the ocean surface has never been done before. It will interfere with fragile ecosystems and unique biodiversity in the deep oceans.

Deep seabed mining is likely to involve the destruction of habitat and damage to the fauna associated with mineral deposits, such as cold-water coral and sea life around hydrothermal vents. The mining process is also likely to create massive sediment plumes that could lead to alterations in the seabed and water column communities and affect food availability. The distance that plumes will travel is not known. Perhaps the most problematic factor is our lack of knowledge of the potential environmental effects, particularly any cumulative effects with other ocean uses or multiple mining operations in an area. As a recent WWF report underlines, data on marine ecosystems remains limited. In fact, the deep sea is the largest and least known ecosystem on the planet.

### **Who regulates seabed mining?**

To minimise these risks and uncertainties, we need a strong regulatory framework. So who is able to regulate this emerging industry? The answer depends on where the deposits are located. Under international law of the sea, states have jurisdiction over resources in the water, seabed and subsoil within 200 nautical miles (370 km) of their coast. A state's rights over the seabed can reach further if it makes a claim to jurisdiction over an extended continental shelf. Seabed mining within these zones is regulated by each coastal state itself, although some states are only just starting to regulate this emerging industry. Most mineral resources are, however, likely to be located on the vast international seabed, beyond national jurisdiction. This international seabed covers roughly half of Earth's surface, and is subject to a unique legal regime based on the 1982 United Nations Convention on the Law of the Sea.

When the Convention was negotiated, states agreed that the international seabed and its mineral resources form part of the "common heritage of mankind". The aim was to ensure that the mineral wealth of the deep sea would be shared among all, rather than being exploited by a few technologically advanced states that have the capacity to recover minerals from several kilometres' depth. To this end, the Convention established the International Seabed Authority (ISA), headquartered in Jamaica. The ISA is a small but powerful institution that regulates and administers all seabed mining on the international seabed on behalf of everyone. The ISA has so far approved 27 exploration contracts for public and private entities, covering a total of some 1.28 million square km. The vast majority of these exploration contracts were issued in the past four years, during which the emerging seabed mining industry has rapidly gained momentum. Against the background of this "gold rush", the ISA is now developing a regulatory framework for commercial-scale seabed mining. This is proving a considerable challenge.

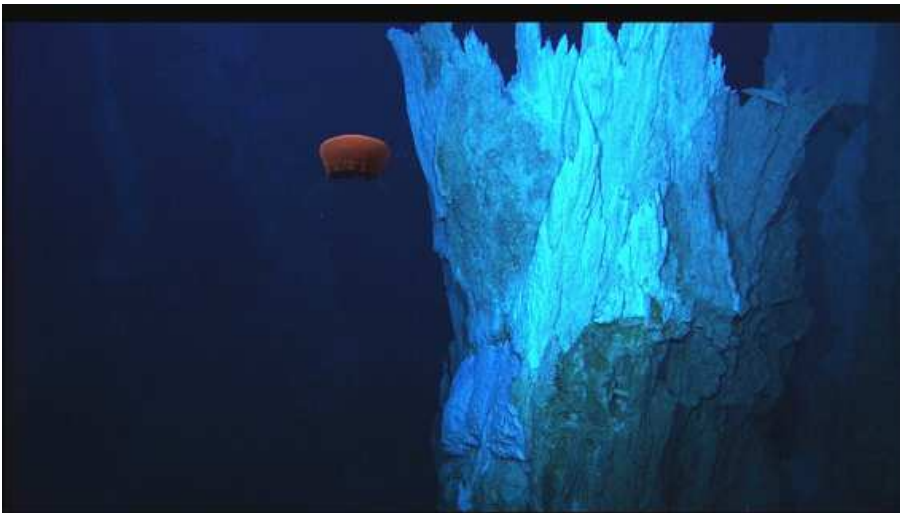
### **The need for a public debate on seabed mining**

Many questions remain unanswered. Will the regulations foresee a staged approach, first trialling mining on a small scale to assess the environmental impacts before authorising large-scale operations? What level of harm to marine ecosystems is deemed acceptable by the public? How will it be ensured that mankind as a whole can benefit from the use of the international seabed? What level of

returns will the ISA receive from the mining operations? We currently have the chance to set in place environmental and social safeguards before commercial deep seabed mining starts. To make the most of this opportunity, though, we need a robust public debate about the risks, benefits, and regulatory parameters of seabed mining. But the challenge is that deep seabed mining is not yet widely discussed. The ISA remains a little-known institution, despite regulating and controlling access to raw material on half of the planet's surface. Greater awareness and engagement will be critical to arrive at a strong regulatory framework for this new use of our oceans in a way that benefits all mankind.

### **Deep Sea Mining a New Ocean Threat**

Richard Steiner, Huffington Post, 10/20/2015



(Image courtesy of NOAA)

Adding to concerns about the disastrous decline in ocean ecosystems, now there is another emerging threat - deep sea mining. While shallow water mining for sand, gold, tin, and diamonds has been conducted for decades, commercial deep sea mining has yet to occur anywhere. But that's about to change. Extensive deep sea mineral exploration is currently underway in international waters governed by the International Seabed Authority (ISA), under the U.N. Convention on Law of the Sea (UNCLOS), and within Exclusive Economic Zones (EEZs) of many coastal nations.

There are currently three main types of deep sea mineral deposits of interest to industry and governments:

1. Polymetallic nodules (also called "manganese nodules") are potato-sized metal nodules found on the abyssal plain from 4,000 m - 6,000 m deep. These nodules are rich in manganese, nickel, cobalt, copper, lithium, molybdenum, iron, and Rare Earth Elements. Nodules grow slowly over millions of years, to diameters from 5 cm - 50 cm, and host unique invertebrate communities. Currently, 13 national consortia operate exploration leases on 4.5 million km<sup>2</sup> of the Clarion-Clipperton (Fracture) Zone (CCZ), between Baja and Hawaii. The U.S., as a non-party to UNCLOS and ISA, issued exploration leases on its own to Ocean Minerals Company (OMCO), a subsidiary of defense contractor Lockheed Martin, to explore for nodules in the CCZ. The only nodule deposits being seriously considered within a national EEZ at present are in the Cook Islands in South Pacific.

2. Seafloor Massive Sulphide (SMS) deposits are found beneath deep sea hydrothermal vents along the 67,000 km of volcanically active mid-ocean ridges and back arc basins, between 1,500 m - 5,000 m deep. These contain high-grade copper, gold, silver, zinc, and other trace metals. Deep sea hydrothermal vent ecosystems were first discovered in 1977 at the Galapagos Rift, and stunned the

world of science, as these vent systems rely entirely on chemosynthesis rather than photosynthesis - the first ever known. Over 300 deep sea vent systems have been discovered so far, and it is estimated that perhaps only 500 - 5,000 may exist in the world ocean, making this one of rarest ecosystems in Earth's biosphere. China and Korea hold contracts to explore SMS deposits in international waters of the Indian Ocean, and Russia and France hold exploration leases on the Mid-Atlantic Ridge. Other SMS deposits being considered are in waters of Papua New Guinea (PNG), Vanuatu, Palau, Niue, Fiji, Micronesia, Solomon Islands, Tonga, and New Zealand. The Nautilus Minerals "Solwara 1" project in PNG waters is fully permitted, the mining ship and equipment are being built, and mining is scheduled to begin in 2018. This would be the first commercial deep sea mining project in history.

3. Cobalt-rich ferromanganese crusts are found on summits and flanks of seamounts at 400 m - 4,000 m depth. There are some 10,000 seamounts in oceans rising at least 1,000 m above the seabed (and perhaps another 90,000 smaller seamounts). Many are in EEZs of central Pacific islands (Federated States of Micronesia, Marshall Islands, Hawaii, Johnston Atoll), and in international waters of the tropical Pacific. Metal crusts form on shoulders of seamounts, rich in cobalt, nickel, copper, iron, manganese; rare metals such as tungsten, platinum, bismuth, tellurium, etc.; and Rare Earth Elements. Crusts grow slowly, 1 mm - 5 mm per million years, and can reach total thickness of up to 260 mm. Seamount crusts are currently being explored by China and Japan in international waters of the western tropical Pacific, but many feel actual mining of seamount crusts would be by far the most problematic and least feasible.

Marine phosphate (fertilizer) and methane hydrate (energy) resources found in shallower waters, 100 m - 500 m deep, are often discussed in context with deep sea minerals. Marine phosphate mining is in consideration off Namibia (currently under moratorium), New Zealand (the environmental permit was denied earlier this year, but the developer is considering reapplying next year), and off Baja Mexico, where Odyssey Marine has submitted its EIA for mining the Don Diego phosphate deposit in 70 m water depth, 12-25 miles offshore. Japan has successfully tested methane hydrate, or "fire ice," extraction from its offshore waters.

But here's the problem. The deep ocean, where mining is proposed, constitutes the largest and least understood biological habitat on Earth. It's an Alice-in-Wonderland world of extremes, extraordinary adaptations, bizarre organisms, beauty and mystery. The region is characterized by darkness (infused with sparkling bioluminescence), extreme pressure, cold temperatures, high biodiversity (perhaps millions of species, most yet to be identified), slow growth and reproductive rates, and high sensitivity to disturbance (low resilience). Given our poor understanding of deep sea ecosystems, growing industrial interest, rudimentary management, and insufficient protected areas, the risk of irreversible environmental damage here is real.

Environmental risks and impacts of deep sea mining would be enormous and unavoidable, including seabed habitat degradation over vast ocean areas, species extinctions, reduced habitat complexity, slow and uncertain recovery, suspended sediment plumes, toxic plumes from surface ore dewatering, pelagic ecosystem impacts, undersea noise, ore and oil spills in transport, and more. Due to the global rarity of deep sea hydrothermal vent ecosystems, the impact of vent mining would be disproportionately high relative to terrestrial mining. Full-scale nodule mining on the abyssal plain would affect thousands of square miles of ocean floor, kill attached invertebrate communities, and create huge subsea sediment plumes that would flow and settle over thousands of square miles of seafloor. Such sedimentation would smother seabed habitat, reduce habitat complexity and biodiversity over vast areas, and post-mining recovery would be extremely slow. Mining of cobalt crusts on seamounts would cause enormous, possibly irreversible impacts to unique, productive seamount ecosystems.

Clearly, we need to avoid such ecological damage. Before any deep sea mining moves ahead, we would need much more extensive scientific research - species identification, community ecology, distribution, genetics, life histories, resettlement patterns, resilience to disturbance, and at least a 10-year continuous time series of observations to understand dynamics of proposed mining sites over-time. In addition, we need more robust management regimes at the ISA and in coastal nations, royalty-sharing and liability agreements, stakeholder engagement, and significant advancements in subsea technology. Until this is achieved, the only wise policy is a global moratorium on all deep sea mining.



(Image courtesy of NOAA)

The need for more deep sea Marine Protected Areas is paramount. New Zealand established its Kermadec Ocean Sanctuary this year on over 620,000 km<sup>2</sup> of the islands and submarine volcanoes northeast of the main islands; Cook Islands established a marine reserve on 1.1 million km<sup>2</sup> (over half) of their EEZ; the U.S. established a 1.2 million km<sup>2</sup> Pacific Remote Islands Marine National Monument; and the ISA established Areas of Particular Environmental Interest (APEIs) over about half (or about 2.3 million km<sup>2</sup>) of the area currently under lease in the CCZ. This is a good start, but still insufficient.

Industry and governments recognize the huge challenges in mining the deep ocean, but are resolved to move forward anyway. As justification, they invoke the "peak minerals" argument, depletion of land-based minerals, and a projected increase in mineral demand in the world economy. But mining proponents habitually avoid discussing the opportunity to reduce mineral demand by increasing the efficiency of metal use in the global economy, cradle-to-cradle design, recycling, and landfill mining. To build a sustainable economy, we will have to break the "economy of waste" - mining raw minerals, using them once or twice, discarding them, and continuing the demand for mining raw minerals. Surely at some point, with smart renewable metal use, we will have enough minerals already up into the global economy and won't need to keep digging holes for more. The sooner we get there, the better.

The Nautilus Minerals "Solwara 1" vent/SMS mining project in PNG waters will likely be the first deep sea mining project, with others following elsewhere in PNG, Tonga, and Fiji. Others projects to watch in national waters include Odyssey's Don Diego phosphate mining project off Baja, and manganese nodule mining in the Cook Islands. Mining on the international seabed is likely 5-10 years off, but there is intense political pressure to do so. This emerging industry would result in serious impacts to our oceans, so it is critical for civil society to engage now, in the early stages of exploration and development. It would be truly unfortunate if we allow the same industrial paradigm that destroyed much of the terrestrial ecosystems of our home planet to do the same in the deep sea. It is time to change this model. This is a very big deal, and we need to pay close attention.

Groups such as the Deep Sea Mining Campaign, MiningWatch Canada, Greenpeace, Earthworks, and the Center for Biological Diversity are doing great work on the issue. The future of our oceans, and thus our planet, may depend on their success.

### **Deutschland will Schätze 4000 Meter unter dem Meer bergen**

Vertrag mit Frankreich zur Zusammenarbeit im Tiefseebergbau  
Hamburger Abendblatt, 19.10.2015

Bremerhaven. Mit vielen Wünschen an die Bundesregierung trifft sich die maritime Wirtschaft ab heute in Bremerhaven zu ihrer nationalen Konferenz. Sie erwartet von der Bundesregierung klare Aussagen zur Stärkung der Wettbewerbsfähigkeit der maritimen Wirtschaft. Der Maritime Koordinator der Bundesregierung, der SPD-Bundestagsabgeordnete Uwe Beckmeyer, will auf der Konferenz eine entsprechende Strategie vorlegen. Augenmerk legt er auch auf eine neue Übereinkunft zwischen Deutschland und Frankreich: Die beiden Staaten wollen den Bergbau im Meer vorantreiben. Sowohl die Regierungen der beiden Länder wie auch Industrieunternehmen werden am Dienstag im Rahmen der Nationalen Maritimen Konferenz in Bremerhaven eine entsprechende Absichtserklärung unterzeichnen, die dem Abendblatt vorab vorliegt. Dabei entsteht eine bedeutsame Allianz, denn sowohl Deutschland wie auch Frankreich verfügen über Tiefseebergbaulizenzen bei der Internationalen Meeresbodenbehörde.

### **Deutschland will unabhängiger vom Import von Rohstoffen werden**

Angesichts steigender Preise gerät der Tiefseebergbau zur Rohstoffversorgung immer mehr in den Blick. Deutschland ist als Industrienation beispielsweise im hohen Maße vom Import wichtiger Metallrohstoffe abhängig. Gelingt es deutschen Firmen, eigene Zugänge zu den Rohstoffen zu bekommen, würde die Versorgungssicherheit wachsen. Zur langfristigen Sicherung des Zugangs zu Metallrohstoffen sind vor allem Vorkommen von Manganknollen am Meeresboden, Kobaltreiche Manganerzkrusten und Massivsulfiden von großem Interesse. Seit 2006 verfügt Deutschland über eine Lizenz zur Erkundung von Manganknollen im Pazifik und seit 2015 über eine zweite für Massivsulfide im Indischen Ozean. Einziges Problem: Ein Abbau im großen Stil rechnet sich noch nicht. Genau hier setzt die Übereinkunft mit Frankreich an. Deutschland will mit den französischen Partnern Strategien zur Umsetzung kommerziellen Tiefseebergbaus in den jeweiligen Lizenzgebieten entwickeln. "Deutsche Unternehmen können dafür zuverlässige, innovative Technologien liefern", so Beckmeyer.

Unterstützt wird die Politik aus der Wirtschaft. Seit April 2014 gibt es auf deutscher Seite den Verein DeepSea Mining Alliance ein Zusammenschluss deutscher Industrie Unternehmen, der die Kommerzialisierung des Tiefseebergbaus vorantreiben will und internationale Kooperationen zur Forschung und Entwicklungen sucht. Projektpartner ist in diesem Fall das Französische Maritime Cluster (FMC). Synergieeffekte lassen sich durch die Nutzung verwandter Technologien aus dem Bergbau und Pumpentechnik erzielen. Technologische Herausforderungen für eine Kommerzialisierung des Abbaus sind die Erhöhung der wirtschaftlichen Effizienz, und die Verbesserung der Umweltverträglichkeit. Wie aus dem Bundeswirtschaftsministerium zu hören ist, wollen Deutschland und Frankreich Impulse für eine stärkere internationale Zusammenarbeit am Meeresboden geben, und dabei hohe Umweltstandards durchsetzen. "Die Umsetzung eines verantwortlichen Tiefseebergbaus ist nur in einer internationalen Zusammenarbeit möglich. Deshalb freue ich mich, dass es uns gelungen ist, mit Frankreich eine Kooperationsvereinbarung auszuhandeln", sagte Beckmeyer dem Abendblatt.



## **Offshore mining policy vital**

The National, October 15th, 2015

By SHIRLEY MAULUDU

THE country should have an Offshore Mining Policy by the end of the year or early next year to cater for offshore mining operations, an official says. Department of Mineral Policy and Geohazards Management secretary Shadrach Himata was responding yesterday to questions by The National on whether it was necessary to have an offshore mining policy in place before any seabed mining operation could take place. “The Offshore Mining Policy is currently going through the Government’s vetting and approval process,” Himata said. “If all goes well, the policy will be applicable by end of the year or early next year.” However, he said the Mining Act 1992 catered for offshore operations such as the Nautilus Minerals Solwara One project, but only to a certain extent. “The current mining legislation (Mining Act 1992) was sufficient enough to cover the regulation of both onshore and offshore mining activities in Papua New Guinea,” he said.

He said although the current Act was more comprehensive, it requires more improvements. “Although the current Act is a bit more comprehensive with respect to the regulation of onshore mining activities, it requires more specific improvements on the regulation of offshore mining activities,” Himata said. Hence, the Nautilus Solwara1 project was sufficiently permitted under the current Mining Act 1992. “What the department is doing now is developing a more specific offshore mining Policy,” he said. “The policy will entail how benefits derived from an offshore project will be distributed and shared. This policy will be used when the Nautilus project comes on stream.” He said the policy would greatly assist the department.

### *News Release*

## **Management Options For Deep Sea Minerals Development Explored**

Secretariat of the Pacific Community, Suva, Fiji, Oct. 13, 2015

Recognizing the importance of a consultative approach to the topic of deep sea minerals, the Secretariat of the Pacific Community, in collaboration with the European Union Deep Sea Minerals Project, recently held a regional workshop in Fiji on environmental management options for deep sea minerals development. Representatives from 11 Pacific Island governments, civil society groups, the private sector and international environment experts participated in the weeklong workshop in Nadi. Comprising panel discussions, working group activities, presentations by mining companies and international environment experts, the workshop was an opportune time for participants to ask experts relevant questions about the environmental issues and impacts associated with deep sea mining. A major component of the workshop involved a review of two important regional environmental documents that will serve as guides for Pacific Island countries.

Firstly, the Regional Environment Management Framework contains an Environment Impact Assessment template developed for deep sea minerals activities, and secondly, the Regional Deep Sea Minerals Scientific Research Guideline has been written for Pacific Island countries and territories to use to develop their respective national marine science guidelines or regulations. These documents are aimed to assist Pacific states to ensure that marine scientific research, prospecting, exploration and mining activities relating to deep sea minerals are well managed and performed in accordance with international standards and best environmental practice. In addition to the workshop’s environment management component, civil society representatives attending the workshop held a meeting amongst themselves to discuss ways in which they can better engage in deep sea mining discussions; as well as their positions on deep sea mining and issues they wish to raise with the experts.

"There's still more to learn about how the ocean environment may be affected by deep sea minerals exploration and mining activities, given this type of mining is yet to commence in the Pacific Islands region," SPC Deep Sea Minerals project manager Akuila Tawake said. "It's important for Pacific governments to possess greater in depth knowledge of the environmental management of deep sea minerals and how to implement effective strategies that will ensure seabed resources are properly and responsibly managed," he added. Pacific countries represented at the regional meeting include Cook Islands, Fiji, Kiribati, Marshall Islands, Nauru, Papua New Guinea, Samoa, Solomon Islands, Tonga, Vanuatu and Palau. This was the eighth regional workshop in the SPC-European Union Deep Sea Minerals Project series. Deep sea minerals occurring in the Exclusive Economic Zones of many Pacific Island countries are increasingly being recognized as a future potential source of economic development.

### **Nautilus shrugs off activists' critique as 'unscientific'**

By Henry Lazenby, [miningweekly.com](http://miningweekly.com), 2nd October 2015

Deep sea mining pioneer Nautilus Minerals is making light of an environmentalist attack on its flagship Solwara 1 copper/gold/zinc/silver project, in the Bismarck sea, earlier this week, characterising critique released on Monday as being unscientific and full of errors and misunderstandings. As steel cutting for Nautilus's production support vessel started in China last week, environmentalists on Monday ramped up the ideological battle against the sea floor mining project by publishing a critique entitled 'Indefensible Flaws', at the Asia Pacific Deep Sea Mining Summit, held in Singapore. "Their critique is highly flawed and it is clear that they only partially understand what it is they're criticising. For instance, to criticise the assessment because it didn't include gold, had no bearing on the overall mining operation," Nautilus CEO Mike Johnston told Mining Weekly Online from Brisbane, Australia.

He explained in the interview that independent natural capital accounting firm Earth Economics did not include gold in the environmental and social benchmarking analysis, released in June, as it was not a critical part of the mining operation, while it had the potential to polarise opinions. "The reason Earth Economics left gold out was because gold is a little bit contentious with most environmentalists. Gold is one of these things that polarises people's opinions. However, if one included it, it would only improve the economics for Solwara 1," Johnston said. He questioned the credentials of the people who criticised the report, noting that the company that undertook the field work also serviced top-tier clients including the World Bank, the International Finance Corporation and the US federal government. Another criticism was that there was not enough information available on the deep ocean ecosystem to evaluate it. "It's true that there had not been natural capital accounting assessments made of those ecosystems, but what economists did was take the highest comparable land values, so that the values assigned to the ocean floor environment would be very conservative," Johnston stated.

Another critic bemoaned the fact that Earth Economics's assessment did not provide adequate surface current data on the project, prompting Johnston to waylay the concern, saying that the person obviously failed to grasp that the whole ore extraction system was designed not to disturb the upper layers of the water column. "We did four water column current measurements and we have all the data. The reason for not including it is because it's irrelevant – we don't impact the surface waters," Johnston stressed. Nautilus planned to use three huge robots to mine the sea floor. The machines would cut into the seafloor with 4-m-wide claws, break the rock and collect it in a slurry that would be piped to a support vessel. The remaining water and rock would be sent back down another pipe nearly all the way back to the ocean floor. Johnston added that certain individuals in the environmentalist lobby were fighting an ideological battle against mining, saying that all mining should end, while others would see no mining happening in the oceans. "We've always had an open rela-

tionship with environmental lobbyists. We've invited them to our annual general meetings and have always had an open-door policy," Johnston said, stressing that the world increasingly needed copper to develop. The company was bullish on the base metal's strong medium- to long-term fundamentals that would support the Solwara 1 project, with added upside when gold was also accounted for.

### **THE CASE FOR MARINE MINING**

Johnston noted that there was, however, a strong case to be made for marine mining, arguing that several studies had shown that the majority of marine pollution was coming from land-based mines and industries through the rivers. Marine mining was also much better than land-based operations, because there were no long-term liabilities of tails dams or waste dumps. "We just mine high-grade ore and send it to China and that's it." The Solwara 1 project would also not impact fresh water sources, such as on land, which could sometimes be in short supply and get politicised owing to the potential long-term impact on the natural resource. "These kind of critiques are not science based and are merely an example of free speech in practice. It cannot impact the company's progress on Solwara 1 to production. Our Papua New Guinea- (PNG-) based partner Eda Kopa is fully on board with us as we progress work on the environmental management plan," Johnston commented.

Work was currently progressing on the Solwara 1 project's environmental management plan, in collaboration with the PNG government. Nautilus expected to submit the completed plan to the PNG government at least six months before it would be able to start mining. The plan would deal with some 80 conditions attached to the 20-year mining licence awarded by the government in January 2011. Johnston said the Eda Kopa partnership was "working well". The relationship seemed to have struggled after an earlier hiccup, when the PNG government wanted more say in the project, since they were paying for their 15% interest in the venture. Meanwhile, Johnston was participating in the International Seabed Authority's efforts to draft guidelines for seabed mining, which would probably be published "in a few years time". "But in the mean time, we work in the PNG government's territory, whose guidelines we follow. We take on board everybody's inputs and, while we would try to implement best practice, we are pioneering a mining method, so we would try to set the bar really high," he said. One of the pitfalls of developing legislation for such ocean floor mining operations was that it could be ambiguous, as was the case in New Zealand, where current legislation presented many trapdoors for miners to be taken to court.

### **THE METHOD**

Nautilus aimed to recover high-grade polymetallic seafloor massive sulphide (SMS) deposits at 1 600 m below the surface, within the Western Pacific Ocean's Rim of Fire. The company planned to produce more than 1.3-million tons a year, with the capacity to ultimately ramp up to 1.8-million tons a year of dewatered ore, which would be delivered to the PNG Port of Rabaul. The Solwara 1 project team in 2007 reported the world's first SMS resource statement after it drilled a National Instrument 43-101-compliant resource using newly developed, remotely operated drills. As of November 25, 2011, the Solwara 1 project had an indicated mineral resource of one-million tons, grading at 7.2% of copper, 5 g/t of gold, 23 g/t of silver and 0.4% of zinc. Its inferred resource comprised 1.54-million tons, grading at 8.1% of copper, 6.4 g/t of gold, 34 g/t of silver and 0.9% of zinc.

### **Dispute over seabed mining negotiations in east Arnhem Land as mining company looks to pull out of the Northern Territory**

By Daniel Fitzgerald, ABC Radio Australia, October 1, 2015

A dispute has broken out between traditional owners, the Northern Land Council (NLC) and shareholders of a company interested in seabed mining in east Arnhem Land. A general meeting had to be held last month by Northern Manganese, which has interests to explore for minerals in Blue Mud

Bay, in an attempt to resolve the issue. In August, a group of breakaway shareholders, unhappy with the company's financial performance and the way the directors have handled the Blue Mud Bay project, tried to replace the board for the second time. They said they were approached by Conway Bush-Blanasi, a spokesperson for the Traditional Owners in the area, who told them the major indigenous stakeholders supported renewed corporate action and wanted new leadership at Northern Manganese. The attempt to replace the board failed, but questions remain over who the company should be negotiating with. Mr Bush-Blanasi said Traditional Owners had the right to bypass the Northern Land Council.



Photo: There is a dispute over mining interests in Blue Mud Bay in east Arnhem Land. (supplied: Google Maps)

"[The NLC] is there to listen to traditional owners, it is stated there in the Land Rights Act," Mr Bush-Blanasi said. "If traditional owners want to negotiate straight to mining companies, they should be allowed to. "I speak on behalf of my people and traditional owners, but as for decision making, it takes a lot more than just me." While Conway Bush-Blanasi wants to negotiate directly with Northern Manganese over the east Arnhem interests, it appears the company does not want to negotiate with him. This is despite the company welcoming the direct approach by Traditional Owners in 2012. In a statement issued to shareholders last month, the company said it had asked the NLC if it represented the Traditional Owners of Blue Mud Bay in relation to exploration licence applications. The NLC replied it did and that it did not support the attempted removal of the Northern Manganese board. In the past, some of the Traditional Owners from Blue Mud Bay have argued in favour of seabed mining.

While Conway Bush-Blanasi wanted to fight for his right to negotiate directly with mining companies, he said he did not want any seabed mining in Blue Mud Bay. "Seabed mining is out of the question, I want it there for my children, my grandchildren and my people," Mr Bush-Blanasi said. "We are looking at all projects, not only mining, Indigenous people have to look at anything and everything and what is sustainable out on country. "Northern Manganese, they are a small company, but like all mining companies, they only have one objective, profit. "We value our family better than what we value a dollar." A Northern Territory moratorium on seabed mining since 2012, renewed in March this year for another three years, prevents Northern Manganese from any further mineral exploration. The company stated in a letter to shareholders, because of the moratorium, coupled with high exploration costs and low commodities prices, the time for a mine "is not now."

Northern Manganese has offered the breakaway shareholders the chance to buy all the company's Northern Territory's interests, saying it wanted to focus on a gold project in Western Australia instead. Mr Bush-Blanasi said he had also been told the company was moving out of the Northern

Territory, and he thought there should be opportunities for traditional owners to take on its exploration licences. "I spoke with [Northern Manganese] three or four months ago and they said they want to leave the Territory," he said. "I was thinking, as an Indigenous businessman, not as a traditional owner, if [Northern Manganese] is going to do that, what chance do landowners have to get their own [exploration licences] over their own country. "So they can deal with the [mining companies] their own way, [then] call the NLC in to make sure everything is okay." Northern Manganese and the Northern Land Council were contacted for comment but no responses have been received.

### **Seabed mining impacts bared**

The National, October 1st, 2015

AS the deep sea mining industry chase investors at the Asia Pacific Deep Sea Mining Summit, a new critique by the deep sea mining campaign revealed indefensible flaws in the environmental and social benchmarking analysis of the Solwara 1 project commissioned by Nautilus Minerals. The proposed Solwara 1 deep sea mine, situated in the Bismarck Sea, is the world's first to receive an operating licence. Endorsed by a coalition of economists, scientists, non-governmental organisations and civil society groups, the critique, entitled *Accountability Zero*, was launched by professor Richard Steiner during his presentation at the Summit on Tuesday. Francis Grey, founder of *Economists at Large* and co-author of *Accountability Zero* said: "By using metrics that bear no relevance to deep sea and marine environments, the Solwara 1 ESBA values at zero the ecosystem goods and services provided by deep sea and marine ecosystems. The ESBA report fails to meet the well accepted requirements of a cost-benefit analysis."

### **World's first deep sea mining proposal ignores consequences of its impacts on oceans**

Deep Sea Mining Campaign, 29 September 2015

SINGAPORE, September 29, 2015 | As the deep sea mining industry chases investors at the Asia Pacific Deep Sea Mining Summit, a new critique by the Deep Sea Mining Campaign reveals indefensible flaws in the Environmental and Social Benchmarking Analysis of the Solwara 1 project commissioned by Nautilus Minerals. The proposed Solwara 1 deep sea mine, situated in the Bismarck Sea of Papua New Guinea, is the world's first to receive an operating licence. Endorsed by a coalition of economists, scientists and civil society groups, the critique entitled *Accountability Zero*, will be launched by Professor Richard Steiner during his presentation at the Summit today. "By using metrics that bear no relevance to deep sea and marine environments, the Solwara 1 ESBA values at zero the ecosystem goods and services provided by deep sea and marine ecosystems." said Francis Grey, Founder of *Economists at Large* and co-author of *Accountability Zero*.

He continued, "Fundamentally, the ESBA report fails to meet the well accepted requirements of a cost-benefit analysis. It is of little value to public policy and deep sea mining (DSM) decision-making," US based consultancy firm Earth Economics (EE), which Nautilus commissioned to write the report, compared the social and environmental impacts of the Solwara 1 deep sea mining project to existing and proposed land-based copper mines. "Comparing the impacts of Solwara 1 to selectively chosen land-based mines is like comparing apples to oranges," said Payal Sampat, Mining Program Director of Earthworks. She continued, "Nautilus commissioned a study that purports to make a case for seabed mining – but which neglects to value marine ecosystem services, or consider the likely impacts on sea water quality, marine ecosystems, or communities who depend on healthy oceans."

The Solwara 1 deep sea mining project has been met with local and international opposition, including three independent science-based reports that detail deficiencies in the science and modelling



employed by Nautilus.<sup>[1]</sup> “The ESBA is not fit for its intended purpose. It fails to provide a framework to assist decisions about the advisability of Solwara 1 or of any other deep sea mining project. Indeed, the use of the ESBA for decision-making purposes would lead to very poor public policy outcomes. The risk of unexpected costs and losses due to unpredicted environmental and social impacts is high and could leave coastal and island communities carrying the brunt of the burden into the long term,” said Dr. Helen Rosenbaum, Coordinator of the Deep Sea Mining Campaign and co-author of the *Accountability Zero* critique.

Granted a 20 year mining licence in January 2011, Nautilus is yet to release the environmental management plan for Solwara 1. “The time for public relation exercises such as the Solwara 1 ESBA is over. Investors, civil society, and governments looking at the world’s first deep sea mine need to see real substance. The release of the Solwara 1 Environmental Management Plan would be a good step,” said Professor Richard Steiner of Oasis Earth. He continued, “It is critical that this foundation document be subject to independent examination and feedback in the public domain.”

[1] Steiner, R (2009) *Independent Review of the Environmental Impact Statement for the proposed Nautilus Minerals Solwara 1 Seabed Mining Project, Papua New Guinea*, Bismarck-Solomon Indigenous Peoples Council, <http://www.deepseaminingoutofourdepth.org/wp-content/uploads/Steiner-Independent-review-DSM1.pdf>;

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## The Dangers of Deep Sea Mining

Shreema Mehta, EarthWorks, September 28, 2015



Photo credit: Papua New Guinea Mining Watch

Papua New Guinea, a small and remote country tucked in a corner of the southwestern Pacific Ocean, has dealt with a long and tumultuous history of mining, including one mine that led to a civil war. So the recent news of yet another mining company securing permits to extract gold,

despite community opposition, is a familiar one. But there's a twist to this story: This mine would be located under the sea. Canadian mining company Nautilus Minerals secured a permit from the PNG government to extract gold and copper from Solwara 1, a deep-sea basin of hydrothermal vents located in the Bismarck Sea. These vents release mineral-rich fluid from beneath the seafloor.

New technologies have made the world's oceans the new frontier for mining. Both companies and governments have started exploration - and even tout deep-sea mining as a safer alternative to the problems caused by mineral extraction on land. But they do so in the absence of any scientific consensus on the long-term impacts of deep-sea mining, and in an environment with very little oversight of mining and other industrial activity. What accounts for this enthusiasm? Perhaps these mines' locations, under the sea and out of sight, make this emerging industry abstract, making it easy to forget its dangers. But in fact these projects pose real dangers. Mining the Solwara 1 site, which Nautilus expects to begin in 2018, would involve digging up sediment from the seabed and destroying the hydrothermal vent chimneys containing gold and copper ore deposits. This liquid ore slurry would then be transferred to a ship via pipe, where it would be dewatered before ultimately going to a land-based processing facility.

The effects of this project are unknown, as the Solwara 1 project is the first of its kind. However, the project will certainly kill off all living organisms living in the chimneys and seabed that would be destroyed and dug up. In addition to the destruction of these fragile sources of marine biodiversity, Solwara 1 will create sediment plumes, or clouds of particles that would proliferate from the removal and dumping of sediments and waste. These plumes disrupt the natural movement of ocean water, and in the process can potentially:

- Smother entire ecological communities on the seabed
- Clog hydrothermal vents
- Introduce nutrient-rich deep water into surface waters, which can cause increased algae production that can harm shallow-water organisms
- Expose organisms to heavy metals: Metals once out of reach to shallow-water organisms can be ingested and accumulate up the food chain — potentially harming the health of humans consuming fish as well. Consumption of these metals can also be fatal to these organisms, or lead to mutation or reproductive failure and other impacts.

It's for these reasons that several community groups in Papua New Guinea have come together to oppose the Solwara 1. Communities that are still grappling with waterways devastated by mining projects are skeptical of this experimental project. "The PNG Government has put the cart before the horse by issuing Nautilus Minerals [the] Solwara 1 mining license without adequate and independent scientific studies, or comprehensive national policy, laws and regulations for Deep Sea Mining (DSM)," said Thomas Imal, a lawyer with local group Centre for Environmental Law and Community Rights (CELCOR). We know dangerously little about the world's oceans. A sensible way forward would be to hit the pause button on deep-sea mining until greater scientific consensus can be reached on the full short and long-term impacts of this new industry.

### ***Press Release***

#### **Steel Cutting marks start of physical construction of Nautilus' Production Support Vessel**

Toronto Ontario, September 28, 2015 - Nautilus Minerals Inc. announces that the steel cutting ceremony for the Company's production support vessel occurred on Friday, September 25, 2015. The vessel is to be used by Nautilus and its PNG partner, Eda Kopa (Solwara) Limited, as the base for its seafloor operations planned at the Solwara 1 Project, in the Bismarck Sea of Papua New Guinea. The ceremony took place at the shipyard of Fujian Mawei Shipbuilding Ltd. It was attended by the

General Manager of Fujian Shipbuilding Industry Group Company Limited, Mr Xie Rongxing, the Chairman, Mr Zhang Zhitong, and General Manager, Huang Yihao of Fujian Mawei Shipbuilding Ltd., Senior Vice President of Greater China (ABS), Mr Kwok-Wai Lee, Mr Robin Reeves, CEO of Marine Assets Corporation (MAC) and representatives from the MAC team.

MAC will own and provide the marine management of the production support vessel, which will be chartered to Nautilus. Mike Johnston, Nautilus' CEO, commented, "I am delighted that steel cutting has happened on schedule and in line with our plan to commence testing and initial production activities at Solwara. As we have now moved into the physical construction phase of the vessel, it was important to mark such a significant occasion. We have worked with Fujian Mawei Shipyard, MAC and others on our project for nearly a year now, and have established a very good relationship, which will continue over the coming years. Our objective remains to develop the world's first commercial high grade seafloor copper-gold project and launch the deep water seafloor resource production industry. With the eyes of the world waiting to see the dawn of this new industry, we look forward to taking delivery of the vessel in December 2017 to enable us to commence our seafloor operations in Q1 2018."

### **Our Promise to Future Generations: A Healthy, Sustainable Ocean**

Catherine A. Novelli, U.S. Under Secretary of State for Economic Growth, Energy and the Environment, Huffington Post, 09/21/2015



World leaders and the international community are gathering soon at the United Nations to adopt the Sustainable Development Goals, which will guide the UN and member states for the next 15 years. A critical component of achieving all the goals will be conservation and sustainable use of the world's ocean, seas, and marine resources -- Goal 14. This is good news. A healthy ocean is essential to ending poverty, drives prosperity, and ensures the health of our planet for generations to come. The ocean makes this planet habitable for human life. It generates half the oxygen we breathe and regulates our climate. Our fate is tied to the ocean's fate. We cannot talk about sustainability without it. Yet, those who depend on the ocean for their livelihood are telling us about the changes they are witnessing. Many of the world's fish stocks are depleted and overfished. Runoff and debris are choking our waters and harming marine life. Carbon emissions are making the ocean more acidic, threatening ancient ecosystems, like coral reefs.

In June 2014, Secretary of State John Kerry brought global leaders and international experts together at the first Our Ocean conference in Washington, D.C. The conference drew attention to the dire state of the ocean, while also highlighting the ocean's regenerative nature and collective actions we can take to make our ocean healthy again for future generations. Addressing threats to the ocean will require innovation, research, and new technological approaches -- and these solutions are in sight. But it will also require significant and sustained action by all of us. We are now preparing for U.S. participation in the next Our Ocean conference, to be hosted next month by Chile. In just 16

months since the last Our Ocean conference, we have already witnessed significant progress and commitments turned into real actions by the United States and partners around the world.

President Obama's expansion of the U.S. Pacific Remote Islands Marine National Monument made it the largest marine protected area (MPA) in the world. This expanse of the Pacific is particularly rich in marine life, including an unusual concentration of large predators, like sharks, five species of protected sea turtles, 22 species of protected marine mammals, and several million seabirds. With this bold step, the President protected a chain of underwater seamounts that are hotspots of biodiversity and created an area where marine life can thrive, fish stocks can regenerate, and marine ecosystems can regain balance so that they can thrive and continue to provide for our needs. And President Obama is not alone in his actions. With a global target of protecting 10 percent of the world's coastal and marine areas by 2020, other nations such as Gabon, the United Kingdom, Palau, and the Bahamas also have recently committed to establishing new MPAs.

Illegal, unreported, and unregulated (IUU) fishing is particularly problematic for sustainable development, threatening food security and stability in many places. Developing countries are most at risk. For instance, total catches in West Africa are estimated to be 40 percent higher than reported catches. Many crews on IUU fishing vessels are from underdeveloped parts of the world and are often subject to unsafe conditions. Experts estimate that global losses from IUU fishing are more than \$10 billion annually. Working closely with other governments and NGOs, we are exploring new technologies to improve surveillance and enforcement of fishing activities in the ocean and fishing bans in MPAs. We are developing a system to keep illegally caught seafood out of the United States by tracking it throughout the supply chain -- from harvest to entry into the country. And we are urging all countries to join the Port State Measures Agreement, a new international treaty that will block illegally caught seafood from entering the stream of commerce around the world. These actions will help level the playing field for fishers and countries who follow the rules and work hard to sustainably manage ocean resources.

Overfishing isn't the only threat to marine life. Experts estimate that by 2025 there could be one ton of plastic in the ocean for every three tons of fish. Plastic created for a single, short-term use can live on for centuries as trash. When not managed properly, plastic waste finds its way into the ocean, where it entangles sea creatures, damages coral reefs, and breaks down into small, non-biodegradable pieces that are eaten by fish and marine mammals. We are rolling up our sleeves, together with businesses, entrepreneurs, scientists, NGOs, and other governments, to solve our plastic-waste problem. We need to reduce plastic waste, look for alternative packaging, and improve waste collection and management on an urgent basis, including by encouraging and incentivizing innovation. There are real business opportunities in waste-to-energy projects and recycling innovations. The United States is helping to support an experimental project in the Philippines that turns plastic waste into clean energy. A new generation of eco-entrepreneurs is recycling discarded fishing nets into skateboards and jeans. Forward-thinking companies are researching how to reduce plastic packaging in the near term and in the long term create a "circular economy" where all parts of a product and its packaging are reused. This is true sustainability.

Perhaps the most challenging threat to our ocean is acidification. The same carbon emissions that cause climate change make the ocean more acidic. This has the potential to undermine dramatically the growth and survival of numerous marine organisms, including oysters, clams, and corals. Achieving an ambitious, durable international climate-change agreement that all countries can join in Paris this December should be front and center on all our agendas. The U.S.'s intention to reduce greenhouse-gas emissions 26 to 28 percent below 2005 levels in 2025 will contribute substantively to international efforts to combat climate change, and we look for similarly ambitious contributions from other major emitters. Sustainable development is a great challenge for us all. During this year's UN General Assembly, the world is watching. The energy we see at this moment to address the

challenges of climate, growth, and sustainable development needs to be carried forward, and heightened attention to the ocean is crucial.

### **Life-sustaining ocean ecosystem dying**

By Melanie Gosling, Environment Writer, Cape Times, September 18, 2015

WWF's Living Blue Planet Report has highlighted enormous losses in the world's oceans – but this was not just about “losing some fish and turtles”, according to John Tanzer, director of WWF International marine programme. “It is about the unravelling of the fabric of an ecosystem that sustains life on Earth.” Tanzer said while Nasa's photos taken from space in 2015 showed the same blue planet that Nasa had captured in 1972, “we know the planet has changed substantially and perhaps irrevocably in the intervening four decades”. The report, released every two years, gives a current picture of the state of the oceans, and according to WWF's director-general, Marco Lambertini, it shows how humanity is “collectively mismanaging the ocean to the brink of collapse”. Lambertini said within a single generation, people had severely damaged the oceans, both by catching fish faster than they could reproduce and by destroying fish nurseries such as estuaries, seagrass meadows, mangroves and corals.

Marine populations globally have dropped by more than half in the last 40 years, and deep-sea fish populations in the North Atlantic have dropped by a massive 72 percent. The report measures trends in 10 380 populations of 3 038 species of marine mammals, birds, reptiles, amphibians and fish. These populations have declined by 52 percent between 1970 and 2010. Tuna, mackerels and bonitos show a decline of 74 percent between 1970 and 2010. There is no sign of their recovery. Researchers looked at three marine species – sharks, turtles and sea cucumbers – as they were good indicators of the level of stress on marine ecosystems. In the Galapagos, sea cucumbers had declined by 98 percent from 1993 and by 94 percent between 1998 and 2001 in the Red Sea. Sea cucumbers, regarded as a delicacy in many areas, play a vital role in marine ecosystems, and researchers found some areas without sea cucumbers had become uninhabitable for other organisms. Global catches of sharks and rays had risen more than three times between 1950 and 2003. One of four species of sharks and rays are threatened with extinction, mainly from over fishing. Sharks are apex predators, and the loss of apex predators will cause degradation of the ecosystem.

Four turtle species are categorised as endangered or critically endangered. More than 25 percent of all marine species live in coral reefs – and 75 percent of coral reefs are threatened, and could be lost altogether in 35 years. About 850 million people directly benefit from coral reefs, which provide food for hundreds of millions. Seagrass meadows, which provide food and protection for many species, including fish that are commercially important, have declined by 30 percent over the last 100 years. Seagrass is also vital for storing carbon and can store more than twice as much as a forest. Nearly 20 percent of mangroves – or 3.6 million hectares – were destroyed between 1980 and 2005, mainly to build harbours and infrastructure, and for agriculture and tourism. Marine and coastal zones have been damaged by mining. While no commercial deep-sea mining operations have occurred yet, the International Seabed Authority has issued licences covering 1.2 million square kilometres of ocean floor. The report said while the impacts from this type of mining were unclear, the huge areas of seabed that had been licensed, could cause impacts that were “unprecedented”. Lambertini said considering the vital role oceans played in world economies, the mismanagement of the oceans was “simply unacceptable”.



## Deep Sea Mining Simulator for Solwara 1

The Maritime Executive, September 15, 2015

Nautilus Minerals has signed a contract with Tree C Technology for a simulator and a mining site monitoring system for the world's first seafloor production system at Solwara 1 in Papua New Guinea. Solwara 1 is expected to be the world's first commercial high-grade seafloor copper-gold mine project. The mine site is approximately 30km (18 miles) from shore in the Bismarck Sea in around 1,600m (5,000 feet) of water. The site has indicated resources of one million tons grading 7.2 percent copper, five grams (0.18 ounces) of gold per ton, 23 grams (0.81 ounces) of silver and 0.4 percent zinc. Inferred resources add 1.5 million tons of 8.1 percent copper, 6.4 grams of gold, 34 grams of silver and 0.9 percent zinc. The planned mining operation at Solwara 1 is the first of its kind, using bespoke designed equipment and a new remote control system designed specifically for the seafloor production tools (SPTs) that will be used.

The excavation and collection of mineralized material has been split into three individual tasks, which will each be carried out by a different seafloor production tool. The auxiliary cutter is designed as the pioneering tool which prepares the rugged sea bed for the more powerful bulk cutter. These two tools gather the excavated material; the third, the collecting machine, will collect the cut material by drawing it in as seawater slurry with internal pumps and pushing it through a flexible pipe to the subsea pump and on to the vessel via the riser and lifting system. Successful execution of the mine plan is contingent on the safe and efficient manipulation of all of the elements of the seafloor production system. The simulator will enable operators to use the consoles and control software that will be used during the actual operation. The virtual environment will respond and behave as close as possible to the real world conditions at this depth requiring the best of simulation technology available today in terms of physics, hydrodynamic and wire dynamics engines.



Nautilus will employ an operations manager who will take overall responsibility for coordination of the seafloor production system. The Tree C developed mining site monitoring system will be a critical tool that shows a simulated but actual view of the subsea mining assets and surface support assets in real-time. The operations manager will direct all SPT and equipment moves based on the monitoring system since there will be no visibility due to turbidity and lack of light at this depth. The simulator is based on the actual control systems and consoles that will be used and is built within a 30-foot container. Delivery is scheduled for the first half of 2017.

It is anticipated that the proposed Solwara 1 project will commence operations in the first half of 2018 subject to project financing and completion of the company's seafloor production equipment and vessel. The production support vessel is being built in China by Fujian Mawei Shipbuilding. When completed, the vessel will measure 227m (750 feet) in length and 40m (130 feet) in width with accommodation for up to 180 people and generate approximately 31MW of power. All of the

below deck mining equipment will be installed in the vessel during the build process to minimize the equipment integration to be completed following delivery of the vessel. The vessel is expected to be delivered by the end of 2017.

## **India Interested In Sea Bed Mining In Cook Islands**

*Cooks looks to India as potential investor*

By Sarah Wilson

RAROTONGA, Cook Islands (Cook Islands News, Sept. 9, 2015) – Minister of Health Nandi Glassie recently returned from the fast-developing nation for the second Forum for India-Pacific Islands Cooperation. He was involved in discussions about financial support from India, and their interest in seabed exploration and mining. Glassie says the Cook Islands is particularly interested in the progress made by India as a pioneer investor in ocean mineral resource exploration, and would be keen to engage in a beneficial exchange. He says there is a "commonality" in the Cook Islands and India's endeavours. "Ocean resource exploration and seabed mining is the new frontier of future wealth, especially for a nation as small as ours." The Cook Islands and other Pacific States are pursuing viable options for mining and Glassie says there may be considerable advantages in developing stronger cooperation.

In terms of the Pacific, Glassie says Papua New Guinea is a recognised player in this field, and the Cook Islands would welcome opportunities to explore and investigate further opportunities to work more closely with partners like India, as well as within the region. "The Pacific can only be strengthened by working more closely with its partners, especially on the basis of shared interests and mutual respect as equals." He says the Cook Islands has appreciated the increase in Grant Fund aid, especially as this funding has a high level of impact on small communities and groups, which are able to access help in a very timely and effective manner. "Over a short period of time, small project aid has resulted in tremendous returns and benefits to many of our people." As Minister of Health, and an MP from a small island, Glassie has a particular interest in doing what he can for those who are disadvantaged by their remoteness and lack of local resources.

He says capacity-building and improving skills remain important priorities for the Cook Islands, particularly as a result of ongoing pressures from depopulation. "And opportunities to strengthen our mutual understanding through scholarship training and cultural exchange will continue to be supported." As a global leader in a wide range of fields, Glassie says India has provided beneficial experience and training to the Cook Islands, including specialist areas of expertise like renewable energy development. "India's support and encouragement in strengthening the cooperative ties with the Pacific is warmly welcomed and deeply appreciated." "Our strengthening ties are not simply based on India's historic links but because our 'pool of goodwill' is being enriched by a more visible presence."

## **Rare nautilus sighted for the first time in three decades**

James Urton, University of Washington, August 25, 2015

In early August, biologist Peter Ward returned from the South Pacific with news that he encountered an old friend, one he hadn't seen in over three decades. The University of Washington professor had seen what he considers one of the world's rarest animals, a remote encounter that may become even more infrequent if illegal fishing practices continue. The creature in question is *Allonautilus scrobiculatus*, a species of nautilus that Ward and a colleague had previously discovered off of Ndrova Island in Papua New Guinea. Nautiluses are small, distant cousins of squid and cuttlefish. They are an ancient lineage of animal, often christened a "living fossil" because their distinctive

shells appear in the fossil record over an impressive 500 million year period. Ward says this recent sighting of *Allonautilus* indicates that there is still much to learn about these creatures.



*Allonautilus scrobiculatus* off the coast of Ndrova Island in Papua New Guinea. Peter Ward

“Before this, two humans had seen *Allonautilus scrobiculatus*,” said Ward, who holds appointments at the UW in both the Department of Biology and the Department of Earth and Space Sciences. My colleague Bruce Saunders from Bryn Mawr College found *Allonautilus* first, and I saw them a few weeks later.” Those sightings were in 1984, when Ronald Reagan was finishing his first term as president and the oldest millennials were starting preschool. Ward and Saunders collected several *Allonautilus scrobiculatus* specimens for analysis and realized that their gills, jaws, shell shape and male reproductive structures differ significantly from other nautilus species. “Some features of the nautilus — like the shell giving it the ‘living fossil’ label — may not have changed for a long time, but other parts have,” said Ward.

*Allonautilus* also sports a distinctive accessory clearly visible in photographs. “It has this thick, hairy, slimy covering on its shell,” said Ward. “When we first saw that, we were astounded.” This slimy nautilus turned out to be even more elusive than its siblings. Aside from another brief sighting by Saunders in 1986, *Allonautilus* disappeared until July 2015, when Ward returned to Papua New Guinea to survey nautilus populations. Since nautilus are expert scavengers, Ward and his colleagues set up “bait on a stick” systems each evening — fish and chicken meat suspended on a pole between 500 and 1,300 feet below the surface — and filmed activity around the bait for 12 hours. “We started using this approach in 2011,” said Ward. “This year, there were about 30 guys involved and each day we would all watch the movies from the night before at 8X speed. There were a lot of ‘ohs’ and ‘ahs’.”

One night’s footage from a site off of Ndrova Island showed an *Allonautilus* approach the bait after a 31-year absence from Ward’s life. It was soon joined by another nautilus, and the two fought for access to the bait until a sunfish arrived on the scene. “For the next two hours, the sunfish just kept whacking them with its tail,” said Ward. The team also used baited traps to capture several nautiluses, including *Allonautilus*, at a depth of about 600 feet. Since most nautiluses do not like the heat, the researchers brought them to the surface in chilled water to obtain small tissue, shell and mucous samples and measure the dimensions of each animal. They then transported the animals back to their capture site and released them.



*Nautilus pompilius* (left) swimming next to a rare *Allonautilus scrobiculatus* (right) off of Ndrova Island in Papua New Guinea. Peter Ward

Ward and his colleagues used this information to determine the age and sex of each animal, as well as the diversity of each nautilus population in the South Pacific. Through these studies, they have learned that most nautilus populations are isolated from one another because they can only inhabit a narrow range of ocean depth. “They swim just above the bottom of wherever they are,” said Ward. “Just like submarines, they have ‘fail depths’ where they’ll die if they go too deep, and surface waters are so warm that they usually can’t go up there. Water about 2,600 feet deep is going to isolate them.” These restrictions on where nautilus can go mean that populations near one island or coral reef can differ genetically or ecologically from those at another. The findings also pose a challenge for conservationists. “Once they’re gone from an area, they’re gone for good,” said Ward.



*Nautilus pompilius* swimming above a rare *Allonautilus scrobiculatus* off the coast of Ndrova Island in Papua New Guinea. Peter Ward

Illegal fishing and “mining” operations for nautilus shells have already decimated some populations, Ward said. This unchecked practice could threaten a lineage that has been around longer than the dinosaurs were and survived the two largest mass extinctions in Earth’s history. In September, the U.S. Fish and Wildlife Service will decide whether to advocate for nautilus to become a protected species under the Convention on International Trade in Endangered Species of Wildlife Fauna and Flora, or CITES treaty. Such protection could curb international trade in nautilus shells, with the aim of reducing nautilus harvests across the Pacific. “As it stands now, nautilus mining could cause nautilus to go extinct,” said Ward.

Ward hopes to see *Allonautilus* again, especially since he would like to study how this species, which arose relatively recently according to genetic tests, behaves differently from other nautilus. Its rarity makes this endeavor challenging. “It’s only near this tiny island,” said Ward. “This could be the rarest animal in the world. We need to know if *Allonautilus* is anywhere else, and we won’t know until we go out there and look.” Ward’s main partners in this field season included Richard Hamilton and Manuai Matawai from the Nature Conservancy and Greg Barord from the City University of New York. More than 30 fisheries experts, guides and local residents in the Admiralty Islands and the Bismarck Archipelago of Papua New Guinea also provided crucial aid and support, Ward said. Their work is funded by National Geographic, the National Science Foundation’s Division of Polar Programs and the Tiffany & Co. Foundation.

Source: <http://www.washington.edu/news/2015/08/25/rare-nautilus-sighted-for-the-first-time-in-three-decades/>

### **Seabed Mining In PNG Will Not Discharge Waste: Nautilus**

*Mining company hopes to begin operating by 2018*

WELLINGTON, New Zealand (Radio New Zealand International, Aug. 24, 2015) – The seabed mining company, Nautilus Minerals, says its world first operation to mine in Papua New Guinea's Bismarck Sea will not discharge any waste into the ocean. The company hopes to start mining on the sea floor by 2018, despite strong opposition from environmental activists and calls for caution from the scientific community. But Nautilus' chief executive Mike Johnston says his company has been conducting environmental impact studies since 2006. He says the results have consistently shown the effects of the operation on the marine environment will be minimal. "The total area directly impacted by mining is less than point one of a square kilometre. Impacts that are expected from the mining projects do not extend outside the mining lease. There are no tailings associated with our seafloor mining project which is pretty much unheard of for mining."

### **NZ Academic Sees Merit In Cooks Mining Exploration**

*Could help ‘fill in gaps in scientific knowledge’*

WELLINGTON, New Zealand (Radio New Zealand International, August 16, 2015) – A New Zealand academic says seabed mining exploration could help fill gaps in scientific knowledge. There's been calls from Pacific NGOs for a moratorium on seabed mining exploration. The Cook Islands last week opened bidding on licences for exploring the seabed's potential for mining. A law professor at the University of Waikato, Barry Barton, says the exploration could help shed light on unanswered questions. "At the early stages there is going to be a lot of benefit to be had in getting to understand the ocean resources and the ocean environments of the Cook Islands. So there is an element of opportunity at a minimum to start getting environmental baseline information to guide decision makers of the future."



## **Cooks Finance Minister: Seabed Mining Could Make Nation Rich**

*Tenders open on bids for exploratory licenses*

WELLINGTON, New Zealand (Radio New Zealand International, Aug. 13, 2015) – The Cook Islands Finance Minister says seabed mining has the potential to make the nation rich. Tenders are now open for a period of four months, ending 11 December, for international companies to bid for exploratory licences within ten blocks of the country's 2 million square kilometre exclusive economic zone. Mark Brown says scientific assessments so far indicate certain areas have very high concentrations of minerals such as cobalt, copper, nickel, and manganese. "They're valued in the billions and billions of dollars in terms of the value of the minerals that are in these nodules. So it does have the potential to transform the country into being a very very wealthy country. And in that regard we have to be I guess cautious". Mark Brown says any wealth will have to be managed properly to protect future generations of Cook Islanders.

## **Chan: Solwara project must benefit locals**

Post-Courier, August 11, 2015

The New Ireland Government is working to ensure that the Solwara 1 Deep-sea mining project results in substantial benefits to the people of New Ireland Province. New Ireland Governor Sir Julius Chan said this yesterday in regards to royalty benefits generated by the debated project in the province. "We continue to have reservations about the Solwara I Project, especially in the area of environmental protection and a liability guarantee, but National Government unilaterally granted a Mining Lease to Nautilus Minerals in January 2011. "Unless we are autonomous, the project will therefore go ahead. " We have no choice but to accept that and we in New Ireland want to be certain that the people in New Ireland, and particularly those closest to the Solwara I site, benefit as they should from the revenues granted. Sir Julius said that the New Ireland Government has been working generously with the East New Britain Government to come to an agreement on the sharing of the benefits of the Solwara I Project.

But the signing of an MOU was regrettably aborted. Sir Julius also noted that the National Government had insisted that there are no "landowners" for the project since it is in the sea. However, he said the people from the West Coast of Namatanai and Sentral Niu Ailan LLGs will be treated as if they were landowners. "That means that we will direct 20 per cent of the royalties to the seven wards adjacent to the area in which the project will be implemented. There will be no landowner association, but the people will benefit as if there were." Both the New Ireland and East New Britain Provinces have insisted that the National Government increase the level of benefits coming to the provinces and the people. "It is time for the people to finally eat some of the wealth that comes from their land."

## **Nautilus: Impact on environment will be minimal**

Post-Courier, August 04, 2015

CANADIAN Miner Nautilus Minerals Inc has assured the environmental footprint of its Solwara-1 project will be minimal. The assurance was given by Nautilus chief executive officer Mike Johnston while giving a project update towards production of this deep sea mine in 2018. Mr Johnston said the company would be mining very deep water at depths of 1600 metres. "The environmental footprint of sea floor mine is much smaller than surface mine. You won't even see it on the surface," he said. Mr Johnston had expressed satisfaction over the environmental work which had been done by the company so far stating: "It was going really well." While he did not elaborate on what it entailed he stated that the company was working closely with relevant authorities. He stated that upon arri-

val at the provincial capital of New Ireland - Kavieng, that he had attended a development forum which had been hosted by the Governor Sir Julius Chan and had given an undertaking of an independent monitoring of the site that they would be mining. "Because it is 1600 metres down you don't see anything and the impacts don't rise more than 200 metres," Johnston said.

### *Commentary*

#### **Reinventing the wheel once more**

Giff Johnson, Pacific Institute of Public Policy, 3 August, 2015



How many times shall we reinvent the wheel? This is the question that needs to be asked as most islands in the region get set to adopt domestic legislation and policy governing deep-sea mining provided by donors. Over the past 18 months or so, a 'Deep-Sea Minerals Project' run by the Secretariat of the Pacific Community and funded by the European Union, has dispatched experts to all independent Pacific islands to bring them up to speed for future mining in 200-mile exclusive economic zones. The SPC-EU teams promote template legislation that is domestically driven by trade and resources and development ministries and agencies who are already, in some islands, engaged in promoting donor-driven development initiatives. The SPC-EU project states on its website that it is 'helping Pacific Island countries to improve the governance and management of their deep-sea minerals resources in accordance with international law, with particular attention to the protection of the marine environment and securing equitable financial arrangements for Pacific island countries and their people.'

The goal is laudable. The question is, can a donor that represents countries with mining interests protect and advocate for the rights of Pacific islands? It sounds like a serious conflict of interest, much as the PACER (Pacific Agreement on Closer Economic Relations) negotiations are, with Australian funding providing training to Forum island officials, paying for island officials to attend PACER negotiations, and financing an Office of the Chief Trade Advisor. All of this creates its own industry, a legion of trade officials who have a vested interest in promoting trade negotiations, whether or not they are, in fact, in the interests of the different island nations. Face the facts: Deep-sea mining potentially offers a serious economic opportunity for the islands, but one that by its nature is not sustainable for the long-term and comes with possibly serious environmental consequences. In addition, experience with onshore mining is limited to a few Melanesian countries, while deep-sea mining experience and legislation is embryonic, at best.

Why keep reinventing the wheel when we have experience and examples of regional cooperation that works? The best of these are in fisheries. The Forum Fisheries Agency is a good example of a regional body that has provided solid management, monitoring and surveillance for the Pacific tuna fishery that has worked for the interests of the islands. But the Parties to the Nauru Agreement (PNA) is probably the body that is the most relevant for deep-sea mining. Instead of going it alone, with each country establishing its own legislation and negotiating deals with mining companies individually, why not use the PNA formula that shows how rights can be managed and, through a unified effort, maximized for all parties. What should be happening at the regional level is discussion aimed at establishing regional or sub-regional agreements so that island nations can agree to minimum terms and conditions for deep-sea mining. Drawing on the experience with the Pacific tuna fishery, the region could be working to set minimum terms and conditions that could be enacted through implementing arrangements to ensure national legislation is not undermined and small island economies are not played off against each other and exploited inequitably. This is exactly what PNA is now doing with the tuna industry.

What is needed is a Forum leaders declaration to address deep-sea mining at the regional level, where agreed-to regional strategies can ensure fair returns for the islands. Given that the International Seabed Authority, which was established by the United Nations to regulate these activities and develop a mining code for management and monitoring of deep-sea mining, is already reported to be issuing licenses for the Pacific, the islands need to get a better grip on what is potentially a multi-billion dollar industry, with significant side effects. Do the islands get a decent return and find ways to successfully manage environmental problems? It seems so obvious that what is needed is a Forum Leaders declaration to address deep-sea mining at the regional level, where agreed-to regional strategies can ensure fair returns for the islands. The ability of PNA's eight members to maintain unity in setting minimum prices for fishing days and enforce management measures for the tuna fishery has resulted in the PNA skipjack fishery holding the highest global certification for sustainability through the Marine Stewardship Council, setting a minimum price for access to fish, controlling fishing effort, establishing compulsory satellite-based surveillance, enforcing 100 per cent observer coverage of purse seiners, and implementing other requirements.

Of even more relevance to deep-sea mining is PNA's restriction limiting the transshipment of catch to export carrier vessels in designated ports, where species composition and harvest tonnage are checked and verified. This also provides significant additional direct and indirect economic benefits to the island ports. Similar transshipment requirements should apply to deep-sea mining ore carriers so independent inspectors can monitor and verify volumes and types of ores being exported. This is unlikely to happen in the absence of a regional approach to mining. Instead of continuing down the path of individual islands negotiating their own separate deep-sea mining arrangements with all the poor governance opportunities this presents, what does the Forum region have to lose by convening a meeting with the goal of establishing a regional deep-sea mining agreement? Member countries through PNA have experience in developing successful regional agreements that establish rules and minimum standards for resource management and exploitation — to the great benefit of their members. Let's use this experience for the benefit of all the islands in the area of deep-sea mining. With the Forum summit in Papua New Guinea just six weeks away, this is an initiative that needs the leaders attention and action.

*Photo caption: The Parties to the Nauru Agreement management of the Pacific skipjack tuna industry has resulted in a five-fold increase in revenue to its eight members since 2010.*

## **Final design of Nautilus vessel expected in October**

Post-Courier, August 03, 2015

THE final design of the Nautilus Mineral Inc's production support vessel (PSV) is expected to be completed by September/October this year. This was revealed by Nautilus chief executive officer Mike Johnston in New Ireland Province last week and while giving journalists an update on the Solwara-1 deep sea mine and the preparations towards production in 2018. Mr Johnston had travelled there to officially launch a water and sanitation pilot project for several schools along the West Coast area. "The preliminary designs are all being done and final design should be finished by about September/October and then they (builders) start cutting the steel and physically build the boat. He said PSV would be built by Fujian Mawei Shipbuilding Limited (FMSL), a very experienced shipyard in China, with the company expected to take delivery of it by the end of 2017.

He said the seafloor production tools (SPT's) had been built in the United Kingdom and were in the process of being commissioned. These include the auxiliary cutter, bulk cutter and the collecting machine. He said he was pleased that Mining Minister Byron Chan and officials from the Mineral Resources Authority (MRA) had, already had the opportunity to see the work being done on them in person. In other developments Mr Johnston announced that the Canadian mining firm would soon be awarding a contract to build a simulator for the mining machines. The CEO explained that the simulator would be used to train the operators of these machines. "We are mining very deep water about 1600 metres, which is a long way down. The project is high tech and everything will be done remotely by robots. We have plans to train local people. They will have to have a reasonable level of education to drive and maintain these machines and work on the vessel," he said.

## **Nautilus: Vessel dewatering plant contract awarded**

Post-Courier, July 31, 2015

NAUTILUS Minerals Inc has awarded the contract for the detailed design of the Solwara-1 dewatering plant to DRA Group's Brisbane office. The dewatering plant will be used on Nautilus' Production Support Vessel (PSV). This was announced by the Canadian miner in its market report in Toronto this week. According to the report DRA is a global multi disciplinary engineering group which delivers mining, mineral processing and infrastructure services from concept to commissioning in addition to comprehensive operations and maintenance services. The scope of work awarded to DRA involves the detailed design of the vessel-mounted material processing facilities.

With a design capacity of 400 t/h, the plant will include screening the Seafloor Massive Sulphides into a number of size fractions, followed by dewatering using centrifuges and filter presses, eventually filtering to 8 microns. The combined dewatered product will then be temporarily stored in the vessel's hold, prior to trans-shipment via Handimax vessels to the company's processing partner in China. The remaining filtered water is then returned via the enclosed riser system to drive the sub-sea lift pump and discharged within 50m of the seafloor from where it originally came. The detailed design phase is expected to be completed in the fourth quarter of 2015. following that the vessel-mounted modules will be fabricated and pre-commissioned onshore prior to integration onto the completed vessel.

## **Civil Society Organizations Call For Sea Bed Mining Ban In Pacific**

*Exploratory leases already granted for 1.5 million square kilometers*

WELLINGTON, New Zealand (Radio New Zealand International, July 30, 2015) – Civil society organisations in the Pacific are joining a growing international call for a moratorium on mining ex-

ploration of the sea floor. In the Pacific EEZ alone exploration leases have already been granted for an estimated 1.5 million square kilometres of the ocean floor. The Pacific Network on Globalisation and the Bismarck Ramu Group in Papua New Guinea are particularly worried about the rapid pace at which PNG is moving towards being the first country in the world to carry out seabed mining. The Pacific Network on Globalisation's campaigns officer Joey Tau says not enough is known about the potential effects of seabed mining and is calling for a halt to mining exploration to allow the science to catch up. "To call for a moratorium on ESM (Experimental Seabed Mining) this experiment that is to take place in our oceans and seek more knowledge on the basis of to what extent this experiment will affect the lives of our pacific people."

### **Deep-sea mining looms on horizon as UN body issues contracts**

By DAVID McFADDEN, Associated Press, Jul 25, 2015

KINGSTON, Jamaica (AP) -- The deep oceans span more than half the globe and their frigid depths have long been known to contain vast, untapped deposits of prized minerals. These treasures of the abyss, however, have always been out of reach to miners. But now, the era of deep seabed mining appears to be dawning fueled by technological advances in robotics and dwindling land-based deposits. Rising demand for copper, cobalt, gold and the rare-earth elements vital in manufacturing smartphones and other high-tech products is causing a prospecting rush to the dark seafloor thousands of meters (yards) beneath the waves. With authorities at the Jamaica-based International Seabed Authority issuing exploration contracts, alarmed conservationists are warning that the deep ocean's fragile biodiversity must be protected and not nearly enough is known about the risks of extracting minerals from seabeds.

"The pace of activity has increased dramatically over the last five years," said Michael Lodge, deputy secretary-general of the obscure U.N. body in Kingston that acts as a global steward of the deep seafloor and is tasked with regulating this new mining frontier. "We're seeing the private sector invest in a big way." The U.N. agency, known by its initials ISA, presides over seabed outside the exclusive territorial waters of individual countries. So far, it has issued 27 exploration contracts, the large majority of them since 2011. The 15-year contracts allow for mineral prospecting on over 1 million square kilometers (over 390,000 sq. miles) of seabed in the Pacific, Atlantic and Indian Oceans. Governments and private companies have been moving so rapidly to stake claims and assess deposits that insiders forecast that commercial deep-sea mining could start within the next five years using robotic collectors equipped with cameras and sonar sensors along with pipe systems that can siphon crushed minerals to ships.

During a gathering this month in Jamaica of representatives from nearly 170 member states, ISA has started drafting a framework to regulate commercial exploitation of seafloor metals and minerals. The session ended Friday. A group of international scientists, in a July 9 article in the journal *Science*, urged ISA to temporarily halt authorization of new mining contracts until networks of "marine protected areas" are established around areas targeted for mining. "We owe it to future generations to ensure that we think before we act and gain a thorough understanding of the potential impacts of mining in the deep sea before any mining is permitted," said Matthew Gianni, co-founder of the Deep Sea Conservation Coalition, which sent observers to ISA's 21st session in Kingston. But despite the warnings, in recent days ISA authorized its latest exploration contract, a 72,745 square kilometer (28,087 sq. mile) permit in the Pacific to China Minmetals Corp., sponsored by Beijing. China now has the most permits from the U.N. body with four.

ISA was launched in 1994 and operates under the U.N. Convention on the Law of the Sea. The only major maritime power that has not ratified the convention is the United States, where lawmakers



have argued it could impinge on U.S. economic and military sovereignty. The Department of the Interior has granted exploration licenses in the Pacific to Lockheed Martin Corp., a U.S. company that has also partnered with the United Kingdom, an ISA member, by setting up a deep-sea mining subsidiary there. So far, most of ISA's contracts have been issued for the deep abyssal plains of the Clarion-Clipperton Fracture Zone, a sprawling area of the Pacific Ocean off Mexico and the U.S. At depths of 4,000 to 6,000 meters, it is known to be rich in nodules containing copper, cobalt, manganese and significant concentrations of rare-earth elements. As part of an environmental plan, ISA has set aside nine areas in this zone, prohibiting them to contractors. Other coveted exploration areas contain copper-rich sulphides formed around hydrothermal vents and black cobalt crusts created along the slopes of seamounts and volcanic mountain ranges. These biologically complex areas are found in the Western Pacific, Atlantic and Indian Oceans. ISA literature estimates that one site could provide up to 25 percent of the annual global market for cobalt.

"The concentrations of minerals that you find in the seabed are very much richer than what's left on land. So demand is only going to increase," Lodge said. Douglas McCauley, an ecologist and conservation biologist at the University of California, Santa Barbara, said seabed mining and other industrial activities like ocean-based power generation and farming indicates that mankind is on the cusp of launching a "marine industrial revolution." Current proposals for the oceans over the next several decades "look uncomfortably similar to what we did to land in the 1700s and 1800s," he said, adding that the onset of the land-based industrialization was associated with a spike in animal extinction rates. But there are basic things humanity can do to approach seabed mining intelligently, he said. First, learn what biodiversity is down there before we mine. Second, go slowly on exploitation contracts and study the impacts of this mining as it is happening. Third, set up systems of protected areas before, not after, mining starts. "The terrestrial industrial revolution happened before we had the tools to manage goals for development and goals for sustaining biodiversity. You can't really blame people in the 1700s for the damage they did to the environment..." he said. "But we certainly are to blame if we don't do seabed mining properly."

### **First Chinese company acquires undersea mining approval**

WantChinaTimes, 2015-07-24



An ore cargo ship docks at the Dongjiakou Port in Qingdao, Shandong province, July 4. (File photo/Xinhua)

China Minmetals Group recently became the first Chinese company to gain the right to explore and mine underwater, according to China News Service (CNS). The Jamaica-based International Seabed

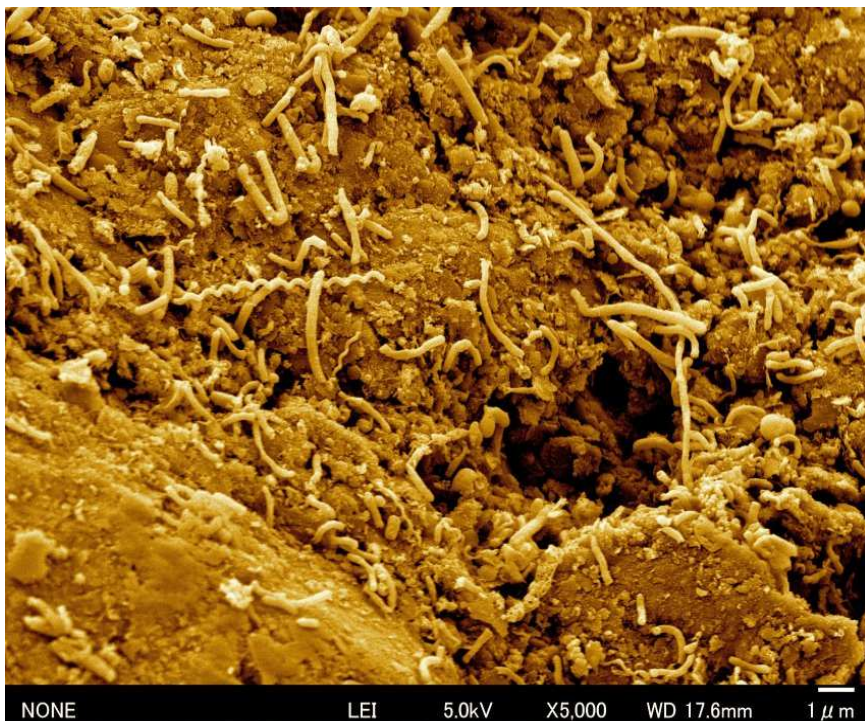
Authority (ISA) on July 20 approved the company's plan to explore and mine an undersea area of nearly 73,000 square kilometers in the East Pacific Ocean, CNS said. On Aug. 8, 2014, China Minmetals submitted its application for the exploration of poly-metallic nodule resources to the ISA, which was established under the 1982 United Nations Convention on the Law of the Sea, CNS said. The company said it plans to sign a 15-year exploration contract with the ISA for the undersea areas that are believed to have millions of tons of mineral resources, including manganese, cobalt, nickel and copper. Apart from conducting environmental surveys and economic evaluations, China Minmetals will also be responsible for training technology personnel, under the contract, the company said.

Industry experts said seabed exploration of mineral resources is inevitable for China, since the country relies heavily on foreign imports and has seen restricted economic development as a result. Several companies have expanded into undersea exploration in recent years, including Canada's Nautilus Minerals, which has had underwater mining rights near Papua New Guinea for 15 years. The Canadian company plans begin productions in 2017 at a copper-gold mine it discovered in the region, CNS said. The Korea Ocean Research and Development Institute also acquired rights for underwater exploration in the economic zones of Tonga and Fiji, according to CNS. Deep sea mining technology has been developing rapidly to tackle issues like water pressure and sea water erosion, and industrial robots have been introduced for undersea mining, CNS said.

### **Pazifik: Forscher entdecken Lebewesen 2500 Meter tief im Meeresgrund**

Die bislang tiefste Bohrung in den Meeresboden hat Mikroben bis in 2466 Meter Tiefe zutage gefördert. Die Laboranalyse zeigte: Die Mikroben ähnelten Kleinstorganismen aus Wäldern. Forscher vermuten im Grund der Ozeane das größte zusammenhängende Ökosystem der Erde.

Von Axel Bojanowski, Spiegel Online, 23.7.2015



Aufnahme im Labor in 1900-facher Vergrößerung: Sie zeigt Zellen, die Kohle als Energiespender nutzen - und Methan produzieren. JAMSTEC/ Hiroyuki Imachi

Im Grund der Ozeane leben offenbar mehr Wesen als in den Meeren selbst. Eine 2466 Meter tiefe Bohrung vom Forschungsschiff "Chikyu" im Nordwest-Pazifik beflügelt diese Vermutung. Der bislang tiefste Stich eines Forschungsschiffes in den Meeresboden förderte vor der japanischen

Halbinsel Shimokita bis in eine Tiefe von knapp zweieinhalb Kilometern Mikroben zutage. Die Organismen ernähren sich von Kohle, berichten Forscher im Wissenschaftsmagazin "Science". Nie zuvor seien lebende Organismen in solch großer Tiefe entdeckt worden, bestätigt die Biologin Julie Huber vom Marine Biological Laboratory in Woods Hole in den USA, die nicht an der Studie beteiligt war. Der bisherige Rekord lag bei 1922 Metern. Woher stammen die Wesen? Die Laboranalyse brachte eine Überraschung: Die Mikroben ähnelten nicht anderen im Meeresboden - sondern Kleinstorganismen aus Wäldern.

### **Untergegangene Wälder**

Der Befund lasse vermuten, dass die entdeckten Bakterien aus Landschaften stammen, die vor Jahrmillionen im Meer versanken, meinen die Studienautoren um Kai-Uwe Hinrichs vom Zentrum für Marine Umweltwissenschaften (Marum) an der Universität Bremen. Die Organismen hätten offenbar 20 Millionen Jahre im Untergrund überdauert. Spuren der untergegangenen Wälder finden sich in der Umgebung der Mikroben: In der Tiefe liegen meterdicke Kohleschichten. Sie entstanden aus Landpflanzen, die nach ihrem Absterben von Sand zugedeckt und immer fester gequetscht wurden, bis sie zu Kohle wurden. Erdwärme heize die Umwelt der Mikroben auf 60 Grad auf, schreiben die Wissenschaftler. Methangas im Sediment zeige, wovon die Organismen lebten: Im Labor haben die Forscher die Umwelt der Tiefe nachgebaut, dort wandelten die Mikroben Kohle zu Methan um. Die Analyse des Erbguts der Wesen ergab, dass sie mit einzelligen Urbakterien verwandt sind, die bereits in anderen Kohleschichten gefunden wurden.

### **Die Urform des Lebens?**

Die Marum-Forscher vermuten in den Tiefen "das größte zusammenhängende Ökosystem der Erde". Frühere Analysen hatten ergeben, dass sich das Erbgut vieler Untergrund-Mikroben aus verschiedenen Weltregionen - im Gegensatz zu den jetzt entdeckten - gleicht, egal ob sie unter Südafrika, Indonesien oder im Boden des Pazifiks lebten. Wie ist die nahe Verwandtschaft über Distanzen von bis zu 16.000 Kilometern zu erklären, wo sich die Mikroben doch in ihrem Leben kaum von der Stelle bewegen und kein Wind sie verweht? Es handele sich anscheinend um eine Kerngruppe von Mikroben, die an ganz unterschiedlichen Orten auftrete, meint Frederick Colwell von der Oregon State University. Die Wesen hätten sich wohl in der Frühzeit der Erde an einem gemeinsamen Ort entwickelt und wurden im Laufe der Jahrmilliarden mit der Drift der Kontinente in alle Welt verteilt. Sie könnten demnach die Urform des Lebens auf der Erde sein.

### **Tot und doch lebendig**

Besonders staunen die Forscher über das Lebensalter mancher Mikroben. Sie bauen den lebensnotwendigen Kohlenstoff so langsam in ihren Organismus ein, dass die Zellen sich nur alle hundert bis 500 Jahre teilen könnten. Sie scheinen tot zu sein und sind doch lebendig. Mit ihrer neuen Entdeckung seien sie womöglich nahe an die untere Grenze des tiefen Lebensraums gestoßen, meinen die Marum-Forscher: "In unseren Proben aus dieser Tiefe haben wir viel weniger mikrobielle Zellen entdeckt als erwartet", sagt Hinrichs. Zwar fände sich in zweieinhalb Kilometer Tiefe vor der japanischen Küste in einem Gramm Sediment tatsächlich nur noch durchschnittlich eine Zelle, ergänzt Biologin Huber. Doch die Bohrung im Pazifik war nur ein Nadelstich - die Erforschung der Tiefenwesen habe erst begonnen, betont Huber: "Die Grenze ist noch nicht erreicht."

### **A call to stop mining the Pacific Ocean**

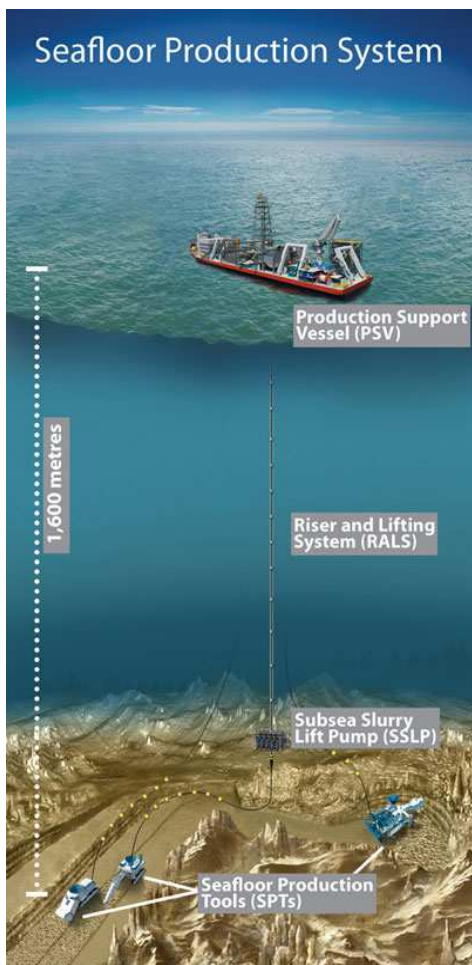
By Rowena Dela Rosa Yoon, AsianCorrespondent, Jul 23, 2015

A global civic movement is mounting a campaign calling to stop mining the Pacific Ocean and other deep seas. Citizens from all around the world have joined civil society, non-government organizations, and scientists in calling on the International Seabed Authority (ISA) to halt issuing further exploration licences and to establish a moratorium on deep sea mining. With over 1.5 million

square kilometres of ocean floor already under exploration leasehold in the Pacific ocean alone, the ISA has approved 27 exploration licences for deep sea mining. Dr. Helen Rosenbaum of the Deep Sea Mining Campaign said,

“We, along with over 640,000 people internationally call on the ISA and nation states to agree to a moratorium on seabed mining unless and until it is proven safe and there is broad civil society consent for this unprecedented industry.” The ISA, an intergovernmental body based in Kingston, Jamaica, was established to organise, regulate and control all mineral-related activities in the international seabed area beyond the limits of national jurisdiction. “It is disappointing that so many exploration licences have been issued without any understanding of the environmental impacts of exploration, let alone exploitation. It also facilitates the development of an industry that does not have the consent of potentially affected communities and wider civil society. This industry has not gained a social licence to operate,” says Dr. Rosenbaum.

Dr. Catherine Coumans of Mining Watch Canada, said, “As the global steward of the world’s oceans it is incumbent upon the ISA to protect the world’s already stressed marine ecosystems. The deep sea is one of world’s last ecosystems to have largely escaped devastating impacts of mining, and as an ecosystem that affects all life on earth it must be protected.” According to Professor Richard Steiner, Conservation Biologist of Oasis Earth, “The issue of deep sea mining is not just for scientists and mining companies. The debate has to be much broader and completely transparent. Presently, the ISA and sponsoring governments receive scientific advice and input primarily from companies with vested interests in a particular policy or regulatory result of the Authority. The authority’s decision making processes must be open to the participation of civil society and independent scientists.”



Nautilus provides image of deep sea mining.



“Governments and the ISA should take note that the Center for Biological Diversity is suing the United States Government over the granting of exploration permits for the Clarion-Clipperton Zone in the absence of environmental impact studies,” stated Dr. Rosenbaum. “There is insufficient scientific data about the impacts of deep sea mining, no regulatory frameworks in place to govern mining operations and the capacity to enforce such frameworks does not yet exist. This landmark legal case will set a precedent for application of the precautionary principle.” A joint submission was made to the International Seabed Authority on its draft regulatory framework for deep sea mineral exploitation by the Deep Sea Mining Campaign, Mining Watch Canada, Earthworks, Oasis Earth and the Mineral Policy Institute. The ISA’s 21st annual session in Jamaica began July 14 and ends July 24, 2015.

## **Deep Sea Mining – A new frontier for ecosystem destruction**

MiningWatch Canada, July 20, 2015

*This week the United Nations’ International Seabed Authority (ISA) is meeting in Jamaica to consider draft regulation for the exploitation of seabed mineral resources. MiningWatch Canada joins a growing global outcry over the speed at which the ISA is moving from licensing deep sea exploration to adopting regulations for mining the deep sea. MiningWatch joins scientists and concerned citizens in calling for the application of the precautionary principle in the form of a moratorium on ISA contracts for seabed mineral exploration, and on exploitation, until independent scientists have had a chance to fully understand the deep sea environment and provide advice on how it should be protected. MiningWatch’s assessment of, Canadian mining company Nautilus’s deep sea project in Papua New Guinea provides ample reason to support such a moratorium.*

Once again, a Canadian mining company is leading the way in pioneering a highly dubious mining practice. And again the country of choice for this latest environmental experiment is Papua New Guinea (PNG). Canada’s Barrick Gold is using the 800-kilometre-long Strickland River system in PNG as a dumping ground for its unconfined mine waste (a practice that is not permitted in Canada), and Canada’s Placer Dome used the sea as a dumping site for its mine tailings by piping them into the ocean from its Misima Island mine (also not permitted in Canada). Perhaps for the industry it is a short step from dumping unconfined mine waste into the ocean, to actually mining the ocean floor. This is what Canada’s Nautilus Minerals Inc. (Nautilus) plans to do in the Bismarck Sea, some thirty kilometres off the coast of PNG between the islands of New Ireland and New Britain.

Nautilus’s Solwara 1 project aims to mine copper, gold, and silver at a depth of 1,600 metres from seafloor massive sulphide deposits (SMSs), as well as from sediments on the seafloor around and below these deposits.[1] Seafloor massive sulphide deposits are also known as hydrothermal vents, or “black smokers.” These hydrothermal vents thoroughly astounded the scientific community when they were discovered in 1977. They are formed when seawater penetrates deep under the seafloor through cracks and is subsequently heated to temperatures that may exceed 400 degrees Celsius, for example by a magma source. The heated water spouts back out of the seafloor carrying with it dissolved metals. As the water hits the seafloor and cools the metals are deposited in layers, creating over time the tall “chimneys” associated with hydrothermal vents. The concentration of metals in and around the hydrothermal vents is generally higher than in deposits on land,[2] making them a tempting target for mining.

### ***What is at risk?***

What particularly stunned the scientific community about hydrothermal vents was the discovery of abundant, diverse and never-before-seen life forms in what was considered at the time to be an environment far too harsh to support life (pressures associated with up to 5000 metres depth, permanent darkness, extreme heat, and high acidity). Among the species found were microbes that derive



energy from chemicals rather than from sunlight. These microbes form the basis for other life around the vents. According to marine specialists at the Woods Hole Institute:

No two vents discharge exactly the same mixes of fluids, so no two vents are colonized by exactly the same life forms. Researchers continue to find new vent species just about every time they look for more. (...) So little is known about them that if vents are mined, we may never know what species have been lost.[3] Furthermore, marine experts readily admit that not only species unique to a particular mined vent will be lost, but biodiversity critical to ecosystem resilience as a whole is at risk: “The result could be the subsea equivalent of replacing an old-growth forest with a field of dandelions. (...) Too little research has been conducted to know for sure.”[4]

### ***Lack of regulatory oversight***

Very little is known about the deep sea environment - it is often commented that more humans have walked on the moon than have visited the sea at these great depths[5] and that we have more detailed maps of Mars than we have of the deep sea. Why, then, are mining companies such as Nautilus granted the opportunity to mine and destroy what has not yet been fully explored, with undetermined consequences for the marine environment, for associated terrestrial communities and natural systems, and for human knowledge about the origins of life on earth? Part of the answer lies in the fact that within the territorial waters of a nation, where the Nautilus project is located, that country can issue permits for exploration and exploitation at will.

Outside territorial waters, the International Seabed Authority (ISA),[6] established under the United Nations some five years after hydrothermal vents were discovered, has the authority to grant exploration contracts for the seabed. The ISA has been doing just that, granting 26 mineral exploration contracts, 18 of which came in the last 4 years[7] even in the absence of regulations for deep sea mining in international waters. Approximately 1.5 million square kilometres of the seabed is already covered by exploration licences.[8] Of the 26 mineral exploration contracts granted, 22 have entered into force, five of which are for polymetallic sulphides, or hydrothermal vents. [9]

This week the ISA is meeting in Jamaica to consider draft regulations for the exploitation of seabed mineral resources. The framework being considered at this point is only for the exploitation of polymetallic nodules.[10] However, there is growing global concern over the speed at which the ISA is moving from licensing exploration of deep sea mineral resources to adopting regulations for mining the deep sea. Scientists and concerned citizens are calling for the application of the precautionary principle in the form of a moratorium on ISA contracts for seabed mineral exploration, and on exploitation until independent scientists have had a chance to fully understand the deep sea environment and provide advice on how it should be protected.[11] MiningWatch’s assessment of Nautilus’s Solwara 1 project provides ample reason to support a moratorium on deep sea mining.

### ***Lack of appropriate technology for reliable deep sea environmental impact assessment and for mitigation of unintended or accidental impacts***

In 2011 MiningWatch Canada joined with local partners in PNG and Australia to form the Deep Sea Mining Campaign.[12] A critical focus of the campaign has been Nautilus’s Solwara 1 project. The Deep Sea Mining Campaign has commissioned independent reviews[13] of the Environmental Assessments for the Solwara 1 project. These reviews point to significant deficiencies, some of which are related to very real difficulties inherent in carrying out a credible environmental assessment for a deep sea project. For example, the Solwara 1 project consists of 11 hectares that will be mined, but the company acknowledges that its impact footprint will be larger, in part because sediments kicked up in the mining process will disperse through ocean currents. The problem is that no one knows exactly how much larger the footprint will be due to a lack of reliable deep sea modelling of physical and biological forces that transport sediments. This point has been proven over and over again in the case of the dumping of mine tailings into the deep sea via a submerged pipe.

In most known cases mine tailings have spread for more widely than predicted by consultants and by modelling prior to the operations.[14]

Of particular concern in the Solwara project is the disposal into the deep sea environment of waste effluent from initial processing on board a ship. This effluent is meant to spew out of a pipe about 25-50 metres above the seabed creating a waste plume that is expected to be carried outside the immediate impact zone of the mine. Lack of reliable modelling makes it impossible to pre-determine the ultimate horizontal and vertical reach of the plume with a high degree of accuracy. Toxicity testing for the effluent that will be discharged into the deep sea environment shows that it is toxic to shallow water species typically used in such studies, and would need dilutions up to 700 times to lose toxicity to these species: “The undiluted elutriate waters prepared from the cold sediment, and crushed active and weathered chimney mineral samples were found to be toxic to both the algae and copepods” (EIA 9.4)[15] Nautilus’s consultants used shallow water species for this toxicity test because they recognized that it would be impossible to do the tests on the deep sea species that will actually be affected by this effluent as these will not withstand being brought to the surface for testing. “No tests using local species from Solwara 1 were available or practicable, animals living at Solwara 1 do not survive for very long under conditions found at the surface.” (EIA 9.4)

Having done the toxicity tests on shallow water species, the consultants subsequently dismissed the results of these tests as irrelevant as “species that exist at Solwara 1 have both differing exposure pathways (e.g., water versus food) and sensitivity to metals.” So while the consultants acknowledge unique characteristics of deep sea species on and around hydrothermal vents, they have failed to conduct toxicity testing on them. Nonetheless, the toxicity testing on shallow water species is important in regard to possible shallow water discharges of the toxic waste products from on board processing. This could happen, for example, through a leak or breakage of the pipe system that is meant to carry the waste effluent into the deep sea environment. Surprisingly, while the EIS considers possible leaks of fuel and hydrocarbons at the surface from the operation, as well as maybe a little ore as it is transferred from the processing ship to a barge, and even acknowledges that it will discharge sewage at surface levels, the EIS dismisses the possibility of discharge of the toxic process effluent at shallow or mid-water depths:

During operations at the MSV [the ship], the only discharge to surface waters will be the discharge of sewage, treated to meet MARPOL standards (see Section 9.9 for further detail). This may elevate nutrients locally and the resultant plankton productivity. Minor quantities of spills of ore may occur during transfer to and from barges. As discussed in Section 9.4, there will be no discharge of water from the dewatering process within the surface or mid-water (mesopelagic) depths in the ocean, therefore no thermal changes to these layers will occur. (EIS 9-14) A long history of pipe breaks in the dumping of mine tailings into the deep sea,[16] not to mention ongoing leaks and breaks in mine waste pipe conveyance systems on land, indicate that such leaks or breakages have to be expected, particularly in the dynamic marine environment. The important point here is that in a marine environment, it is much harder, if not impossible, to mitigate the impacts of leaks or accidental discharges of, for example, toxic process effluent into shallow water. The examples provided here explain why the upbeat conclusions drawn by Nautilus consultants about the expected lack of significant environmental impacts from the project, are too often based on best case scenarios, speculation and hopeful “expectations” rather than on hard data.

### ***Desperate measures to justify Deep Sea Mining***

Based on scientific knowledge of hydrothermal vents, Solwara 1 will destroy biodiversity as it will likely destroy species that have not yet been discovered, even at the relatively better-studied Solwara 1 site, and that are endemic and unique to the individual hydrothermal vents mined.[17] In a recent report commissioned by Nautilus the company appears to seek to divert attention from this

reality by arguing that deep sea mining will be *less* damaging than terrestrial mining. To this end, Nautilus hired Earth Economics (EE) to compare the potential impact of the Solwara 1 project with terrestrial copper mines, two existing and one proposed.[18] Earth Economics does not explain why it only ran its comparison on the copper component of the ore from the Solwara 1 site and not on the significant gold content that will be obtained by Nautilus. The three copper mines chosen as comparison sites by EE are particularly nasty projects. MiningWatch can only applaud the irony that a mining company has paid for a comprehensive review of very well-known, well-researched, and well-documented devastating social and environmental impacts associated with mining as it occurs all over the world. However, the confidence that EE displays that deep sea mining of hydrothermal vents will be less environmentally damaging remains unsupported. It is more factual to describe it as an expansion of environmental damage of a new and different kind, with as yet largely unknown impacts, in a previously un-mined environment.

Earth Economics relies for its analysis on studies paid for and supported by Nautilus, but does not critically assess these studies or address the kinds of concerns with the EIS that are raised above. Furthermore, EE seems to be willing to adopt the same kind of unsupported optimism that other paid consultants display. For example, in regard to potential recovery of the mined out Solwara 1 site EE says that “[a]s Nautilus indicates (...) the mine site could recover quickly following disturbance, if adequate hard substrates and larval recruits are available.” The fact is that independent scientists have long pointed to the slower than usual recovery of deep sea ecosystems due to harsh conditions in the deep sea[19] and even the EIS notes that “[i]t is thought that rates of colonisation and growth of organisms such as the bamboo coral *Keratoisis* on hard inactive substrates are slow (Van Dover, 2000a) and hence, recovery of *Keratoisis* and its associated fauna may take longer than recovery of active vent communities.” (EIS 9-23) While discussion of recovery of the mine site is based on hypothesis, it is at least as realistic to be pessimistic as to be optimistic.

The EE report relies heavily on an analysis of copper as facing steadily increasing demand, essential to human development, and decreasing in terms of economic deposits on earth. These arguments set EE up to argue that recovery of the high grade deposits that Nautilus is seeking to mine as important for human development. Leaving aside the current collapse in demand and prices for copper, it must be understood that hydrothermal vents are not abundant, and hydrothermal vents that are economic to mine even less so. And while the metal grades in hydrothermal vents are higher than most metal grades on earth, it has been noted that the total metal content of hydrothermal vents is lower than that of ore deposits on land. “It is therefore unlikely that the marine mining of massive sulphides will have a significant impact on global resource supply.” [20] In other words, terrestrial mining will continue unabated. In that case, the harm caused by terrestrial mining will only be supplemented by harm to the marine environment. Finally, there is an obvious observation which must nonetheless be made, namely, that changing operating environments from terrestrial to marine does not change the nature of the industry itself, which is responsible for often-unnecessary harm in terrestrial mining. It is the very same industry that is associated with ongoing devastation at existing and planned mines around the world, devastation well described by EE, that is now seeking profits from the sea: the same industry, the same investors, the same funders, the same profit motives. It is simply not believable that just by changing ecosystems this beast will also change its spots.

[1] Other potential targets of future deep sea mining operations are polymetallic or manganese nodules, which are found at depths below 4000 metres and cobalt crusts on the sides of undersea mountains at depths of 1000-3000 metres.

[2] For example, copper concentrations in mineable deposits on land will be around 0.6 % while copper grades at the Solwara 1 site are around 7.2%. Canadian Geographic. May 13, 2014.

<http://www.canadiangeographic.ca/blog/posting.asp?ID=1160>

[3] What is seafloor mining? Woods Hole Institute. Accessed July 2, 2015.

<http://www.whoi.edu/main/topic/seafloor-mining>

[4] Ibid.

[5] Twelve humans have walked on the moon. The greatest depth achieved by humans in submersibles is about 1100 metres. Only three humans have reached this depth.

<http://news.nationalgeographic.com/news/2012/03/120325-james-cameron-mariana-trench-challenger-deepest-returns-science-sub/>

[6] International Seabed Authority. See <https://www.isa.org.jm/> The ISA was established under the 1982 United Nations Convention on the Law of the Sea.

[7] Center for Ocean Solutions. “Managing mining of the deep seabed: Contracts are being granted, but protections are lagging.” ScienceDaily, 9 July 2015.

[www.sciencedaily.com/releases/2015/07/150709145151.htm](http://www.sciencedaily.com/releases/2015/07/150709145151.htm). For a list of the sites see

[https://www.isa.org.jm/sites/default/files/files/documents/isba-21tc-8rev1\\_1.pdf](https://www.isa.org.jm/sites/default/files/files/documents/isba-21tc-8rev1_1.pdf)

[8] See <http://www.deepseaminingoutofourdepth.org/>

[9] Another 14 ISA licences are for exploration for polymetallic nodules, and 3 for exploration for cobalt crusts. See <https://www.isa.org.jm/news/isa-council-debate-exploration-contract-extension-hears-status-report>

<https://www.isa.org.jm/sites/default/files/files/documents/sb-21-2.pdf>

[10] See <https://www.isa.org.jm/sites/default/files/files/documents/sb-21-2.pdf>

[11] The meeting of the ISA in Jamaica to discuss regulations for deep sea mining is attracting a significant amount of attention. Avaaz has a petition calling for a moratorium at

[https://secure.avaaz.org/en/deep\\_sea\\_mining\\_loc/?copy](https://secure.avaaz.org/en/deep_sea_mining_loc/?copy); see also The Center for Biological Diversity sent out the following media release:

[http://www.biologicaldiversity.org/news/press\\_releases/2015/deep-sea-mining-07-16-2015.html](http://www.biologicaldiversity.org/news/press_releases/2015/deep-sea-mining-07-16-2015.html)

[12] See <http://www.deepseaminingoutofourdepth.org/> MiningWatch has served on the management committee of the Deep Sea Mining Campaign since its inception. The campaign is staffed by Dr. Helen Rosenbaum and Natalie Lowrey and is a **Project of The Ocean Foundation, a Partner of Mission Blue/Sylvia Earle Alliance and a Member of the Deep Sea Conservation Coalition.**

[13] See <http://www.deepseaminingoutofourdepth.org/report/>

[14] See <http://www.miningwatch.ca/submarine-tailings-disposal-toolkit>

[15] For the Environmental Impact Assessment see

<http://www.cares.nautilusminerals.com/Assets/Documents/Main%20Document%20Text.pdf>

[16] See Submarine Tailings Disposal Toolkit <http://www.miningwatch.ca/submarine-tailings-disposal-toolkit>

[17] Earth Economics notes that “High levels of genetic diversity amongst microorganisms have also been found at the Solwara site, with few “dominant” species. Typical ranges for any given species are generally below one metre. Species only feet away from each other might have little or no relation or shared genetic material.” <http://www.nautilusminerals.com/i/pdf/Environmental-and-Social-Benchmarking-Analysis.pdf> p.25.

[18] See <http://www.nautilusminerals.com/i/pdf/Environmental-and-Social-Benchmarking-Analysis.pdf>

[19] See for example Center for Ocean Solutions. “Managing mining of the deep seabed: Contracts are being granted, but protections are lagging.” ScienceDaily, 9 July 2015.

[www.sciencedaily.com/releases/2015/07/150709145151.htm](http://www.sciencedaily.com/releases/2015/07/150709145151.htm).

[20] See [http://worldoceanreview.com/wp-content/downloads/wor1/WOR1\\_chapter\\_7.pdf](http://worldoceanreview.com/wp-content/downloads/wor1/WOR1_chapter_7.pdf)

## Press Release

### Deep-sea Mining Regulations Need Stronger Environmental Protections

Center for Biological Diversity, July 16, 2015

KINGSTON, *Jamaica*— Scientists and conservationists are calling on the International Seabed Authority, now meeting in Jamaica, to adopt stronger-than-proposed protections for wildlife and oceans in setting environmental standards for deep-sea mining projects. The Center for Biological Diversity, which recently sued the United States government for issuing deep-sea mining permits that circumvent the ISA's nascent environmental review process, warns that the current push to start strip-mining the ocean floor could do irreparable damage to marine life. "Big corporations are rushing to mine our deep seas before scientists fully understand these mysterious ecosystems or how to protect them. We need to slow this process down and do whatever we can to shield them from the new gold rush," said Miyoko Sakashita, oceans program director for the Center. "And we don't think the United States should be defying the international system and breaking its own environmental laws to permit deep-sea mining." In May the Center sued the U.S. government for issuing exploratory permits to a Lockheed Martin subsidiary for mining work in the Clarion-Clipperton Zone halfway between Mexico and Hawaii. That claim is independent of the ISA, which includes the 161 nations that have adopted the United Nations Convention on the Law of the Sea.

Also in May the Center submitted comments to the ISA on the development of its regulatory process, supporting proposals by the Deep-Ocean Stewardship Initiative to establish an independent review board and to broaden the ISA's focus on individual projects to take into account regional and cumulative impacts. In addition the Center urged the ISA to improve its public noticing and comment procedures and to deny applications that involve significant environment impacts. Meanwhile the Center for Ocean Solutions published a study in the July 9 issue of *Science* calling for the ISA to create marine-protected areas in international waters where mining would be banned, a proposal the Center also supports. "This sort of large-scale industrial mining on our ocean floors is inherently destructive, so we need to do all we can to protect sea life from its impacts," Sakashita said.

The deep ocean is believed to contain billions of dollars worth of nickel, copper, cobalt, manganese, zinc, gold and other rare-earth metals and minerals. Extracting those materials has been considered too expensive, difficult and risky for investors in the past, but technological advances and skyrocketing prices for these materials have led to a strong push by the mining industry. The ISA has issued 26 exploratory mining permits in international waters, and another project permitted by Papua New Guinea in its territorial waters, Solwara I, could soon become an active commercial mining operation. The ISA's 21st annual session in Jamaica began July 14 and ends July 24. Learn more and read about the Center's lawsuit at [www.biologicaldiversity.org/campaigns/deep-sea\\_mining/](http://www.biologicaldiversity.org/campaigns/deep-sea_mining/).

### Deep seabed mining regulation in the Pacific

By Robert Makgill and Ana P Linhares, New Zealand Law Society, 16 July 2015

Deep seabed mining is increasingly seen as commercially feasible within the Pacific region. This is because it has vast seabed mineral deposits located outside sovereign territory.<sup>1</sup> Despite advances in seabed mining technology, scientific knowledge concerning the unique biophysical character of the deep sea environment remains sparse. This means there is relatively little information concerning the potential risk of environmental damage associated with proposed seabed mining activities.



## Obligations

The exploration and development of natural resources outside sovereign territory is governed under the 1982 United Nations Convention on the Law of the Sea (UNCLOS). Mining the seabed located under the high sea, more commonly known as the Area, is controlled under Part XI of the UNCLOS. Likewise, the right of states to undertake mining within their Exclusive Economic Zone (EEZ) and continental shelf is also established under UNCLOS. These rights to develop natural resources located within the seabed are attended by the corresponding obligations to protect and preserve the marine environment. States and state-sponsored companies proposing to engage in exploration or exploitation of resources in the Area must obtain approval from the International Seabed Authority (ISA).

The Republic of Nauru and the Kingdom of Tonga applied to the ISA to explore the Clarion-Clipperton Zone in April 2008. Located in the Pacific Ocean, to the south and south-east of the Hawaiian Islands, this part of the Area is considered to hold the most promise in terms of commercially viable manganese nodule recovery. Nauru and Tonga subsequently became concerned about their potential liability for damage to the marine environment resulting from seabed mining and postponed their applications. Nauru then requested the ISA obtain an advisory opinion on state parties' obligations and liability for seabed mining from the Seabed Disputes Chamber of the International Tribunal for the Law of the Sea (the Chamber).

## Advisory opinion

The Chamber delivered an advisory opinion on 1 February 2011 answering that each state party has a general obligation of due diligence to adopt "laws and regulations" and to take "administrative measures which are, within the framework of its legal system, reasonably appropriate for securing compliance by persons under its jurisdiction".<sup>2</sup> The Chamber identified a number of direct obligations through which law-making and enforcement might be given effect. Key obligations identified included the precautionary approach, best environmental practices and environmental impact assessment (EIA).<sup>3</sup>

These obligations would feature strongly in future regulatory efforts within the Pacific region designed to address the lack of information and uncertainty in relation to the impacts of mining on the marine environment. The Chamber went on to find that state parties would be liable for damage arising from the failure of a state to carry out its obligations. On the other hand, adoption of the precautionary approach, best environmental practices and EIA within a state's legislative framework would reduce the risk of liability in cases where environmental damage did occur as the result of seabed mining activities.

## Wave of action

The Chamber's opinion led to a wave of regulatory action throughout the Pacific region. The precautionary approach, best environmental practices and EIA have since found their way into a number of regulatory initiatives including the:

1. European Union and Secretariat of the Pacific Community Regional Legislative and Regulatory Framework for Deep Sea Minerals Exploration and Exploitation (Regional Framework);<sup>4</sup>
2. Cook Islands National Seabed Minerals Policy 2014;
3. Tongan Seabed Mining Act 2014; and
4. New Zealand Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012 (EEZ Act).

These initiatives can be said to have firmly established the key obligations within the Pacific as central to regulating seabed mining activities. Moreover, the recent decisions of the Environmental Protection Authority (EPA) in *Trans-Tasman Resources and Chatham Rock Phosphate*,<sup>5</sup> concern-

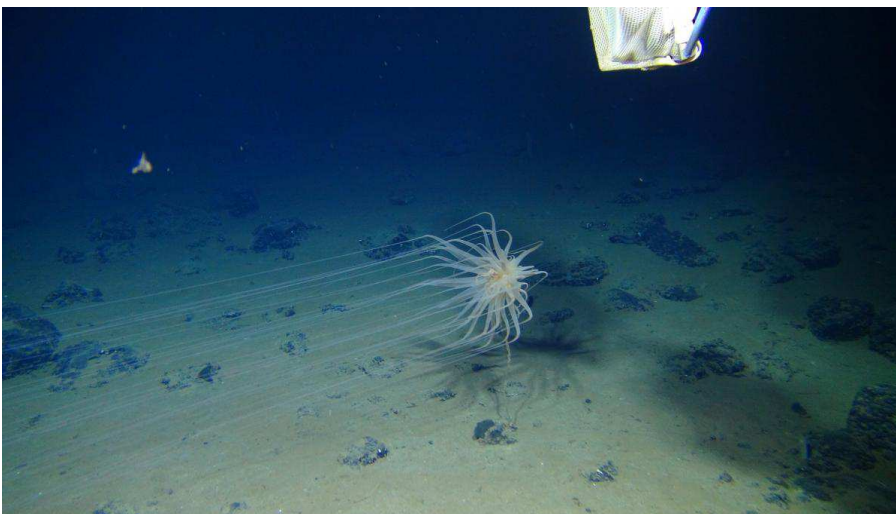
ing applications for seabed mining under New Zealand's EEZ Act, have demonstrated that consideration of the precautionary approach, best environmental practices and EIA require an adequate understanding of the existing marine environment before development can proceed. In declining both applications, the EPA has made clear that lack of information and uncertainty does not require regulators to prevent exploration and development from taking place.

However, the precautionary approach does require the collection of adequate baseline data on existing environments before commencing exploration or development. This is to ensure that any potential environmental changes arising out of lack of information or uncertainty as to the impacts of seabed mining are able to be monitored and controlled to avoid significant adverse effects. The key obligations identified in the Advisory Opinion have been adopted in the Pacific region as regulatory prerequisites to deep sea exploration and development. The decisions made in New Zealand have, in turn, signalled that baseline data is required to proceed where there is imperfect information. It might be said that the obligations identified by the Chamber are serving the regulatory function for which they were intended.

1. See forthcoming publication – Makgill, R. and Linhares, AP., 'Chapter 15: Deep Seabed Mining – Key Obligations in the Emerging Regulation of Exploration and Development in the Pacific', in Warner, R. and Kaye, S. (eds.) Routledge Handbook of Maritime Regulation and Enforcement.
2. *Seabed Disputes Chamber of the International Tribunal for the Law of the Sea Responsibilities and Obligations of States Sponsoring Persons and Entities with Respect to Activities in the Area* (Advisory Opinion) (1 February 2011) ("Advisory Opinion"), at para 110.
3. Anton, D., Makgill, R. and Payne, C., 'Advisory Opinion on Responsibility and Liability for International Seabed Mining (ITLOS Case No. 17): International Environmental Law in the Seabed Disputes Chamber', (2011) 41/2 Environmental Policy and Law 60 to 65, at 63.
4. Secretariat of the Pacific Community (SOPAC Division), Pacific-ACP States Regional Legislative and Regulatory Framework for Deep Sea Minerals Exploration and Exploitation prepared under the SPC-EU EDF10 Deep Sea Minerals Project, (1st ed. July 2012).
5. Trans-Tasman Resources Ltd Marine Consent Decision, *Environmental Protection Authority*, dated 17 June 2014; and Decision on Marine Consent Application by Chatham Rock Phosphate Limited, Application Ref: EEZ000006, *Environmental Protection Authority*, 10 February 2015.

## Protecting the deep sea: a call for balancing mining and ecosystem protection

Center for Ocean Solutions, July 9, 2015

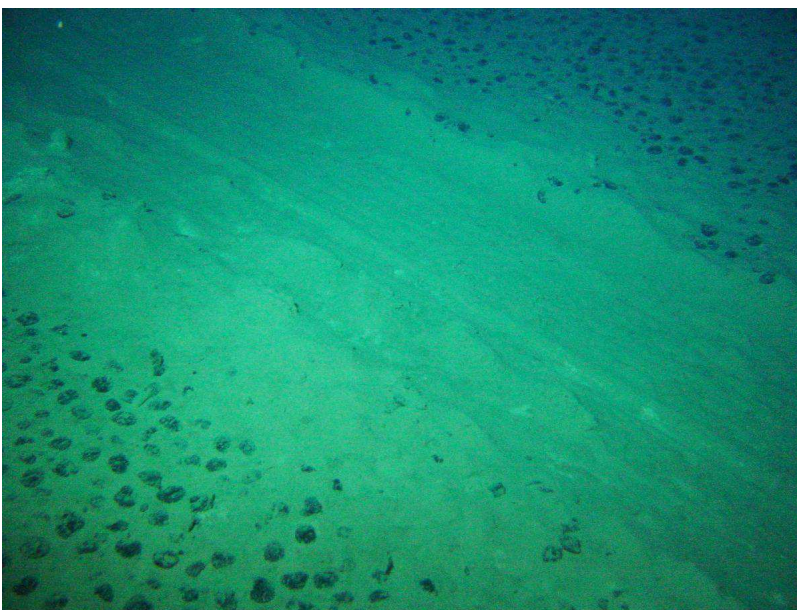


*Relicanthus* sp. - a new species from a new order of Cnidaria collected at 4,100 meters in the Clarion-Clipperton Fracture Zone (CCZ) that lives on sponge stalks attached to nodules. Credit: Craig Smith and Diva Amon, ABYSSLINE Project.

Monterey, CA - Thousands of feet below the ocean's surface lies a hidden world of undiscovered species and unique seabed habitats—as well as a vast untapped store of natural resources including valuable metals and rare-earth minerals. Technology and infrastructure development worldwide is dramatically increasing demand for these resources, which are key components in everything from cars and modern buildings to computers and smartphones. This demand has catalyzed interest in mining huge areas of the deep-sea floor. In a paper published this week in *Science*, researchers from the Center for Ocean Solutions and co-authors from leading institutions around the world propose a strategy for balancing commercial extraction of deep-sea resources with protection of diverse seabed habitats. The paper is intended to inform upcoming discussions by the International Seabed Authority (ISA) that will set the groundwork for future deep-sea environmental protection and mining regulations.

“Our purpose is to point out that the ISA has an important opportunity to create networks of no-mining Marine Protected Areas (MPAs) as part of the regulatory framework they are considering at their July meeting,” says lead author Lisa Wedding, an early career science fellow at the Center for Ocean Solutions. “The establishment of regional MPA networks in the deep sea could potentially benefit both mining and biodiversity interests by providing more economic certainty and ecosystem protection.” The ISA is charged with managing the seabed and its resources outside of national jurisdictions for the benefit of humankind. According to the United Nations Convention on the Law of the Sea (UNCLOS), the deep seabed is legally a part of the “common heritage of mankind,” meaning that it belongs to each and every human on the planet. “The ISA is the only body with the legal standing and responsibility to manage mining beyond national jurisdiction,” said Kristina Gjerde, an international high-seas lawyer and co-author on the *Science* paper.

Since 2001, the ISA has granted 26 mining exploration contracts covering more than one million square kilometers of seabed, with 18 of these contracts granted in the last four years. Researchers recommend that the ISA, as part of its strategic plans to protect deep-seabed habitats and manage mining impacts, take a precautionary approach and set up networks of MPAs *before* additional large claim areas are granted for deep seabed mining. “Given our paltry understanding of deep-sea environments, regional networks of MPAs that designate significant portions of the deep seabed as off-limits to mining would provide key insurance against unanticipated environmental impacts,” said co-author Steven Gaines, dean of the Bren School of Environmental Science & Management at the University of California at Santa Barbara.



A 26-year old test mining track (1.5 m wide) created at the seafloor of the CCZ illustrating the extremely slow recovery of these abyssal ecosystems from physical disturbance. Credit: Copyright Ifremer, Nodinaut cruise (2004).

Mining impacts could affect important environmental benefits that the deep sea provides to human beings. For example, the deep sea is a key player in our planet's carbon cycle, capturing a substantial amount of human-emitted carbon which impacts both weather and climate. Mining activities could disturb these deep-sea carbon sinks, releasing excess carbon back into the atmosphere. The deep sea also sustains economically important fisheries, and harbors microorganisms which have proven valuable in a number of pharmaceutical, medical and industrial applications. "Deep-sea areas targeted by mining claims frequently harbor high biodiversity and fragile habitats, and may have very slow rates of recovery from physical disturbance," said Craig Smith, a co-author and professor of oceanography at the University of Hawaii at Manoa. Smith and a team of scientists, helped the ISA pioneer the deep sea's first regional environmental management plan in 2012. Located in an area of the Pacific Ocean known as the Clarion-Clipperton Zone (CCZ), the plan honored existing mining exploration claims while protecting delicate habitats by creating a network of MPAs. The CCZ serves as a model for how future deep-sea ecosystem management could unfold.

"This kind of precautionary approach achieves a balance of economic interests and conservation benefits," said Sarah Reiter, a co-author and former early career law and policy fellow at the Center for Ocean Solutions who now works as an ocean policy analyst at the Monterey Bay Aquarium. The upcoming ISA session on July 15th represents a critical juncture for defining the future of deep-sea mining and protection. "The time is now to protect this important part of the planet for current and future generations," said Larry Crowder, a co-author and science director at the Center for Ocean Solutions and senior fellow at the Stanford Woods Institute for the Environment. "Decisions that affect us all will be made by the ISA this summer."

*The Center for Ocean Solutions is a collaboration among the Stanford Woods Institute for the Environment, the Hopkins Marine Station at Stanford University, the Monterey Bay Aquarium and the Monterey Bay Aquarium Research Institute. The Center works to solve the major problems facing the ocean and prepares leaders to take on these challenges. For more information see [center-foreceansolutions.org](http://center-foreceansolutions.org).*

## **Mining Heads Into The Deep Sea, Raising Environmental Concerns**

HuffingtonPost, Kate Sheppard, 07/07/2015

Mining in the deep sea for minerals is uncharted territory, but one company is well on its way to making it a reality. Now, the company is trying to convince skeptical audiences it's a good idea. Shontel Norgate, chief financial officer of Nautilus Minerals Inc., pitched a roomful of ocean advocates at last month's World Ocean Summit on the idea of deep-sea mining for minerals like copper and gold. Mining offshore, said Norgate, has a smaller environmental footprint than mining on land. Plus, she said, it doesn't require relocating communities or accounting for other human consequences of terrestrial mining. Deep-sea mining, she argued, "appears to be significantly better from environmental and social perspective." Moreover, Norgate said, many energy technologies of the future, including wind, solar, and hybrid and electric cars, use copper components. "If we're saying no to fossil fuels, we're effectively saying yes to more copper," Norgate told the crowd. "Where is that copper coming from?"

Toronto-based Nautilus has received permission to move forward with a plan to mine one mile below the ocean's surface, off the coast of Papua New Guinea -- the first project of its kind in the deep sea. While oil and gas operations have ventured into deep waters for years, it's new territory for mining. Nautilus expects to begin production at its Solwara 1 mine in 2018. The company predicts the mine will yield around 80,000 tons of copper and 150,000 ounces of gold per year. If the project is successful, the company will seek to expand to two other sites, in Papua New Guinea, and off the coast of the Polynesian nation of Tonga. Many are skeptical of deep-sea mining's supposed benefits,

and its environmental implications are relatively unknown. Nautilus has hired the environmental consulting firm Earth Economics to try to assess how a seabed mine might compare with a terrestrial mine. The analysis, released last month, compares likely impacts of the Solwara mine with three terrestrial mines of similar proportions -- Bingham Canyon in Utah, Prominent Hill in Australia, and the proposed Intag mine in Ecuador.

The analysis found that, unlike with terrestrial mines, there aren't issues like community displacement, use of freshwater supplies, erosion, or loss of land for other uses like food production, recreation, or cultural and historic conservation. Deep-sea mining would cause a loss of habitat and genetic resources, affect air and water quality, and use energy and raw materials, according to the analysis. But the overall environmental impact of deep-sea mining would not be as severe as that of an onshore mine, the analysis said. The report also predicted that demand for copper, for wiring and other needs, is likely to continue, and neither land-based mines nor recycling are likely to supply enough. Maya Kocian, a senior economist at Earth Economics, said the firm was cautious in taking on the analysis. Earth Economics normally studies the value of parks and recreation areas, she said. "Nautilus had to come to Seattle to convince our board to do it," said Kocian. "There was hesitation to move forward."

In the end, Kocian said, the firm found that there would be environmental impacts, but the comparison yielded interesting findings. "Mining destroys habitat," said Kocian. "But we have to make tradeoffs." And a full accounting of the impacts can help set appropriate standards for mining, she said. "The mining industry is going to move forward and continue to mine for copper," said Kocian. "It is important that we set standards in place now for both mining on land and in the deep sea." But environmental groups are skeptical of the supposed benefits of deep-sea mining. "We are opening up a totally new industry in the deep-sea environment, and the deep-sea environment is a vulnerable environment," Monica Verbeek, executive director of Seas At Risk, a Brussels-based association of European environmental groups, told *The Huffington Post*. "It's low in light, energy, and it takes forever for these deep sea creatures to grow and mature. You can do a lot of damage there very quickly." Verbeek argued that the more environmentally sound option would be to invest more in recycling existing minerals and finding alternatives to copper. "Why start this whole industry in a very deep, very fragile environment where working conditions are very difficult?" she asked.

"The truth is that we don't yet know what the true environmental impacts of deep seabed mining are as yet," said Richard Page, an oceans campaigner with Greenpeace, via email. Because the Nautilus operation will be the first, it is being watched with special interest said Page. "We know little about the ecology of the deep sea and the resilience of the system, and the effectiveness of the proposed efforts to assist natural recovery are unknown." Nautilus' Norgate argued that the newness of the exploit into the deep sea gives the company a chance to do things differently. "I certainly believe that if we get this right -- and I am a great believer that we will get this right because of the amount of work we've done -- it does have the potential to start a new industry and change the way we've been mining copper for decades," Norgate said in an interview. "We have a clean piece of paper here to decide how we want to do this, how we want this industry to be," Norgate continued. "We don't have the baggage that comes with the terrestrial mines or the oil and gas industry. We can take the best of all of those and create a new industry."

### **Chan confident seabed mining will start soon**

The National, June 29th, 2015

MINING Minister Byron Chan is confident that the mining of copper and gold on the seafloor in Bismarck Sea will start soon. He recently visited Newcastle in the United Kingdom to witness Nautilus Minerals offshore mining tools being manufactured and assembled. "The offshore mining tools

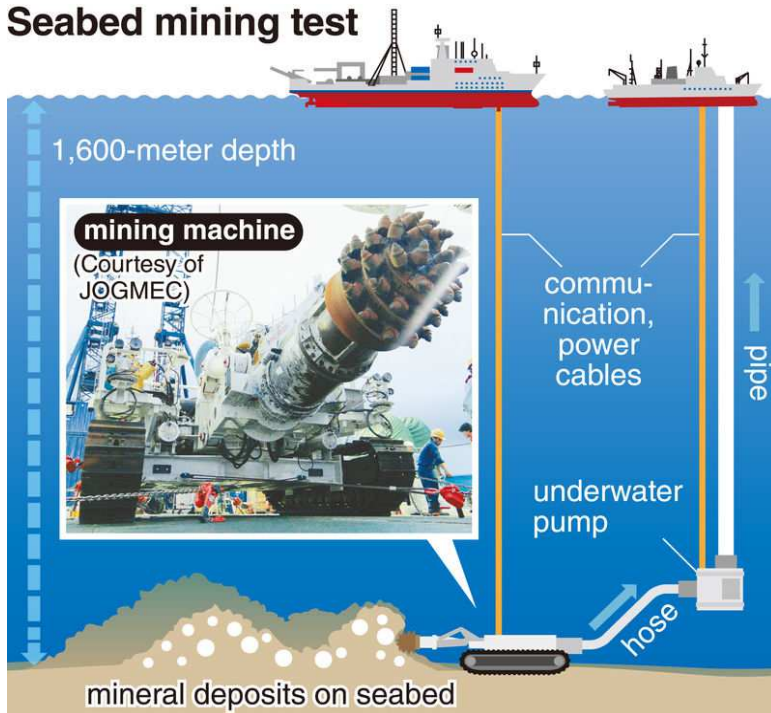


are huge and are about to be completed. I can say with confidence now that I have seen and witnessed these equipment myself that seafloor mining within the Bismarck Sea is soon to become a reality,” he said. Chan was referring to the construction and assembling of the three seafloor mining tools – the auxiliary cutter, the bulk cutter and the collector. He said it was satisfying to witness the seafloor mining tools being assembled. “The advent of this technology being developed by Soil Machine Dynamics Ltd of Newcastle in the UK for Nautilus and the Government of PNG is nothing short of impressive,” he said. “I commend SMD for their engineering and design expertise in delivering these tools. “I take pride in the fact that we are not only developing these tools for ourselves but for all mankind who will benefit from their application in future and we the people of PNG are taking a leadership position in this new frontier of offshore mining,” Chan said.

## Government set to mine mineral resources off Okinawa

The Japan News, June 28, 2015

### Seabed mining test

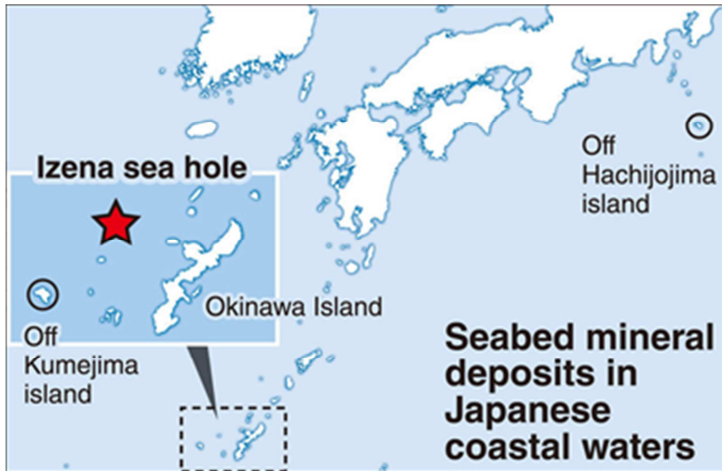


The Yomiuri Shimbun

The Natural Resources and Energy Agency intends to conduct deep-sea test mining of minerals found on the seabed off Okinawa Island, in fiscal 2017. The government aims to mine as much as 1,000 tons of zinc, silver and other mineral resources at a depth of about 1,600 meters in the sea off the island. It is a world first to conduct such large-scale mining of minerals that lie under the seabed, according to the agency. A large number of mineral deposits have lately been found one after another in waters near Japan. Currently, the Hishikari gold mine in Kagoshima Prefecture is the only domestic commercial mine in the country, the agency said. Japan is 100 percent dependent on imports for minerals such as iron, copper and zinc, which are indispensable for the production of cars and home electrical appliances.

The test mining is expected to be the first step to realizing commercial exploitation in the future, observers said, which would end Japan’s reputation as a country with limited natural resources. The agency plans to conduct the test mining on deposits found at the so-called Izena sea hole at about 100 kilometers northwest of Okinawa Island. It plans to use two mining machines developed by the Japan Oil, Gas and Metals National Corporation, the agency said. The agency plans to conduct the test mining by the end of fiscal 2017, using a special-purpose pump — which is expected to be de-

veloped in fiscal 2016 — to pull up unearthed minerals to a mother ship on the surface. It plans to mine about 100 tons of minerals every day for two to four weeks. The costs are expected to come to around ¥15 billion to ¥20 billion, according to the agency.



The Yomiuri Shimbun

Meanwhile, a Canadian company has launched the development of a machine to mine seabed minerals at a depth of more than 1,000 meters in the sea. A successful operational test of a Japanese-made mining machine at the Izena hole in the summer of 2012 confirmed the existence of about 3.4 million tons of mineral deposits including zinc, silver and gold. Mineral deposits also have been found in the coastal seas of Kumejima island in Okinawa Prefecture and Hachijojima island in Tokyo. The agency also plans to conduct a detailed survey of such mineral deposits. The government plans to conduct a full-scale project to conduct an integrated operation from exploitation to refinement in cooperation with private companies in the 2020s.

### **Nautilus gives thumbs up for progress of project**

The National, June 18th, 2015

NAUTILUS Minerals says it is happy so far with the development of its Solwara 1 project in New Ireland. Chairman Geoffrey Loudon (pictured) said: “I am delighted that this time last year saw us formally commence our partnership in the Solwara 1 Project with the independent state of Papua New Guinea; we appreciate their continued support. “It is very exciting for us to have secured a vessel charter with experienced vessel provider, Marine Assets Corporation. “We look forward to working with them and the shipyard, Fujian Mawei Shipbuilding, in seeing the delivery of our first vessel as we work toward making seafloor mining a reality in 2018.” The company said that results of its annual general meeting held Tuesday in Toronto, Canada, 34.10 per cent of the issued shares were represented. Shareholders voted strongly in favour of all resolutions brought before them.

### **New Zealand Maori backs moratorium on seabed mining**

Robin Martin, Taranaki reporter, Radio New Zealand, June 16, 2015

A South Taranaki iwi is getting behind a call for a moratorium on all seabed mining until the Government can prove its effects are minimal. The Ngati Ruanui Runanga chief executive said the iwi was supporting a petition for a moratorium started by environmental group 'Kiwis Against Seabed Mining'. Debbie Ngarewa-Packer said Trans-Tasman Resources' unsuccessful application for consents to mine ironsand off the South Taranaki coast showed that there were too many uncertainties in the controversial practice. She said the Government should investigate seabed mining thoroughly

and not rely on a few "guinea pig" areas to establish its environmental, cultural and economic impacts.

### **NGOs question Nautilus Minerals report on seafloor mining ‘minimum’ impacts**

Cecilia Jamasmie, mining.com, June 16, 2015



A coalition of Canada-based environmental groups is questioning a study commissioned by Nautilus Minerals (TSX:NUS) that claims mining copper from the seabed causes less disruptions to the environment and local communities than traditional extraction methods. The organizations, including Mining Watch, Earthworks, Deep Sea Mining Campaign and Oasis Earth Canada, are calling shareholders “not to pay the price of ignorance” when it comes to investing in the Solwara 1 deep sea copper, gold mining project in Papua New Guinea.

From their press release:

*Toronto, June 16, 2016.*— Civil society, non government organizations and scientists warn Nautilus shareholders not to pay the price of ignorance when it comes to investing in the Solwara 1 deep sea mining project in Papua New Guinea. On 1st June 2015 Nautilus released an environmental and social benchmarking report on the proposed Solwara 1 mine in the Bismarck Sea of Papua New Guinea. “The purpose of the report is to reassure investors and the world that mining the sea floor is a social and environmentally responsible way to satisfy global demand for minerals. Investors should be wary.” said Deep Sea Mining Campaign coordinator, Dr. Helen Rosenbaum. “The benchmarking report is based on information provided by Nautilus, has been reviewed by the company’s CEO, and is clearly an attempt to downplay the risks posed by the Solwara 1 project. How then can Nautilus claim that benchmarking report represents independent research.” The benchmarking report demonstrates limited scientific understanding of the impacts of seabed mining and ignores the wide range of risks identified by comprehensive independent reviews of the project’s Environmental Impact Statement (EIS).

These reviews demonstrate that the Solwara 1 EIS contains flawed assumptions and poor quality science. Richard Steiner, Oasis Earth Professor and Conservation Biologist said, “Extremely little is known about the environmental goods and services of deep sea ecosystems in comparison to terrestrial ecosystems. Additionally, because of their rarity, the mining of hydrothermal vents at the Solwara 1 site would remove a very high proportion of the global total of these ecosystem types – a property not considered by the report.” According to Dr. Catherine Coumans of Mining Watch Canada, whose work on the impacts of land based mines is cited in the Nautilus report, “The re-

port compares only the first of several potential Solwara sites with massive industrial scale terrestrial mines. Taken together with the cumulative impacts that can be expected of multiple deep sea mines planned by Nautilus, the comparison between terrestrial mines and the Solwara 1 site is like comparing apples to mangoes.”

“This report tells us nothing about the relative social and environmental impacts. It wrongly assumes no impacts on communities and no cultural claims. There is vocal opposition and disagreement to the Solwara 1 project by coastal communities of the islands of New Ireland and East New Britain. They believe they are already seeing the impacts of the Solwara 1’s exploratory phase. According to their customary law they have the right to ban Nautilus from entering their waters and they have already done so.” “Compensation claims for these impacts pose a significant risk to shareholders and investors.” Dr Rosenbaum said that the benchmarking report “downplays the contribution that ‘urban mining’ will make. New technologies are in the pipeline and these will provide economically viable win-win alternatives to mining – creating environmental and social benefits from our growing waste problem. Deep sea mining and its investors will be left in the wake of urban mining and with on ongoing liabilities to boot. Smart investors are already backing the winner.”

“The benchmarking report attempts to paint a picture of DSM as being the lesser of two evils. In reality DSM is just the evil we know least about”, said Dr. Coumans.

The Solwara 1 project, located in the minerals-rich Manus basin, is expected to become the world's first commercial high-grade deep-sea copper and gold mine.

### **Nautilus Minerals: Investor and Shareholder Alert**

Deep Sea Mining Campaign Media Release, 16 June 2015

TORONTO | Environmental groups warn Nautilus shareholders not to pay the price of ignorance when it comes to investing in the Solwara 1 deep sea mining project in Papua New Guinea. On 1st June 2015 Nautilus released an environmental and social benchmarking report on the proposed Solwara 1 mine in the Bismarck Sea of Papua New Guinea. “The purpose of the report is to reassure investors and the world that mining the sea floor is a social and environmentally responsible way to satisfy global demand for minerals. Investors should be wary.” said Deep Sea Mining Campaign coordinator, Dr. Helen Rosenbaum. “The benchmarking report is based on information provided by Nautilus, has been reviewed by the company’s CEO, and is clearly an attempt to downplay the risks posed by the Solwara 1 project. How then can Nautilus claim that benchmarking report represents independent research.”

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### **Nautilus Minerals announces extension**

The National, June 15th, 2015

NAUTILUS Minerals says it has agreed to extend by six months the exercise date for options granted to its joint venture partner in the Solwara 1 Project. Last December, the company and state nominee, Eda Kopa Ltd, a subsidiary of Petromin PNG Holdings Ltd, formed a joint venture for the deep-sea mining project. Under the terms of the venture, Eda Kopa took an initial 15 per cent interest with an option to take up additional 15 per cent interest within a year on paying certain amounts pursuant to a formula described in the agreement. The option was exercisable in three 5 per cent lots within six, nine and 12 months respectively from the date the joint venture was formed. If Eda Kopa does not exercise any of the five per cent options within the relevant time period then that option and any subsequent options are deemed to have lapsed. To facilitate further discussion between the Nautilus and Eda Kopa, the Canadian subsea miner has agreed to extend the exercise date of the three five per cent options by six months respectively.

### **Nautilus opts for quality with Solwara-1 project**

Post-Courier, June 09, 2015

CANADIAN miner Nautilus Minerals plans on setting the highest standards and will opt for nothing less than the best with its Solwara-1 Project in the Bismarck Sea. Solwara-1 is located between New Ireland and East New Britain Provinces. Its deposit reportedly sits at a depth of 1,600 metres and, according to the company, boasts a copper grade of approximately 7 per cent as well as gold grades of well over 20 grams per ton. Start time for, what will be the world’s first ever deep sea mining project, has been locked in at 2018. With all eyes now turned to it, Nautilus is doing everything to ensure all aspects are adequately covered so there is no room for any errors, let alone criticisms. "We want to see the highest standard in this project," Nautilus country manager Mel Togolo said while responding to questions and concerns which had been raised by journalists during a media briefing on the project in Port Moresby yesterday. He said all contracts awarded for design and construction of all the equipment that would be used for the projects had been given to very reputable and renowned companies.

Mr Togolo said the vessel that would be used was being built by a reputable shipping company in China-Fujian Mawei Ship building Limited and that the company was expected to take delivery of it in 2017. He said the design work of the vessel had already received preliminary approval from the American Bureau of Shipping. Other companies that had been engaged for the associated equipment included Rolls Royce of Norway MacGregor both from Norway, Bedeschi SPA of Italy and



Siemens International Trading (Shanghai) Ltd of China. The environmental impact on the water column in the sea, terrestrial waters and the marine life had also topped the agenda at the meeting, especially as this project would be the first of its kind in the world. Mr Togolo said Nautilus had commissioned Earth Economic to review the environmental and social impacts of the project. While the independence of the report had been questioned, given that it was commissioned by the company, Mr Togolo had cautioned on issues being raised without it being read in its entirety. The review had been done benchmarking it against two other existing mines in the US and Australia and a proposed mine in Equador, South America.

### **Kiwis Against Seabed Mining group takes campaign a step further**

CHRIS GARDNER, stuff.co.nz, June 8, 2015



Waikato Times

KASM Chairperson Phil McCabe protesting against deep sea oil drilling in 2013. A Raglan-based pressure group that stands against seabed mining is marking World Oceans Day by widening a petition. Kiwis Against Seabed Mining (KASM) said Lush Cosmetics had already collected 3500 signatures over six weeks calling for environment minister Nick Smith to impose moratorium on seabed mining. On Monday, KASM chairman Phil McCabe said in a statement that he was widening the campaign. "After two failed seabed mining proposals, it has become abundantly clear that we don't know enough about the impacts of this experimental practice, and we need more information," McCabe said. "The mining industry is now calling for our Government to weaken the laws that govern our oceans to make it easier for them to mine the seabed - that's totally unacceptable," he said.

"World Oceans Day is a good day to call taihoa on seabed mining. We need to know what we're dealing with and where we want to go before diving headlong into this uncharted territory," said McCabe. Trans Tasman Resources and Chatham Rock Phosphate both recently lost bids to mine the seabed off New Zealand. Trans Tasman Resources' application was to mine iron sands off the South Taranaki Bight. Chatham Rock Phosphate's application was for phosphate off the Chatham Rise. KASM is concerned New Zealand, which has the fourth largest Marine Estate in the world, poorly understood the seabed and there was no overarching management plan. "Instead of inviting more wastage of investment dollars on further haphazard and inappropriate seabed mining applications, KASM thinks it's time for the Government to go back to the drawing board, do more research into the makeup of our marine environment and initiate a national discussion on how we want to treat our oceans," the statement said. "We're only just discovering the blue whale foraging ground in the Taranaki Bight – what else is out there that could be affected? We just don't have that information."

## **New international report highlights reputation risk for firms involved in seabed mining**

by Ramunickel, PNG Mine Watch, June 5, 2015

Business Intelligence group, RepRisk, has released a new report highlighting the environmental, social and governance risks for companies involved in seabed mining and drilling. RepRisk is a leading international business intelligence provider serving global banks, insurance companies, investment managers and corporates. In its report, RepRisk, details the many environmental concerns surrounding experimental seabed mining including:

- Irrevocable damage to marine ecosystems that are already fragile because of overfishing and pollution
- Release of toxic particles and exposure of species to heavy metals and acids that could enter the food chain
- Impacts of light on species accustomed only to the dark and of noise in an environment where sound is used for communication
- Spreading of contamination from mine waste or leaks by ocean currents
- Reduction of fish stocks affecting coastal communities
- Loss of complex and diverse ecosystems that could potentially benefit mankind
- Loss of resources that could provide for the discovery of new medicines

RepRisk also reviews the history of the controversial Solwara 1 experimental seabed mine in Papua New Guinea. Both United States mining company Anglo American and Russian giant Metalloinvest have stakes in the mine lease holder, Nautilus Minerals. RepRisk outlines the strong campaign against the Solwara 1 that involves groups like Greenpeace, Friends of the Earth and ACT NOW! as well as scientist, university professors, church leaders and local communities. According to RepRisk these groups have all voiced "fierce opposition to the Solwara 1 Project". As well as the environmental concerns outlined above which are all relevant to the proposed Solwara 1 mine, RepRisk highlights the concern over the ability of the PNG government to monitor a completely new mining technique. RepRisk also outlines the concerns of coastal communities that the project will pollute the seawater, cause other environmental damage, and have a negative impact on their livelihoods and food sources, which are dependent on fishing. The report also highlights the 2012 report that claims the Solwara's Environmental Impact Study was seriously flawed, as it failed to correctly identify the risks associated with the project and had underestimated the impacts on local communities. Report: <https://ramumine.files.wordpress.com/2015/06/reprisk-special-report-on-seabed-mining-and-drilling-2015.pdf>

## **Nautilus recommences exploration activities**

Post-Courier, June 04, 2015

CANADIAN miner Nautilus Minerals has recommenced exploration activities in Papua New Guinea, but is looking at expanding this to include several other countries in the region. Its first program abroad is already underway in the Solomon Islands. Nautilus president and chief executive officer Mike Johnston had, in the company's Annual Report, stated that the recommencement of exploration to be important for the company's future. However, Mr Johnston stated these activities would not distract it from its primary task in delivering the Solwara-1 project on time and on budget. Country manager Mel Togolo said, during a media briefing in Port Moresby yesterday, that production is expected to start in early 2018. He said the anticipated life-span of the Solwara-1 Project to be up to three years. He said the company had undertaken the decision to recommence exploration to ensure it has a pipeline of projects to feed into the production system that would be available in the waters. He affirmed that the company did have an exploration plan in place, adding this did not just cover PNG alone. "We will do more work in other Pacific countries. We now have a team in

Solomon Islands, doing more exploration work there and we have got potential in Tonga as well," he said.

### **Nautilus reaffirms commitment to project**

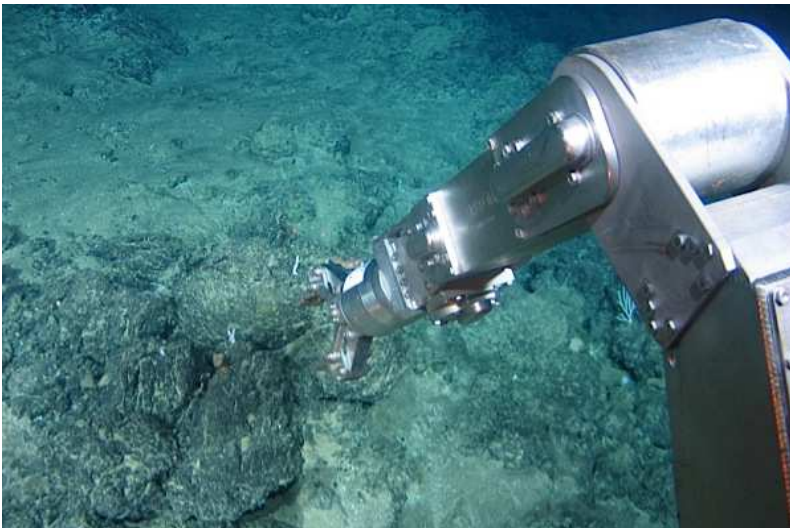
The National, June 4th, 2015

NAUTILUS Minerals remains committed to the Solwara-1 project near New Ireland, the company says. PNG country manager Mel Togolo said Nautilus had achieved various milestones in developing the deep-sea mining project. He said one of the highlights was the progress on the building of the production support vessel which would be completed at the end of 2017 and the testing of three seafloor production tools. Togolo said several contracts had been awarded to leading world companies for the supply and installation of various key components to the production support vessel. "The sea floor production tools are undergoing commissioning currently in England and their delivery is expected at the end of the year, so that's a big hurdle for us," Togolo said.

"These are milestone achievements for the company, achievements which reiterate our commitment to success fully delivering the Solwara 1 project to the people of Papua New Guinea." He added that he was pleased with the progress of its corporate social responsibility programmes that were currently underway to deliver much needed services to communities in New Ireland. "I am happy to say, our water and sanitation pilot programme from last year continues into 2015 with the second phase recently kick started," Togolo said. "In our efforts to identify and prioritise community needs, my team completed a community needs assessment survey interviewing an estimated 1500 households within the villages along the west coast of New Ireland."

### **Seafloor copper extraction better than traditional mining — report**

Cecilia Jamasmie, Mining.com, June 1, 2015



Extracting copper from the seabed can cause less disruptions to the environment and local communities than traditional mining. (Image courtesy of Nautilus Minerals)

A fresh study commissioned by Canadian seafloor miner Nautilus Minerals (TSX:NUS) shows that extracting copper from the seabed causes less disruptions to the environment and local communities than traditional mining, the company said. The report, released by Earth Economics, compared Nautilus' copper, gold Solwara 1 project — located in the Bismark Sea, north of Papua New Guinea — to three traditional copper mines: Bingham Canyon (Utah, U.S.), Prominent Hill (South Australia, Australia) and Intag (a proposed project in Ecuador). Based on the analysis of each mine's social

and environmental impacts, the research concluded that seafloor mining has the potential to not only provide economic benefits within the communities nearest to the operations, but also to minimize the impact of copper mining. According to Nautilus Minerals, the study proves that the proposed Solwara 1 project would be "far superior" than existing and proposed terrestrial copper mines.

According to Nautilus Minerals, the study proves that the proposed Solwara 1 project would be "far superior" than existing and proposed terrestrial copper mines. "[Seabed mining] has also the potential to change the physical nature of the mining industry for the better," Nautilus' chief executive officer said in a statement.

The Toronto-based company, the first yet not the only one with projects to mine the ocean floor, summarized the key finding of the reports as follows:

1. World demand for copper continues to rise, with increasing global economic development, expanding renewable energy supplies (wind, hydro, wave geothermal, tidal power) and growing copper plumbing, electronics and communications sectors.
2. Recycling is likely limited to around 35% of the supply of copper. Copper ore concentrations are declining. Environmental and social impacts of copper mining are rising.
3. There is an urgent need to meet world copper demand while reducing fresh water use and contamination, damaging impacts to communities, mine footprints and CO2 emissions from copper mining.
4. Seafloor mining has the potential to minimize the impact of copper mining by producing more copper with fewer natural capital inputs, fewer damaging outputs and a smaller area of impact.
5. The proposed Solwara 1 project when compared to the terrestrial mines, entails far less environmental and social impact and less short and long-term risks.
6. Terrestrial mines have significant impacts. Measured on the basis of impacts per ton of copper, the Solwara 1 project would outperform terrestrial mines:
  - People will not be displaced by the proposed Solwara 1 project.
  - There will be no impact to food production.
  - There will be no impact to surface or groundwater fresh water supplies.
  - There will be no significant risk of disaster (e.g. mine tailing slide into communities).
  - There will be no impact to pollination, soil formation, erosion, historic and cultural values.
  - The monetary damages (measured in terms of USD/year) resulting from terrestrial mines is estimated to be significantly more than that of the proposed Solwara 1 project (4 to 13 times per ton of copper produced for the three mines used in the comparison).
  - The long-term mining liabilities for freshwater contamination, tailings and overburden failures that threaten downstream communities do not exist in Solwara 1.

Nautilus settled a key dispute with the PNG's government last year, and since then, progress has moved quickly on the Solwara 1 project. The company expects to have all its undersea mining tools ready to go by mid-2016. It has also entered a charter agreement for a massive mining vessel, which it expects to receive in late 2017. After that, Nautilus expects to start digging up copper and precious metals almost right away. The project, located in the minerals-rich Manus basin, is expected to become the world's first commercial high-grade deep-sea copper and gold mine.

Report: <http://www.mining.com/wp-content/uploads/2015/06/Earth-Economics-Environmental-Social-Benchmarking-Solwara-1-2015.pdf>

## **NZ's environment once again at risk from seabed prospectors**

Press Release: Green Party, NZ Scoop, 29 May 2015

The Government should immediately implement a moratorium on seabed mining, the Green Party said today. The Green Party is responding to the news that Trans-Tasman Resources has applied to

New Zealand Petroleum and Minerals for a 4,436km<sup>2</sup> Prospecting Permit offshore along the West Coast of the South Island. "New Zealand needs to follow the lead of Australia's Northern Territory and Namibia and put a moratorium on seabed mining," Green Party oceans spokesperson Eugenie Sage said today. "Seabed mining is completely experimental and has the potential for major impacts on the seabed, water quality and marine mammals and other marine life. "A moratorium would avoid the company wasting its resources, and the public having to waste their time mobilising to oppose it to protect our marine environment.

"The two previous seabed mining applications by Tran-Tasman's have been rejected by the Environmental Protection Agency. "With less than 0.5 percent of New Zealand's waters currently protected in marine reserves, and no oceans policy as such, seabed mining is a risk not worth taking," Ms Sage said. "With the West Coast a stronghold for Hector's dolphin, Trans-Tasman will face similar public opposition in the South Island as they did for their applications off the North Island's West Coast. "It is vitally important we protect the places we love from extractive activities that cause real damage. "Our economic future relies on protecting the environment which is the basis for our prosperity. New Zealand's economic development should be in clean energy, green tech and smart industries like IT, rather than harmful extractive technologies," Ms Sage said.

### *News Release*

#### **SPC, EU To Establish Deep Sea Mining Network**

Secretariat of the Pacific Community, Apia, Samoa. May 29,2015

The Secretariat of the Pacific Community and the European Union will establish a community of practice for Pacific Islands' policy officers and legislative drafters involved in deep sea minerals. The new initiative is a key outcome of an intensive regional training workshop on deep sea minerals policy formulation and legislative drafting hosted by the Government of Samoa and organized with SPC in Apia last week. The virtual community of practitioners will usefully exchange practices, experiences, questions and challenges with regards to the development and implementation of their deep sea mineral policies and legislation. The Director of SPC's Geoscience Division, Professor Mike Petterson, said the initiative will enable policy officers and legislative drafters to share and discuss the future development of deep sea mineral regulatory frameworks, including the strengths and weaknesses in existing deep sea mineral policies and legislation, and to grasp whether there is a need for further development and changes. "Additionally it will ensure that there's a better understanding of the needs and priorities of the Pacific region as a whole, as well as the ability to identify possible areas of regional cooperation and information sharing for deep sea mineral activities," Petterson said.

The new virtual community will be facilitated through a blog or portal managed by SPC as part of its European Union-funded Deep Sea Minerals Project. "The community of practice proposed within the project will enhance the governance of deep sea minerals in the region," the Ambassador of the European Union for the Pacific, Andrew Jacobs, said. "It is another effort to ensure that deep sea minerals in the Pacific are managed sustainably and we are supportive of such efforts." Initiated in 2011, the project has been assisting Pacific Island countries in accessing all available information and for those who wish to engage in deep sea mineral activities, by supporting informed governance in accordance with international law, with particular attention to the protection of the marine environment and securing equitable financial arrangements for the benefit of Pacific people. As one of its key result areas, the project aims to assist Pacific Island countries in the formulation of national policy, legislation and regulations to ensure the responsible governance and careful management of deep sea mineral resources. The workshop in Apia, Samoa, was attended by 70 participants from 13 Pacific Island countries.



## Submission to International Seabed Authority highlights failures in Solwara 1 PNG Mine Watch, May 24, 2015



MiningWatch Canada  
Mines Alert

OASIS EARTH



### Submission to the International Seabed Authority on the report to ISA members and stakeholders *Developing a Regulatory Framework for Mineral Exploitation in the Area*

Submitted by e-mail to: [consultation@isa.org.jm](mailto:consultation@isa.org.jm)

By the Deep Sea Mining Campaign, Earthworks, MiningWatch Canada, Oasis Earth and the Mineral Policy Institute  
15 May 2015

An NGO submission to the International Seabed Authority has highlighted all the failures in the approval of the controversial Solwara 1 experimental seabed mine in Papua New Guinea. The Solwara mine will involve the open cut strip mining of the seafloor in the Bismarck sea between New Ireland and East New Britain.

The Submission to ISA has been presented as part of the ISA consultations on its proposed Regulatory Framework for seabed mining.

The submission calls for:

1. the free, prior and informed consent of Indigenous Peoples for any exploration or mining
2. the broad support of potentially affected communities and wider civil society for any exploration or mining
3. peer-reviewed research on the potential impacts of the mining operation to marine ecosystems and species
4. peer-reviewed research on the potential impacts of the mining operation to the health and the economy of human communities at local, national and regional levels
5. peer reviewed research on the cumulative impacts of mining operations and the establishment of mechanisms and strategies to address these

None of these recommendations has been met in the development process for the Solwara 1 mine – which highlights the human rights and environmental failures by the PNG authorities.

See: <https://ramumine.files.wordpress.com/2015/05/submission-to-isa-may-2015.pdf>

### Unbekannte Winzlinge: Die faszinierende Mikrowelt der Ozeane

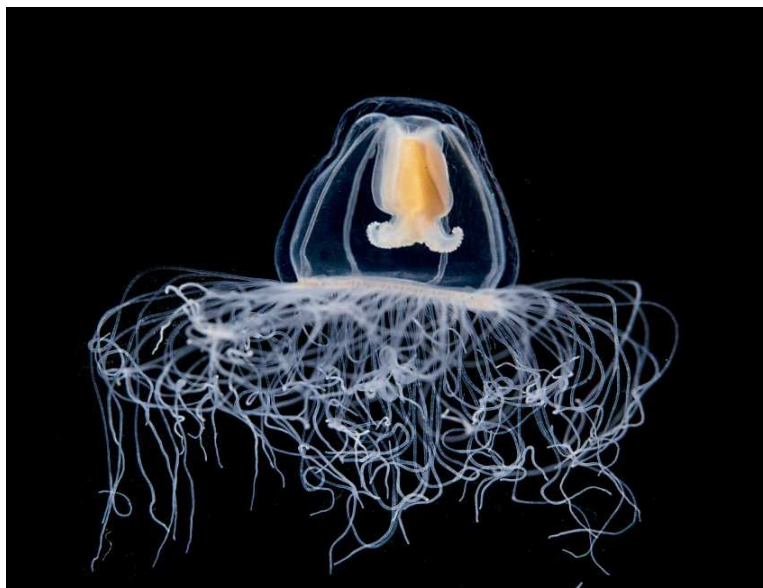
*Winzige Organismen im Meer produzieren die Hälfte des weltweiten Sauerstoffs. Forscher kennen die Wesen kaum, dabei sind sie für das Überleben der Menschheit unverzichtbar. Nun öffnen faszinierende Fotos einen Blick ihre Welt.*

Tara Expéditions, CNRS, Christian Sardet, Spiegel Online Wissenschaft, 22.5.2015

Dreieinhalb Jahre lang haben Hunderte Forscher die Zusammensetzung von Plankton in allen Weltmeeren untersucht. Für das internationale Mammutprojekt sammelten sie an Bord des Segelschiffes "Tara" Proben an 210 Stellen bis in eine Tiefe von 2000 Metern. Die Analysen, deren erste Resultate das Fachblatt "Science" nun in fünf Artikeln (1, 2, 3, 4, 5) veröffentlicht, sollen diese weitgehend unbekannte Welt erschließen. Plankton produziert - in den sonnendurchfluteten oberen Meeresschichten - die Hälfte des weltweit gebildeten Sauerstoffs. Die Größe der einzelnen Organismen reicht von 0,02 Mikrometern bis 2 Millimeter. In der Gruppe zu finden sind Organismen von Viren über Bakterien bis zu Meerestierchen. Die Vielfalt der Lebewesen haben die Forscher in eindrucksvollen Bildern festgehalten.



Tara Expéditions/ CNRS/ Christian Sardet; Plankton aus dem Pazifik: Hier zu sehen sind verschiedene Mikroorganismen.



Tara Expéditions, CNRS, Christian Sardet; Winzige Qualle: Diese anmutige Schönheit stammt aus dem Mittelmeer und ist eine Verwandte der Quallen-Art *Turretopsis nutricula*, die als biologisch unsterblich gilt. Zellen aus ihrem Außenschirm werden nach dem Tod zum Keim neuer Polypen, weshalb die Nachkommen mit der Mutter genetisch identisch sind.

### **Temperatur bestimmt Zusammensetzung der Arten**

"Zusammen liefern diese Studien zwingende Belege für ausgedehnte Netzwerke von bisher versteckten biologischen Interaktionen im Meer", schreiben zwei US-Forscher in einem "*Science*"-Kommentar. "Die 'Tara'-Meeresexpedition hat einen Schatz an Daten erzeugt, der jedem zur Verfügung steht, der einzutauchen bereit ist." Neben der Sauerstoffproduktion sind die Organismen als Nahrungsquelle entscheidend für das Überleben der Tiere im Meer. Selbst große Wale ernähren sich von den winzigen Lebewesen. Ein Erbgut-Katalog mit 40 Millionen Genen, den eine Forscher-

gruppe um Shinichi Sunagawa vom Europäischen Laboratorium für Molekularbiologie (EMBL) in Heidelberg aus den Daten der Expedition erstellt hat, soll Aufschluss über die Vielzahl der Arten geben. Die Zusammensetzung verschiedener Plankton-Gemeinschaften in den oberen Schichten hängt vor allem von der Temperatur ab, berichten die Forscher. Dies deutet darauf hin, dass die Erderwärmung starken Einfluss auf Gemeinschaften haben dürfte.



Tara Expéditions, CNRS, Parafilm; Meeressaphir aus dem Mittelmeer: Dieser männliche Vertreter der parasitären Ruderfußkrebse reflektiert und zerlegt Licht mithilfe winziger Platten in seiner Haut.

### **Kein Vorbeikommen am Kap Agulhas**

Durchmischt werden die Lebensgemeinschaften besonders stark am Übergang zwischen Indischem Ozean und Atlantik vor dem Kap Agulhas an der Südspitze Afrikas. Kein Wunder: Die sogenannten Agulhasringe gehören zu den stärksten Wirbeln im gesamten Ozean. Hier mischt sich warmes Wasser aus dem Indischen Ozean mit kalten Atlantikströmungen. "Es ist, als ob das Plankton an der Spitze Südafrikas kalt durchgespült wird", sagt Daniele Iudicone von der Stazione Zoologica Anton Dohrn in Neapel. "Die Strömung bildet riesige Wirbel, die das Plankton kräftig durchmischen und abkühlen. Dadurch wird die Anzahl der Arten verringert, die auf die andere Seite gelangen können." *jme/dpa*

### **Landmark Lawsuit Challenges U.S. Approval of Deep-sea Mineral Mining**

*New Ocean Gold Rush Could Hurt Marine Life Before Impacts Are Known*

Center for Biological Diversity, May 13, 2015



Loggerhead sea turtle photo courtesy Wikimedia Commons/Damien DuToit.

SAN FRANCISCO— The Center for Biological Diversity sued the U.S. government today over its first-ever approval for large-scale deep-sea mining, a destructive project between Hawaii and Mexico that would damage important habitat for whales, sharks and sea turtles and wipe out seafloor ecosystems. The lawsuit targets the National Oceanic and Atmospheric Administration for issuing and renewing exploratory permits for the work before completing environmental impact studies required by federal law. This is the first major legal challenge to an emerging global industry that is seeking to extract gold, nickel, copper and other increasingly valuable metals and minerals from the seabed beneath international waters. “Like mountaintop-removal coal mining, deep-sea mining involves massive cutting machines that will leave behind a barren landscape devoid of life,” said Emily Jeffers, the Center attorney who filed the case in federal district court in Washington DC. “Deep-sea mining should be stopped, and this lawsuit aims to compel the government to look at the environmental risks before it leaps into this new frontier. We need to protect the ocean wildlife and habitat, and the United States should provide leadership for other nations to follow before more projects get underway.”

The lawsuit challenges a pair of exploratory permits that were issued to OMCO Seabed Exploration LLC, a subsidiary of defense contractor Lockheed Martin, to pursue mining work in the Clarion-Clipperton Zone in the equatorial Pacific Ocean, about halfway between Hawaii and Mexico. OAA issued the first licenses in 1980, but they expired in 2004, and this case challenges their renewal in 2012, which was based on a request from the company. The deep ocean is believed to contain billions of dollars worth of nickel, copper, cobalt, manganese, zinc, gold and other rare-earth metals and minerals. Extracting those materials has been considered too expensive, difficult and risky for investors, but technological advances and skyrocketing prices for these materials, much of which are used in consumer electronics, have triggered a strong push by the mining industry.

There are now 26 mining permits that have been issued to explore mining, including an active commercial mining operation that has been permitted by Papua New Guinea, the Solwara I project. Most of the permits have been issued through the International Seabed Authority (ISA) for the Clarion-Clipperton Zone which is rich in valuable polymetallic nodules, but the United States asserts claims in the area independent of the multi-nation ISA. “The rush to strip-mine the deep-ocean floor threatens to damage mysterious underwater ecosystems. If we aren’t careful, this new gold rush could do irreparable harm to the basic building blocks of life,” said Jeffers. “The federal government has a moral duty, as well as a legal one, to understand the full environmental impacts before the mining industry scrapes away our deep-sea resources.” For more information and to download a copy of the lawsuit, please visit the Center’s Deep-sea Mining webpage and list of FAQs at [www.biologicaldiversity.org/campaigns/deep-sea\\_mining/index.html](http://www.biologicaldiversity.org/campaigns/deep-sea_mining/index.html).

### **Nautilus: Financial results revealed**

The National, May 13th, 2015

FINANCIAL data from Nautilus Minerals for the first quarter shows that it is well set to advance its seabed mining of rich volcanic copper and gold rich minerals in Papua New Guinea waters. The Canadian miner is the operator of the Solwara 1 project in the Bismarck sea. The company advised that it continued to advance the project and in particular, the three key equipment contracts. Chief executive officer Mike Johnston said: “We (Nautilus) are delighted to have made such good progress since the beginning of the year with the build of our seafloor production equipment. For the next 12 months we will remain focused on the build of the PSV (production support vessel) and the delivery of the equipment that is to be integrated in it.” “It is very pleasing to have recommenced our exploration initiatives, with our first programme planned for May this year in the Solomon Islands, as we advance our pipeline of seafloor massive sulphide systems in the South West Pacific. “The company remains committed to maximising shareholder value by achieving its objective of

developing the world's first commercial high grade seafloor copper-gold project and launching the deep water seafloor resource production industry in 2018."

### *Gemeinsame Pressemitteilung*

**Startschuss für weitere exklusive Erkundung von Rohstoffen in der Tiefsee: Deutschland unterzeichnet Lizenzvertrag zur Exploration polymetallischer Sulfide im Indischen Ozean**  
Bundesministerium für Wirtschaft und Energie, Bundesanstalt für Geowissenschaften und Rohstoffe, Datum: 6.5.2015

Im Beisein von Matthias Machnig, Staatssekretär im Bundesministerium für Wirtschaft und Energie (BMWi), haben der Generalsekretär der Internationalen Meeresbodenbehörde, Nii Allotey Odunton, und der Präsident der Bundesanstalt für Geowissenschaften und Rohstoffe (BGR), Prof. Dr. Hans-Joachim Kämpel, heute in Berlin im Bundeswirtschaftsministerium einen Lizenzvertrag zur Erkundung von Sulfid-Lagerstätten im Indischen Ozean unterzeichnet. Die Vertragsunterzeichnung ist ein wichtiger Meilenstein auf dem Weg zu einem umweltgerechten und nachhaltigen Tiefseebergbau. Mit der Lizenz kann die BGR exklusiv in einem ca. 10.000 Quadratkilometer großen Gebiet südöstlich von Madagaskar polymetallische Sulfide am Tiefseeboden erkunden. Sie tritt neben eine bestehende Lizenz zur Erkundung von Manganknollen im Pazifik.

Staatssekretär Machnig: "Die BGR leistet Pionierarbeit für deutsche Technologieunternehmen und für die künftige Rohstoffversorgung Deutschlands. Als Industriestandort und Hochtechnologieland ist Deutschland in besonderem Maße vom Import von Rohstoffen abhängig. Dabei steht Deutschland in Konkurrenz zu anderen Staaten. Wir sollten die Option Tiefseebergbau daher schon aus strategischen Gründen verfolgen und werden deshalb eine detaillierte Studie dazu vergeben, ob und wie ein kommerzieller Abbau in den deutschen Lizenzgebieten realisiert werden könnte. Dabei werden wir auf höchste Umweltstandards achten, um das sensible Ökosystem der Tiefsee als gemeinsames Erbe der Menschheit zu bewahren."

BGR-Präsident Prof. Dr. Kämpel: "Die Entwicklung des Tiefseebergbaus als Zukunftsprojekt ist von großer Bedeutung für die deutsche Wirtschaft, sowohl zur Ressourcensicherung als auch für die Entwicklung neuer Technologien. Darüber hinaus leistet die BGR auch einen wichtigen Beitrag zur Entwicklung von umweltgerechten Standards und trägt durch ihre Arbeiten zu einem besseren Verständnis der marinen Umwelt und der geologischen Situation im Indischen Ozean bei. Unsere Erfahrungen aus dem ersten Lizenzgebiet zu den Manganknollen im Pazifischen Ozean fließen dabei in unsere weiteren Arbeiten ein."

Für Deutschland ist internationaler Tiefseebergbau doppelt interessant: Erstens kann er langfristig zur Versorgungssicherheit Deutschlands mit Hochtechnologierohstoffen beitragen. Zweitens eröffnet er interessante Marktchancen für deutsche Hersteller von innovativer, umweltverträglicher Meerestechnologie, wie die Gründung der Deep Sea Mining Alliance, die inzwischen über 25 Mitglieder vorwiegend aus der deutschen Industrie zählt, zeigt. Chancen und Rahmenbedingungen des Tiefseebergbaus einschließlich der damit verbundenen Umweltfragen stehen durch die Initiative Deutschlands auch auf der Tagesordnung des kommenden G7-Gipfels 2015 auf Schloss Elmau.

Metallreiche sulfidische Ablagerungen, wie sie seit vielen Millionen Jahren am Meeresboden entstehen, sind die wichtigsten Quellen für Buntmetalle wie Zink, Kupfer und Blei, wirtschaftsstrategische Rohstoffe wie Tellur, Selen, Indium, Gallium oder Germanium sowie für die Edelmetalle Gold und Silber. Die Lizenz, die der Rat der Internationalen Meeresbodenbehörde im Juli 2014 gebilligt hatte, hat eine Laufzeit von 15 Jahren und kann anschließend in eine Abbaulizenz münden.



## **Nation's Lutherans await PM's response on 'experimental' seabed mining**

Rachel Shisei, PNG Loop via PNG Mine Watch, 4 May 2015

More than 1.2million churchgoers of the Evangelical Lutheran Church of Papua New Guinea (ELC-PNG) nationwide are still awaiting Prime Minister Peter O'Neill's response to the petition they handed to his office last year against the controversial Seabed Mining. The ELC-PNG Bible Study Master, Pastor Matei Ibak confirmed that the church hadn't received any response from Mr O'Neill's office from the day the petition representing 1.2million of them was made till today. Pr Ibak said the church was expecting a response to the petition sooner from Mr O'Neill, since he is a Lutheran churchgoer and therefore proudly regarded as a 'Son of the Lutheran Church' being the Prime Minister. The petition was made at the 29th Synod of the Lutheran Church held on Karkar Island in Madang Province last year, which saw presidents of all 17 districts in the country representing their congregation and signing the petition against Seabed Mining at the Synod.

He said the church clearly stated on the petition that this act to allow the Canadian-owned company Nautilus to touch the country's seabed is clearly not a Christian practice as it is against what the bible instructs. The petition signed by the ELC-PNG Head Bishop, Reverend Giegere Wenge, stated the bible verses of Genesis 1:26 and Genesis 2:15 to support their stand against the undersea mining. The ELC-PNG, like all other NGOs and individuals against this undersea mining, clearly indicated the word 'experimental' before the words 'seabed mining' on its petition to show that it is against the company experimenting in Papua New Guinea's seas.

## **Tiefseebergbau Goldgrund**

Süddeutsche Zeitung Online, Von Alexander Stirn, 1. Mai 2015

Kupfer, Kobalt, seltene Erden: Am Boden der Tiefsee liegen Schätze, die eigentlich nur noch geborgen werden müssen. Doch die Kosten und Folgen sind unklar.

Das Gold liegt auf dem Boden. Man muss es nur finden. Und herausfräsen. Und einsaugen. Und an die Meeresoberfläche bringen, an Land karren, trennen, reinigen, aufbereiten. Und dann hoffentlich noch etwas Geld damit verdienen. Rohstoffe vom Meeresboden - seien es Gold, Kupfer oder seltene Metalle wie Lanthan und Kobalt - haben Minengesellschaften in ihren Bann gezogen. Tief im Ozean, bis zu 6500 Meter unter der Meeresoberfläche, breitet sich eine schöne neue Welt des Unterwasserbergbaus aus: Manganknollen, die wie Kartoffeln auf dem Meeresboden liegen und nur aufgeklaubt werden müssen. Kobaltkrusten, die die Hänge unterseeischer Bergketten überziehen - steinhart, aber reich an Metallen. Und Sulfidschichten, die sich rund um heiße Quellen am Meeresboden abgelagert haben und nicht nur stinkenden Schwefel, sondern Gold und Silber enthalten. Es ist ein riesiger Schatz, der im Grunde nur noch gehoben werden muss. Und die Chancen dafür stehen gar nicht so schlecht: "Für lange Zeit, für mehr als 100 Jahre, war der Bergbau in der Tiefsee nicht mehr als eine Idee", sagt Mark Hannington, Leiter der Abteilung für marine Rohstoffe beim Kieler Meeresforschungszentrum Geomar. "Nun aber haben die wirtschaftlichen, politischen, technischen und wissenschaftlichen Herausforderungen einen Punkt erreicht, an dem sie machbar scheinen."

## **Das Wissen über die Tiefsee hat nicht mit den menschlichen Aktivitäten dort mitgehalten**

Ob sie auch machbar sind - und ob der Abbau aus ökologischen Gründen überhaupt zu vertreten ist - muss sich allerdings noch zeigen. Denn die Tiefsee gibt ihre Schätze nur ungern preis: Mehr als die Hälfte der Erde ist von kilometertiefen Ozeanen bedeckt. In ihnen ist es kalt und dunkel, der Druck ist enorm. Die tiefen Gewässer sind zudem eine reiche Quelle für Nährstoffe, sie speichern Kohlendioxid aus der Atmosphäre, sie sind Lebensraum für eine Vielzahl höchst unterschiedlicher Arten. Jeder Eingriff kann fatal sein. Viel mehr ist über die Ozeane aber auch nicht bekannt. "Leider

hat unser Wissen über die Tiefsee und ihre Ökosysteme nicht mit dem rapiden Anstieg der menschlichen Aktivitäten im Wasser mitgehalten", sagt Lisa Levin, Direktorin des Zentrums für Meeresbiodiversität am Scripps-Forschungszentrum in Kalifornien.

"Und genau jetzt, wo kommerzielle und strategische Interessen die Wissenschaft überholen, bereiten wir den Abbau von Rohstoffen vor?" Levin ist, wie viele ihrer Kollegen, nicht begeistert. Die Forscherin mahnt zur Vorsicht. "Wir brauchen eine Balance zwischen dem Bedarf an diesen Rohstoffen und dem Schutz der Ökosysteme mit ihren vielfältigen Funktionen." Nur: Wie könnte diese Balance aussehen? Wie lässt sich das Unbekannte schützen? Gar nicht zu graben, scheint keine Alternative zu sein - schließlich gibt es auf den ersten Blick gute Gründe für den Abbau am Meeresgrund. "Weltweit ist die Nachfrage nach Rohstoffen und Mineralien in jüngster Zeit stark gestiegen, nicht zuletzt durch den wirtschaftlichen Aufschwung in Ländern wie China oder Brasilien", sagt Hannington. Immer tiefer müssen die Bergbauer daher in die Erdkruste vordringen, immer teurer wird der Abbau, immer schwerer fällt es, überhaupt noch Mineralien mit hoher Qualität zu finden.



Rohstoffe vom Meeresboden: Bis zu 6500 Meter unter der Meeresoberfläche schlummern Schätze wie seltene Erden, die nur noch gehoben werden müssten. (Foto: Yuriko Nakao/Reuters)

Hinzu kommt, dass die Rohstoffe sehr ungleich über die Erde verteilt sind. Etwa 40 Prozent des Metalls Kobalt, das in Batterien und besonders widerstandsfähigen Stählen verwendet wird, kommen nach Berechnungen des *World Ocean Review* aus der Demokratischen Republik Kongo - einem äußerst armen, politisch instabilen Land. Bei den sogenannten Seltenen Erden ist das Ungleichgewicht noch größer. Hier stammen 97 Prozent aus China, darunter das silbrige Metall Lanthan, das vor allem für Akkus benötigt wird. In der Batterie eines modernen Hybrid-Autos können sich mehr als zehn Kilogramm des wertvollen Stoffes befinden. "Da verwundert es nicht, wenn das Interesse immer größer wird, diese Seltenen Erden künftig aus der Tiefsee zu holen", sagt Lisa Levin.

Rein technisch scheint dem wenig entgegenzustehen. "Wir haben zuletzt große Fortschritte bei Tiefseerobotern gemacht, wir haben Zugang zum Meeresboden wie nie zuvor, wir kommen dorthin und können Aufgaben erledigen", sagt die Meeresbiologin Cindy Lee Van Dover von der Duke University im amerikanischen North Carolina. Erste Firmen wollen das ausnutzen: Die kanadische Firma Nautilus Minerals tüftelt seit langem an ihren Bergbaurobotern. Nächstes Jahr sollen die weißen Maschinen nun endlich zum Einsatz kommen - in der Bismarcksee östlich von Papua-Neuguinea. Dort, in 1600 Metern Tiefe, hat das Unternehmen eine elf Hektar große Sulfidschicht entdeckt. Mit bis zu 15 Gramm Gold pro abbaubarer Tonne liegt auf dem Meeresgrund dreimal so viel Edelmetall wie in typischen Lagerstätten an Land. Beim Kupfer ist die Konzentration sogar zwölfmal so hoch.

Um an die Schätze heranzukommen, soll zunächst ein kleiner Roboter den Boden einebnen. Eine zweite, große Maschine wird dann die Sulfidschichten abfräsen. Ein drittes Raupenfahrzeug saugt

sie ein und bringt sie zu einer riesigen Unterwasserpumpe. Von dort wird der Schlamm durch ein 30 Zentimeter dickes Rohr zu einem Schiff an die Oberfläche gedrückt. Er wird entwässert, das Abwasser wird gefiltert und wieder 1500 Meter in die Tiefe gepumpt - dorthin, wo es herkam. Der verbleibende Schlamm wird umgeladen und in einen 50 Kilometer entfernten Hafen geschleppt, wo er weiterverarbeitet werden soll. Ein Großteil der Technik kommt aus der Öl- und Gasförderung, die seit Jahrzehnten in ähnlichen Tiefen sucht, bohrt und schweißt. Mark Hannington ist trotzdem skeptisch. "Wer mit Ingenieuren spricht, besonders aus der Ölindustrie, bekommt zu hören, dass der Abbau ein rein technisches und damit lösbares Problem sei", sagt der Meeresforscher. "Wir haben am Geomar allerdings lange genug in solchen Tiefen gearbeitet, um zu wissen, dass das ein ganz besonders feindlicher Ort ist - für Maschinen und für jede andere Aktivität."

Zum Abbau der Manganknollen und Kobaltkrusten existieren derzeit nicht einmal Maschinen. Für die Ernte der Knollen, bei der der Meeresboden bis in eine Tiefe von fünf Zentimetern durchpflügt werden muss, hat die deutsche Bundesanstalt für Geowissenschaften und Rohstoffe vor einigen Jahren immerhin Entwürfe bestellt. Für den Abbau der Krusten, die mit einem Meißel von den darunter liegenden Bergen getrennt werden müssen, gibt es nur Konzeptstudien. Nach Schätzungen des World Ocean Review müssten jährlich mehr als eine Million Tonnen Kobaltkrusten mit einer Dicke von mindestens vier Zentimetern abgetragen werden, damit sich der Aufwand lohnt. Für Mark Hannington führt das unweigerlich zu der Frage, ob solch ein Abbau überhaupt wirtschaftlich sinnvoll sein kann - zumal ständig steigende Rohstoffpreise nicht garantiert sind, wie aktuell das Öl zeigt. Ende der 1970er-Jahre hatte schon einmal ein Goldrausch die Tiefsee erfasst. Auch Deutschland wollte damals Sulfidschichten und Manganknollen abbauen. Dann gingen die Preise der Rohstoffe zurück, der Tiefseebergbau mit seinem immensen Aufwand rechnete sich nicht mehr. Die Aktivitäten schiefen ein.

Auch heute ist die Aufbruchsstimmung nicht ungetrübt. Auf der einen Seite stehen die reinen Zahlen, und sie klingen vielversprechend: In einem typischen Sulfidfeld könnten sich, so Van Dover, 1,5 Millionen Tonnen abbaubares Material befinden. Bei einem durchschnittlichen Kupfergehalt von acht Prozent würde allein der Abbau des rötlichen Metalls knapp 700 Millionen Dollar einbringen, vom zusätzlichen Gold und Silber ganz zu schweigen. Auf der anderen Seite stehen unkalkulierbare Kosten: Die Brocken müssen nicht nur abgebaut und an die Oberfläche gebracht werden, die Ingenieure müssen sie auch verarbeiten, an Land schiffen, das Metall extrahieren, es reinigen und verkaufen. Und sie müssen sich bewusst sein, dass Kosten auf sie zukommen können, die sie heute noch gar nicht erahnen - sei es wegen technischer Schwierigkeiten oder neuer Umweltauflagen. "Erst wenn all das zusammengezählt ist, wird klar sein, ob sich mit Tiefseebergbau wirklich Geld verdienen lässt", sagt Hannington. "Alle in der Branche warten daher sehnsüchtig darauf, dass endlich jemand anfängt."

Entgehen lassen will sich die möglichen Milliarden dennoch niemand: 19 Lizenzen zum Erkunden maritimer Lagerstätten hat die Internationale Meeresbodenbehörde (ISA) inzwischen vergeben, die von Jamaika aus die Ausbeutung der Tiefsee koordiniert. Während Nautilus Minerals innerhalb der 200-Meilen-Zone von Papua-Neuguinea schürfen will und daher nur mit dem Inselstaat über Abbaurechte verhandeln muss (was sich jahrelang hingezogen hat), liegen die meisten anderen Vorkommen in internationalen Gewässern. Staaten - aber auch Firmen - können bei der ISA eine Lizenz zur Exploration aussichtsreicher Parzellen erwerben. Deutschland hat das bereits getan, genauso wie Frankreich, Indien und China.

### **Seegurken, Würmer und Schnecken werden nicht schnell genug fliehen können**

Bei den Manganknollen dürfen diese Felder 150 000 Quadratkilometer groß sein; 15 Jahre sind für die Erkundung vorgesehen. Im Anschluss dürfen die Staaten mit dem Abbau beginnen - allerdings nur auf der Hälfte der Fläche, der Rest soll ärmeren Ländern zur Verfügung gestellt werden. Damit will die ISA, die durch das Seerechtsübereinkommen der Vereinten Nationen ins Leben gerufen

wurde, ihrem eigentlich Zweck nachkommen: Rohstoffe im Meer als Erbe der Menschheit und als gemeinsame Ressource aller Staaten zu verwalten. Kommendes Jahr laufen die ersten Erkundungslizenzen aus. Die Staaten müssen dann entscheiden: Wollen sie die Exploration um fünf Jahre verlängern, wollen sie ihre Lizenzgebühren abschreiben und die Parzelle aufgeben oder wollen sie tatsächlich abbauen? Unter welchen rechtlichen und ökologischen Rahmenbedingungen der Bergbau dann betrieben werden darf, muss die ISA allerdings noch festlegen. Angesichts des kaum vorhandenen Wissens über den Lebensraum Tiefsee erwarten Meeresbiologen nichts Gutes - zumal die ISA keine Umweltschutzorganisation ist. "Die Meeresbodenbehörde dient primär dazu, die Leute zum Bergbau zu bringen. Schließlich ist das die Einnahmequelle der ISA", sagt Van Dover.

### **11 034 Meter**

tief ist die tiefste Stelle der Weltmeere im Marianengraben im Westpazifik. In der Hadopelagial genannten Zone ab 6000 Meter Tiefe herrschen beständig Temperaturen um den Gefrierpunkt, zugleich ist der Druck mehr als 1000-mal höher als an der Wasseroberfläche. Dennoch gibt es auch dort Leben: An der tiefsten Stelle des Marianengrabens sind die Mikroorganismen sogar aktiver als an einer sechs Kilometer tiefen Stelle in der Nähe. Auch wenn wenig über die Ökosysteme am Meeresgrund bekannt ist, scheint eines klar zu sein: Der Abbau von Rohstoffen wird nicht ohne Folgen bleiben. Die Maschinen, die zum Beispiel Manganknollen abernten sollen, wirbeln unweigerlich Sedimente auf. Strömungen können diese Wolken erfassen, abtransportieren und in anderen Regionen ablagern. Empfindliche Organismen, insbesondere am Boden sitzende Tiere, werden zugedeckt und sterben. Auch Seegurken, Würmer und Schnecken, die nicht schnell genug vor dem Pflug fliehen können, haben keine Chance. Viele aufgeschreckte Tiere erwischt schließlich der Sauger, der die Knollen einsammelt soll.

"Wenn wir die Knollen verlieren, verlieren wir auch die Arten, die nur dort leben", sagt Van Dover. Sie kommen, wenn überhaupt, nur sehr langsam zurück: In einem groß angelegten Versuch hatten deutsche Ozeanforscher vor 25 Jahren ein mehrere Quadratkilometer umfassendes Areal im Pazifik umgepflügt. Anschließend überprüften sie in regelmäßigen Abständen, was dort kreucht und fleucht. Erst nach sieben Jahren konnten sie wieder die gleiche Dichte an Bodenlebewesen vermelden. Einige Arten kehrten jedoch nie zurück. Dieses Jahr wollen die Forscher erneut nachschauen.

Auch bei den Unterwasserbergen, die mitunter von Schleppnetzen beschädigt werden, sind 30 Jahre nach der Zerstörung weniger Arten vorhanden als zuvor. Eine der Forderungen von Meeresbiologen lautet daher: Wir brauchen Schutzgebiete, deren Ökosystem vergleichbar ist mit dem der Bergbau-Parzellen. Vertriebene Arten könnten sich dort niederlassen; einzigartige Tiere würden nicht komplett verschwinden, falls ihr Lebensraum woanders vernichtet wird. "Wenn wir wissen, dass es repräsentative Schutzgebiete gibt, können wir Bergbau betreiben", sagt Linwood Pendleton, Ökologe an der Duke University. "Wenn wir unsicher sind, sollten wir gar nicht erst damit anfangen."

Eine weitere Idee: Rohstoffe sollten nur in kleinen Streifen abgebaut werden, damit Lebewesen zumindest die Chance haben, den verwüsteten Boden von rechts und links rasch wieder zu besiedeln. Nautilus Minerals will vor Papua-Neuguinea zudem Schnecken umsiedeln, künstliches Substrat am Meeresboden ausbringen und einen Teil der abgebauten Fläche renaturieren - während ein anderer Teil zu Vergleichszwecken unbehandelt bleiben soll. Auslaufende Lizenzen, neue Regelungen, erste Bergbauprojekte, Umweltstudien: "Alles kommt in den nächsten drei bis fünf Jahren zusammen. Dann werden wir hoffentlich wissen, ob Tiefseebergbau machbar ist", sagt Geomar-Forscher Hannington.

Für Cindy Lee Van Dover klingt das wie Chance und Bedrohung zugleich: Bevor das große Geld fließe, müsse die Tiefseeforschung Ergebnisse liefern - und diese Resultate müssten in sinnvollen, gut überlegten Vorschriften münden, fordert die Biologin. Hinterher sei es zu spät. "Wenn wir eine wirklich fortschrittliche Regelung zum Schutz der Unterwasser-Umwelt haben wollen, müssen wir

nun handeln", sagt Van Dover. "Ich will, dass die Leute in hundert Jahren sagen: Die haben damals, auf Basis der verfügbaren wissenschaftlichen Daten, den richtigen Kurs gesetzt - und sind nicht am Steuer eingeschlafen."

## Ocean wealth valued at US\$24 trillion, but sinking fast

Post-Courier, April 28, 2015



The value of the ocean's riches rivals the size of the world's leading economies, but its resources are rapidly eroding, according to a report released by WWF today. The report, *Reviving the Ocean Economy: The case for action - 2015*, analyses the ocean's role as an economic powerhouse and outlines the threats that are moving it toward collapse. The value of key ocean assets is conservatively estimated in the report to be at least US\$24 trillion. If compared to the world's top 10 economies, the ocean would rank seventh with an annual value of goods and services of US\$2.5 trillion.

The report, produced in association with The Global Change Institute at the University of Queensland and The Boston Consulting Group (BCG), is the most focused review yet of the ocean's asset base. *Reviving the Ocean Economy* reveals the sea's enormous wealth through assessments of goods and services ranging from fisheries to coastal storm protection, but the report also describes an unrelenting assault on ocean resources through over-exploitation, misuse and climate change. "The ocean rivals the wealth of the world's richest countries, but it is being allowed to sink to the depths of a failed economy," said Marco Lambertini, Director General of WWF International. "As responsible shareholders, we cannot seriously expect to keep recklessly extracting the ocean's valuable assets without investing in its future."

According to the report, more than two-thirds of the annual value of the ocean relies on healthy conditions to maintain its annual economic output. Collapsing fisheries, mangrove deforestation as well as disappearing corals and sea grass are threatening the marine economic engine that secures lives and livelihoods around the world. "Being able to quantify both the annual and asset value of the world's oceans shows us what's at stake in hard numbers; economically and environmentally. We hope this serves as a call for business leaders and policymakers to make wiser, more calculated decisions when it comes to shaping the future of our collective ocean economy," said Douglas Beal, Partner and Managing Director at The Boston Consulting Group. Research presented in the report demonstrates that the ocean is changing more rapidly than at any other point in millions of years. At the same time, growth in human population and reliance on the sea makes restoring the ocean economy and its core assets a matter of global urgency.

"The ocean is at greater risk now than at any other time in recorded history. We are pulling out too many fish, dumping in too many pollutants, and warming and acidifying the ocean to a point that essential natural systems will simply stop functioning," said Ove Hoegh-Guldberg, the report's lead author and Director of the Global Change Institute in Australia's University of Queensland. Climate change is a leading cause of the ocean's failing health. Research included in the report shows that at

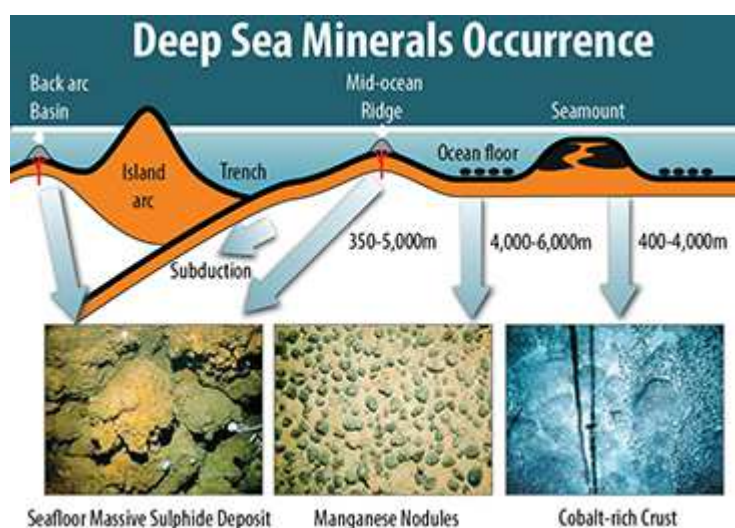


the current rate of warming, coral reefs that provide food, jobs and storm protection to several hundred million people will disappear completely by 2050. More than just warming waters, climate change is inducing increased ocean acidity that will take hundreds of human generations for the ocean to repair. Over-exploitation is another major cause for the ocean's decline, with 90 per cent of global fish stocks either over-exploited or fully exploited. The Pacific Bluefin tuna population alone has dropped by 96 per cent from unfished levels.

It is not too late to reverse the troubling trends and ensure a healthy ocean that benefits people, business and nature. *Reviving the Ocean Economy* presents an eight-point action plan that would restore ocean resources to their full potential. Among the most time-critical solutions presented in the report are embedding ocean recovery throughout the UN's Sustainable Development Goals, taking global action on climate change and making good on strong commitments to protect coastal and marine areas. "The ocean feeds us, employs us, and supports our health and well-being, yet we are allowing it to collapse before our eyes. If everyday stories of the ocean's failing health do not inspire our leaders, perhaps a hard economic analysis will. We have serious work to do to protect the ocean starting with real global commitments on climate and sustainable development," said Lambertini. WWF's global ocean campaign, Sustain Our Seas, builds on decades of work by the organization and its partners on marine conservation. WWF is working with governments, businesses and communities to encourage leaders to take urgent measures to revive the ocean economy and protect the lives and livelihoods of billions of people around the world.

## Marshall Islands consults on deep sea minerals

Secretariat of the Pacific Community, 24 April 2015, Suva



The Republic of the Marshall Islands (RMI), with the assistance of the Secretariat of the Pacific Community (SPC)–European Union (EU) Deep Sea Minerals Project, has commenced public consultations on deep sea minerals, with a particular emphasis on the draft national Deep Sea Minerals Policy and Seabed Management Bill, which will be submitted to the RMI cabinet in June 2015. Government representatives, national agencies, the private sector, non-governmental organisations (NGOs), churches, members of parliament, the Council of Iroij and communities took part in the consultations, which were held in Majuro and Ebeye between 22 and 24 April 2015. The main objective of these consultations was for the government to present the vision, goals and objectives of the draft national Deep Sea Minerals Policy and in the contents of the Seabed Management Bill.

This was also an opportune time for the government to raise awareness of the opportunities for the country to engage with the deep sea minerals industry, with the view of discussing alternative sources of revenue that will be used for the well-being of the people. These consultations highlight the government's commitment to ensuring public participation and transparency, and addressing the concerns of all stakeholders. "We would like to applaud the RMI government's effort in facilitating an open and inclusive process for its new Deep Sea Minerals Policy and Seabed Management Bill," said the EU Ambassador for the Pacific, Andrew Jacobs. "Dialogue and discussion on commercial exploitation of Deep Sea Minerals with a wide range of stakeholders helps build the necessary trust and understanding between different parties on a sensitive subject," the Ambassador added.

"The involvement of all of the people of RMI, including local communities, is key in the approach followed by the government to move forward with the Deep Sea Minerals industry", said Secretary of the Ministry of Resources and Development of RMI, Rebecca Lorennij. "We are extremely grateful to SPC and the EU for the support and assistance provided to RMI and we want to believe that this partnership will continue and enable the Republic of the Marshall Islands to build its expertise and capacities with the view of managing and regulating this new industry for the benefit of Marshall Islands people," the Secretary added. The Deep Sea Minerals Project supports this broad consultation, and offers technical advice and assistance to its 15 participating Pacific countries, providing accurate information and guidance through awareness programmes and workshops at both the national and regional level, to ensure that countries have relevant information to make informed decisions. A consultative approach is vital in the formulation of any policy or national framework, as the public's views and concerns must be taken into account before an agreement is made.

The RMI awareness-raising meetings coincide with the development of a new series of videos the Deep Sea Minerals Project has made, to answer frequently asked questions regarding deep sea mining. The "Q&A Videos" feature world-renowned experts in deep sea mining, and are specifically designed to increase the public's understanding of deep sea mining activities in the Pacific region. The first Q&A Video features Cindy Van Dover, a professor of Biological Oceanography at Duke University in the United States and an expert on deep ocean exploration, who answers questions such as: What kind of organisms lives near deep sea vents? Why is it important to learn about these organisms? Why should scientists be involved in commercial mining activities? and What can be done to minimise the impacts of mining? The video shows underwater footage from seafloor massive sulphide sites bringing to life the surrounding environment, and is available on the Deep Sea Minerals Project's website: <http://gsd.spc.int/dsm/index.php/q-a>.

## **Solwara 1 vessel contract awarded**

Post-Courier, April 23, 2015

Nautilus Minerals has announced that the order for the supply of the entire electrical installation for the production support vessel for the Solwara 1 Project has been awarded to Siemens International Trading (Shanghai) Ltd, a wholly owned subsidiary of Siemens AG. Mike Johnston, Nautilus' chief executive officer commented that the electrical package marks the fourth major long lead time package to be awarded by the shipyard, Fujian Mawei Shipbuilding. "We are especially pleased to be partnering with another world class, global company such as Siemens. Their involvement with our first seafloor production system, along with other industry heavyweights such as GE Oil and Gas, Sandvik, Soil Machine Dynamics, Rolls Royce, Bedeschi and McGregor, highlights the quality of the system that we are building.

We look forward to reporting on Siemens' progress as the vessel construction progresses." According to a statement released, Siemens will supply the entire shipboard electrical installation for the Company's Production Support Vessel (PSV) to be first deployed for the Solwara 1 Project in the Bismarck Sea of Papua New Guinea. The scope of supply will extend to all main generators, switchboards, transformers, electrical motors and associated systems for power generation, propulsion, automation and distribution. Siemens will also be providing various switchboards and transformers to facilitate power distribution to various items of Seafloor Production Equipment to be built into the PSV during the ship building process.

### **World's first subsea mining vessel to be equipped with MacGregor subsea cranes** International Shipping News, 21/04/2015



MacGregor, part of Cargotec, has been awarded a contract by Fujian Mawei Shipbuilding Limited for two subsea knuckle boom cranes to be installed on the world's first seabed mining vessel. Delivery of the cranes is scheduled for Q1/2017. The order was booked into first quarter 2015 order intake. The 227m production support vessel has a beam of 40m. It has been designed by Singapore's SeaTech Solutions for Dubai-based owner Marine Assets Corporation (MAC). Following delivery at the end of 2017, it will operate under long-term charter to Canadian seafloor exploration company Nautilus Minerals Inc. The MacGregor order consists of two knuckle boom cranes; a 200t active heave-compensation (AHC) subsea crane with the capability to operate to a depth of 2,500m, and a smaller 100t subsea crane.

Mike Johnston, CEO of Nautilus Minerals, says, "We are very pleased to have such a world class supplier providing key equipment for use on our Production Support Vessel. The cranes are an essential component in ensuring operations can be performed safely across all of our large working deck areas. We look forward to reporting on the progress of this equipment as we move closer to production in 2018." "We are delighted that we have been chosen to supply the cranes for this exciting and prestigious new vessel," says Tom Svennevig, Vice President, Offshore Load Handling, MacGregor. "The demands of offshore operations are constantly changing. At MacGregor, we work hard to understand our customers' requirements and to ensure that we are always ahead of the competition in our ability to offer exactly the right hardware for the job, supported by our global service infrastructure." Source: MacGregor

## Nautilus moves into top gear to start PNG seafloor mining in 2018

ABC Radio Australia, 21 April 2015

Canadian company Nautilus Minerals is once again gearing up to become the world's first deep sea miner of gold and copper at its Solwara 1 site in Papua New Guinea. Since Nautilus resolved a long-running dispute with the Papua New Guinea government in December, it has let contracts with global giants from Britain's Rolls Royce through to engineering firms, shipbuilders and specialist part makers in China, Germany Italy and more. 2018 has been named as the new start date.

**Presenter:** Jemima Garrett

**Speaker:** Mike Johnston, Nautilus CEO

**GARRETT:** The Pacific is rich in seafloor massive sulphide deposits and in nodules, both of which contain very high concentrations of valuable minerals.

Canadian company, Nautilus Minerals is determined to be the first in the world to mine these deposits but in 2012 a commercial dispute with the PNG government brought its plans at its Solwara site in the Bismark Sea to a grinding halt. In December, the PNG government finally paid the USD\$113 million it owed for its stake in the project. Since then preparations for mining have gone into top gear. The three purpose-built machines needed on the seabed are expected to be delivered at the end of this year and other components will be ready next year. Nautilus CEO Mike Johnston says the final piece of equipment, a specially-designed ship to support mining, will be ready to start in 2018.

**GRAB:** We are on track for delivery of the vessel in the last quarter of 2017.

**GARRETT:** You are now in a joint venture with the Papua New Guinea government and PNG has paid for its 15% stake right up to the time of first production. This hasn't been an easy relationship. A dispute halted work in 2012. Even after that when the International Court of Arbitration had ruled in your favour PNG was late with its payments. What is the relationship like now?

**JOHNSTON:** Oh, the relationship is very, very good at the moment. We have had our first joint venture meeting. Petromin (the vehicle for state ownership) is a very good partner. The issues around the dispute and arbitration, you know, they were different people involved. Our relationship with the government has always been very solid. The dispute was around commercial items which were a little bit tricky at the time but those have all been resolved and we have formed the joint venture and both parties are working together to deliver the project.

**GARRETT:** Nautilus has all the permits necessary to start mining, including an environmental permit. Activists, dismayed by the impact of mining on land, continue to fight a vociferous campaign against the Pacific becoming the world's guinea-pig for extending commercial development to the sea floor. Mike Johnston says seafloor mining has a much smaller environmental impact than land mining and is also less risky.

**JOHNSTON:** It is not like building a mine in Papua New Guinea itself where you have to build roads and you've got to stop those from washing away and you've got to build power stations and stop those from being subject to floods and earthquakes and things and you have got to build waste dumps and dams and things. So we don't have to do that. We have got fixed price contracts and our equipment is being built in factories.

**GARRETT:** Nautilus is investing in health facilities, education and infrastructure and aims to hire Papua New Guineans for at least 50 percent of its new senior and professional jobs. Once mining gets underway 140 staff will be present on the mining support vessel and rosters will be organised to ensure total employment is many times that number. Mike Johnson says Nautilus's role as a good corporate citizen has contributed to its good relations with provincial and national governments.

**JOHNSTON:** The government of Prime Minister O'Neill is very focussed on trying to raise the standard of living and development in PNG and they see people, companies like us, with our social programs and that, are an additional way for the government to help deliver services to the broader community in Papua New Guinea.

**GARRETT:** You still need to find around USD\$200 million to get to the production stage. How hard will that be and will the PNG government be upping its stake in the joint venture?

JOHNSTON: Well, we have very supportive shareholders, major shareholders. We don't see it as being a problem. With regards to the PNG government stake they do have the option to take additional equity. They have to make, their first election is, I think in June. To be honest, I haven't spoken directly to them at the moment, about that option, but PNG government has got a lot of things on, too.

GARRETT: There is a lot of talk in PNG about the benefits of mining not getting to the people. Once you get to the stage of mining, what will you be doing to ensure that is not the case with your project?

JOHNSTON: Well, we ensure it is not the case for our project right now. You know, we are delivering services, improved sanitation and water, we have a plan, there are 7 wards that we are working most closely with on the west coast of New Ireland. We have a tender out at the moment for the design of the bridges we are looking to put in. So, yeah, the people of the west coast of New Ireland are going to benefit and are currently benefitting from our project, from mining. I think some of the claims from people that say the benefits of mining aren't being felt by the people is not exactly completely true, you know. Over the last 25 years in which I have lived and worked in PNG I have seen enormous changes in the country which a lot of those have been driven off the back of mining investments and LNG, with the LNG project.

### **Nautilus Minerals Inc.: Vessel Electrical Installation Contract Awarded to Siemens**

TORONTO, ONTARIO--(Marketwired - Apr 20, 2015) - Nautilus Minerals Inc. (the "Company" or "Nautilus") announces that the order for the supply of the entire electrical installation for the production support vessel has been awarded to Siemens International Trading (Shanghai) Ltd., a wholly owned subsidiary of Siemens AG. Mike Johnston, Nautilus' CEO, commented, "the electrical package marks the fourth major long lead time package to be awarded by the shipyard, Fujian Mawei Shipbuilding. We are especially pleased to be partnering with another world class, global company such as Siemens. Their involvement with our first seafloor production system, along with other industry heavyweights such as GE Oil and Gas, Sandvik, Soil Machine Dynamics, Rolls Royce, Bedeschi and McGregor highlights the quality of the system that we are building. We look forward to reporting on Siemens' progress as the vessel construction progresses."

#### **About the Electrical Installation**

Siemens will supply the entire shipboard electrical installation for the Company's Production Support Vessel (PSV) to be first deployed for the Solwara 1 Project in the Bismarck Sea of Papua New Guinea. The scope of supply will extend to all main generators, switchboards, transformers, electrical motors and associated systems for power generation, propulsion, automation and distribution. Siemens will also be providing various switchboards and transformers to facilitate power distribution to various items of Seafloor Production Equipment to be built into the PSV during the ship building process.

### **Seafloor exploration on in Solomons**

Solomon Star, April 19, 2015

A major seafloor mining exploration voyage is due to get under way in Solomon Islands at the end of the month. Nautilus Minerals is set to become the first company in the world to start commercial seafloor mining when its operations begin in Papua New Guinea in 2018. It's now set to look for copper and gold in massive sulphide deposits around seafloor hot vents in waters off San Cristobel and the Santa Cruz islands. It will also be doing more exploration in Tonga later in the year.



## **Nautilus targets 2018 undersea production at Solwara**

The Northern Miner, 2015-04-14

VANCOUVER — It's been a bounce-back twelve months for junior Nautilus Minerals (TSX: NUS; US-OTC: NSUMF), which has overcome a major socio-political hurdle to get back on track to develop the world's first undersea mining operation at its Solwara 1 massive sulphide project 30 km off the coastline of Papua New Guinea (PNG). Nautilus had to temporarily suspend development at Solwara back in early 2013 when it came to loggerheads with the PNG government over the structure of its partnership agreement. The company managed to negotiate a new deal last May, and received its initial, US\$113-million payment in mid-December, which entitles the PNG government to a 15% stake in the project. The company quickly got to work signing a vessel charter and various supply orders it will need to mine a sea-floor massive sulphide (SMS) deposit 1,600 metres beneath the surface of the Bismarck Sea, and is now targeting first production in early 2018. Solwara hosts indicated resources of 1 million tonnes grading 7.2% copper, 5 grams gold per tonne, 23 grams silver and 0.4% zinc. Inferred resources add 1.5 million tonnes of 8.1% copper, 6.4 grams gold, 34 grams silver and 0.9% zinc.

"There have been plenty of highlights since our last update roughly six months ago. The major events include the special charter agreement and ship building contract, which triggered the government payment and formation of our joint venture," commented president and CEO Michael Johnston during an investor update on April 14. "The state has turned out to be a very good partner for us, and that has continued through our recent meetings. We're in the process of commissioning the bulk of the major machinery, and it looks really fantastic," he added. Sea-floor production is a staged process that essentially requires three pieces of machinery, namely: a bulk cutter, auxiliary cutter and collecting machine. The auxiliary cutter takes an initial run to prepare the seabed for the powerful bulk cutter. The two machines collect excavated material, while the collecting machine harvests the cut material by drawing in sea-water slurry with internal pumps and pushing it through a flexible pipe to a subsea pump, and on to the production ship using a riser system.

Nautilus expects to receive all three vehicles by the end of the fourth quarter, along with its riser and ancillary equipment. Johnson added that the design and construction of the vessel is the "critical path" at Solwara, however, since it will have the greatest impact on the company's production timeline. Nautilus entered into an agreement for the charter of a production support vessel (PSV) in early November, which led to a contract with Fujian Mawei Shipbuilding in southeastern China. The PSV will serve as an operational base for the Solwara joint venture, and be chartered to Nautilus for a minimum period of five years for US\$199,900 per day, with options to either extend the charter or purchase the vessel at the end of the contract. "All the companies we've awarded contracts to are significant names in their fields," Johnston elaborated. "Our goal is to continue that theme through the vessel build, and we're basically aiming to produce a high-quality Chinese vessel hull with well-designed components around the thrusters, cargo handling, cranes, and power units. These will all be designed by major players in the shipping industry."

The company put down a US\$10 million deposit on the vessel, with another US\$18 million due on the commencement of the charter contract. In an odd twist, Nautilus' contractor Marine Assets — located in Dubai — was the victim of a "cyber-attack" that resulted in the initial US\$10 million being lost. The company subsequently provided a conditional US\$10 million down payment, while an investigation is ongoing. The incident hasn't impacted Nautilus' timeline, however, and it still expects delivery of the vessel by the end of 2017, which should lead almost directly into production. Johnson acknowledged that the company will have to raise additional funds during the interim, and said it expects to publish updated capital and operating figures later this year. "A couple of the key issues in determining those figures include: the government options, negotiations with our processing partner, and the design of the de-watering system," Johnson continued. "With the vessel

build ongoing in China there are clearly significant opportunities for us, and we're in discussions for further partnership opportunities in Asia.”

The PNG government can earn up to an additional 15% in Solwara through a staged process. The state's first 5% option is coming up in June. The company will also be getting back to exploration later this year, as it announced a contract for a seafloor program on its wholly-owned portfolio in the Solomon Islands. The goal is to define SMS targets using efficient multi-beam echo sounder and plume hunting techniques. Plume hunting is a regional geochemical technique involving the discovery of metal rich plumes of material that are ejected into the water column from prospective areas, by natural geological processes. "We're really looking to get our exploration moving again and get the pipeline lined up to provide resources for our mining equipment. It's important to look past Solwara I," Johnston concluded. "We're looking for new systems and we're in the process of organizing the program so we can hit a lot of targets. We have some of the highest-quality commercial seafloor mapping equipment outside of the military." Nautilus has traded within a 52-week window of 20¢ and 79¢, and is up around 132%, or 29¢ year-on-year, at 51¢ per share at press time. The company maintains 445 million shares outstanding for a \$228-million market capitalization, and reported working capital of roughly \$100 million to end 2014.

### **Nautilus signs deal for Solomon Islands operations**

The National, April 9th, 2015

NAUTILUS Minerals has signed a contract with Gardline CGG Pte Ltd to provide exploration services for its Solomon Islands operations this year. The company said the mv Duke would be used to generate targets to expand Nautilus' seafloor massive sulphide (SMS) prospect inventory within its 100 per cent owned Solomon Islands exploration licenses. Nautilus chief executive officer Mike Johnson said the company was excited to resume operations and focused on adding to its high grade SMS prospect inventory by applying high tech exploration techniques the company had been refining since 2006. "This is the second time we have been supported by Gardline in our exploration efforts and we look forward to continuing our relationship with them," Johnson said. According to a company statement, the programme would define SMS targets using efficient multibeam echo sounder and plume hunting techniques.

Plume hunting was a regional geochemical technique involving discovery of metal rich plumes of material that were ejected into the water column from prospective areas, by natural geological processes. The primary objective of this programme was to discover further mineralised systems to support the Nautilus' business model. Among its many anticipated advantages, seafloor resource production would allow aggregation of resources from multiple mineralised systems without need for significant additional capital. A company's spokesperson told The National yesterday that exploration in Solomon Islands would start on May 1. "There are plans for further exploration in other sites of interest, however, at this stage, we cannot speculate until confirmation is given."

### **Get Ready For an Explosion of Mining on the Ocean Floor**

By Sefton Darby, Vice News, April 8, 2015

Last week, noted billionaire Richard Branson issued a call for more comprehensive protection of the Arctic, which in turn prompted some people to say rude things to him. Several pointed out that Branson's airline and space business ventures depend in no small part on fossil fuels — as Scottish comedian Frankie Boyle tweeted back at Branson, "You own an airline you mad cunt." But the blowback was not the most notable part of Branson's statement. Because while he listed the usual

threats like oil drilling and commercial fishing, he also snuck in a mention of seabed mining. And that's a threat you're going to hear about a lot more in the future. Historically, resources like oil and gas and minerals have been easy, cheap, and safe to get at. These days, however, they are increasingly rare, expensive, and difficult to extract. Changes in technology — like fracking — have opened up new sources of those resources. Rising prices have made others — like previously unusable low-grade ores — newly profitable.

But going to faraway places for our resources is the new reality. If you'd asked oil company executives in the 1980s what the big pipeline projects would be in the year 2000, they probably wouldn't have said "Baku in Azerbaijan," and they definitely wouldn't have said "the Chad to Cameroon pipeline." Yet by the early 2000s, both of those projects were well underway, and the bars of Baku were filled with the Scottish, Texan, and Norwegian flotsam that inevitably collects around the world's big oil projects. (A few years back, the world's largest KFC opened in Baku's historic railway station.) And if mining on land is too troublesome, you can always turn to the 70 percent of the planet that's covered in water. De Beers Marine has been dredging for diamonds off the coast of Namibia at depths of around 400 feet for a decade — and at shallower depths for longer than that. An enormous 280-tonne "crawler" on tracks is deployed off the side of a ship where it sucks up diamond-rich material off the seabed. It's just like an M1 tank. Except four times the size. And underwater.

Next up will probably be Nautilus Minerals' Solwara-1 project in Papua New Guinea, which will use similarly massive seabed cutters and collectors to extract copper-gold ore from mineral-rich volcanic vents 5,000 feet down. New Zealand appeared to be getting in on the seabed mining action when two companies, Trans-Tasman Resources and Chatham Rock Phosphate, came up with projects to mine for iron ore and phosphate respectively. Local NGOs, Maori *iwi* [tribes], and the fishing industry fought back, and recently the government's Environmental Protection Agency declined to grant environmental permits. The fights that are lining up over seabed mining are pretty massive, and that's why people like Branson and Cameron — and a host of environmental NGOs — have been mobilizing.



Mafuta, a new bottom-crawling diamond suction miner in 2013 when it was being built for De Beers, the diamond mining conglomerate. Photo via De Beers.

Google *seabed mining* and you'll find a wealth of groups that are campaigning hard against it, and the EPA's decisions in New Zealand has given them hope. The principal concern of those who oppose the industry is that no one really knows enough about offshore ecosystems and the species that inhabit them to understand what the impact of such mining is going to be. Plumes of disturbed ma-

terial or pollution could smother corals and severely impact sea life. To fully understand the economic and environmental values of what's down there is going to cost hundreds of millions of dollars of research and exploration. Governments seem inclined to fund only tiny bits of that research, and while mining companies may be able to afford it, no investor is going to put money down without being certain mining will result. And there's a fair amount of skepticism in the NGO community about the quality and integrity of the environmental studies commissioned by mining companies.

This dilemma has pushed the debate to the extremes. On one side sit the developers — who in their right mind, some of them argue, would not want to even try to develop resources that could be worth billions of dollars? Offshore mining companies also point out that undersea mining won't take place literally or figuratively in anyone's backyard. On the other side, environmentalists look at how some resources have been developed on land, and they see any moves into less regulated offshore mining as a particularly steep and slippery slope to the degradation of the rest of the planet. Who will win the debate? A relatively plentiful mineral may actually hold the answer to that question. Twenty years ago, the 5.7 billion humans on the planet consumed on average about 4 pounds of copper per person each year — in their electronics, in their buildings, etc. Today, there are 7.25 billion people, and we each use more than 5.5 pounds of copper per year. The reality of those numbers — and others like them — are going to make mining companies awfully eager to exploit the ocean, and make it awfully difficult for environmental interests to stop them.

### **Nautilus Minerals resumes undersea mining exploration**

Cecilia Jamasmie, mining.com, April 7, 2015



Computer rendition of Nautilus' floating base.

Canadian seafloor miner Nautilus Minerals (TSX:NUS) said Tuesday it has struck a deal with provider Gardline CGG, which will allow the company resume exploration around Solomon Islands, east of Papua New Guinea (PNG), where it is developing a gold, copper and silver underwater mine. The goal is to expand Nautilus' Seafloor Massive Sulphide prospect inventory by applying high tech exploration techniques the firm has been refining since 2006. The company's CEO, Mike Johnston, said the goal is to expand Nautilus' Seafloor Massive Sulphide prospect inventory by applying high tech exploration techniques the firm has been refining since 2006.

Gardline CGG will supply a vessel, the MV Duke, equipped with a hull mounted Kongsberg EM302 multibeam system, a state of the art seafloor mapping system that provides some of the highest quality seafloor mapping data available, according to Nautilus. The deep sea miner settled a key dispute with the PNG's government last year, and since then, progress has moved quickly on

the Solwara 1 project. The company expects to have all its undersea mining tools ready to go by the middle of next year. It has also entered a charter agreement for a massive mining vessel, which it expects to receive in late 2017. After that, Nautilus expects to start digging up copper and precious metals almost right away.

### **Nautilus releases results**

Post-Courier, April 02, 2015

Solwara 1 Project operator Nautilus Minerals Inc. (Nautilus) has announced the release of its audited consolidated financial statements for the year ended December 31, 2014, together with Management's Discussion and Analysis and the company's Annual Information Form. In the release, Nautilus highlighted among other achievements the resolving of issues with the Government of Papua New Guinea (State) and forming of the Solwara 1 Joint Venture. Nautilus has also entered into a Vessel Charter with Marine Assets Corporation for delivery of a purpose built Production Support Vessel by the end of 2017, the advancing of the Solwara 1 Project with the bulk cutter assembled and the commissioning and Factory Acceptance Testing phase (underway), and also confirmed Clarion Clipperton Zone nodule deposit. The Canadian based deep sea miner said on the financial aspect, it has \$US118.8 million (K317.2 million) in cash and cash equivalents as at December 31, 2014.

Nautilus' chief executive officer Mike Johnston said; "We are delighted with the significant progress we made in 2014. "Securing a vessel charter was a major milestone for the Solwara 1 Project. We are also extremely pleased to have formally commenced our partnership in the Project with the State's nominee, Eda Kopa (Solwara) Limited (State Nominee) after receiving its contribution of \$US120 million (K320 million) and we appreciate the State Nominee's continued support." Mr Johnston said the company remains committed to maximising shareholder value by achieving its objective of developing the world's first commercial high grade seafloor copper-gold project and launching the deep water seafloor resource production industry in 2018.

### **Nautilus Minerals CEO Mike Johnston Talks Underwater Mining**

By Teresa Matich, Copper Investing News, March 15, 2015

To be sure, Nautilus Minerals is one of the more interesting mining companies out there. Its project, Solwara 1, lies on the seafloor near Papua New Guinea, where the company is planning to mine high-grade copper and gold deposits. To find out a bit more about underwater mining, Resource Investing News (RIN) had a chat with Mike Johnston, CEO of Nautilus, at the 2015 PDAC conference in Toronto. In the interview below, Johnston discusses what makes Solwara 1 so high grade, and speaks to questions about the environmental impacts of underwater mining. He also touches on New Zealand's recent rejection of underwater mining projects, and about Nautilus' partnership with the Papua New Guinean government. Overall, it was interesting to get some insight into the world of underwater mining and how Nautilus intends for its project to work.





RIN: The resource at Solwara 1 has an exceptionally high grade of 7 percent copper and 6 grams per tonne gold. Why is that?

MJ: Well, very simplistically it's because of the hot fluids which come up from deep in the crust. As soon as they reach the seafloor they go from being 400 degrees Celsius and a pH of 2, and they have to basically reach equilibrium with seawater at depth, which is 2.6 degrees Celsius and a pH of 8. To do that, they have to completely change their chemistry, which means they have to drop all the metal they're carrying almost instantly.

That's where you end up with [high-grade] material like this. So very, very high grade. So all the copper that's in that fluid gets dropped within half a meter ... and it forms these chimney deposits, [which are] very high grade. And in the case of Solwara 1, and most of our other systems, they also contain a lot of precious metals — as you said, 5 grams of gold, which on land that would be a high-grade gold deposit.

RIN: Okay. And given all those benefits you just mentioned, New Zealand did reject underwater mining recently. How is Nautilus reassuring investors in light of that?

MJ: Well, the two projects that have been in the news from New Zealand recently are both very shallow-water projects. They're what we call "dredging" — the first project was in about 50 meters or 60 meters of water depth, so quite shallow. Ours is [at about] 1,500 meters, so we're in very deep water. The second [New Zealand] project was at a water depth of about 200 to 250 meters.

Both projects were given mining licenses by the New Zealand government. The problem is actually in the legislation in New Zealand, and it's specific to New Zealand. The environmental legislation has been written by their environmental department and doesn't allow any development. This is just blatantly ridiculous. They either have to fix that or they've got a serious problem.

We're really happy where we're working in Papua New Guinea. They have a very strong mining industry in Papua New Guinea, very good regulations. They have separate environment departments and mining departments, and we are monitored by both of those separately and they have independent verification. It's a very good system.

RIN: Speaking of the environment, you must get questions about environmental impact. How does Solwara 1 affect the deep-sea, mid-sea and surface levels, and what is Nautilus doing to mitigate that?

MJ: What we did was a very extensive environmental impact assessment of the project — right at the start, before we submitted our permit. In that process, we did a lot of independent studies by researchers from the United States, Australia, Canada, Europe, and those experts in their fields all produced various reports about the project and about the Solwara 1 site. Critical to those assessments was the full water column current analyses which we did ... and those studies show that it's physically impossible for any activities on the seafloor to impact above 1,300 meters water depth. So everything happens below 1,300 meters. That's due to the fact that deep water is colder and denser than shallow water, and the two don't mix — in Solwara 1, they don't mix at all. Where they do mix on the planet is at the poles, when the surface water gets cooled right down and starts to freeze. Then it's at the same temperature and density as the deep-sea water ... so that keeps everything within the confines of the mine.

Our system is designed with a very, very strong environmental focus. What we have is a steel riser system and a pump at the bottom of that riser system. We pump the mined material from the bottom of the ocean up into the vessel, where we separate the ore from the water and the slurry. The water then gets pumped down return pipes — steel pipes on the side of the main pipe — all the way down to where the pump is at 1,500 meters and then it's exhaust at that point. It goes right back to where it came from, but before it goes back, we actually filter it to 8 microns. [That's] actually arguably cleaner than it is down in the bottom, because there's ash and all sorts of volcanic activity happening down on the bottom of the sea. So we put it back probably cleaner than what it is when we take it out.

RIN: Okay. And finally, you've partnered with the Papua New Guinean government for the project. What sort of support have you seen from it?

MJ: The Papua New Guinea government is very supportive of the mining and petroleum industry in general. The prime minister, and various ministers, have said to me personally that they no longer want to be on the sidelines of resource development in their own country. They want to be active participants.

The government now has a policy of taking equity and new projects. They really like the Solwara 1 project ... because of all the benefits; it doesn't have waste, we don't have tailings in our project. We don't have waste dumps. All the things which people don't like about mining on land essentially are not there for deep-sea mining.

So the Papua New Guinea government has taken up a 15-percent equity stake in the project, and it supports the project. In fact, it supports it so much that it paid all of its share in advance for the project. We have found the Papua New Guinea government is a very good partner to have. They're very supportive. They work with you. They tell you when things are going well; they tell you when things are going bad.

The government's ownership is also separated from the regulatory arms of the government. So the Mineral Resources Authority, which is a separate entity that manages mining projects and their compliance, is separate to Petromin [PNG Holdings]. They have different ministers. And then the environment department is also responsible for monitoring environmental compliance — with your mining license conditions, your environmental conditions — and that's got a separate minister and is separate from Petromin as well.

The government separates its regulatory and investment arms, and is treated just like any other investor. It's a very good system.

RIN: Thanks for joining me.

MJ: It's been a pleasure.

### **Nautilus awards cargo contract**

Post-Courier, March 12, 2015

The order for cargo handling equipment for use on Nautilus' production support vessel has been awarded to Bedeschi SPA, a state-of-the-art cargo handling system company in Italy. Nautilus Mineral Inc said this is the second major equipment contract to be awarded by the shipyard, Fujian Mawei Shipbuilding Limited, the company responsible for design and construction of the vessel. Nautilus chief executive officer, Mike Johnson, is excited about this relationship and says they are happy to be building relationships with such long established and reputable world class supplier to the global port and shipping industries, as they work toward the completion of their first vessel. Nautilus said in a statement that this state-of-the-art cargo handling system will be used on the production support vessel to load de-watered materials into four storage holds and is designed to recover the material from the storage holds and transfer it directly to a handymax vessel for shipment to China. Nautilus further stated that the use of Bedeschi system reduces costs associated with material handling from that originally expected and eliminates the need for multiple handling of material, improving the safety of marine operations around the vessel.

Last year Nautilus entered into an agreement with Marine Assets Corporation (MAC) for charter of a vessel to be first deployed for use at the Solwara 1 Project. It was announced that MAC had entered into a contract with Fujian Mawei Shipbuilding to design and construct the vessel in accordance with Nautilus' specifications. This vessel will first serve as the operational base to extract and transport high grade copper and gold material from the Project site, in the Bismarck Sea, after funding is secured to complete development of the project. When completed, the vessel will measure 227 metres in length and 40 metres in width with accommodation for up to 180 people and generate approximately 31MW of power. All of the below deck mining equipment will be installed in the vessel during the build process to minimize the equipment integration to be completed following delivery of the vessel. The vessel is expected to be delivered by the end of 2017.



them hills, pouring millions of dollars on the application process, only to be denied by the very regime that invited them in. Then we have coastal communities, affected iwi and existing users of the marine environment uniting and spending countless hours and considerable resources fighting to protect their values, way of life and existing livelihoods. The reality is that it's an extremely complex situation and, it seems, no-one is prepared to back down at this point. There is too much at stake. It cannot be denied that mining for minerals from the seabed, as proposed by the two companies, is destructive. Scientifically, we have only scratched the surface when it comes to understanding the complexities of our marine environment, let alone what the effects would be if the untested activity of large-scale mining were introduced.

And no-one in the world has done seabed mining of this kind yet. The science and the engineering are new, and untested. Should we be the guinea pigs? Our EEZ is massive: 20 times our land area and it is poorly understood. But the Government should not be relying solely on industry to fill the information vacuum. Its opening up of these areas was premature. The EPA, in its Chatham Rock decision, said "it is incontestably the case that there remained significant gaps in the data and information provided about the consent area's marine environment as well as uncertainty about the impact of the proposal on existing interests and the environment". It is time for the national discussion that one would expect for an issue that touches the core of New Zealand values and is of such potential significance to our environment and economy.

The Environmental Defence Society has called for a spatial planning exercise for our EEZ. I imagine that would be a considerable process but it would go a long way to resolving many of the unresolved issues that have surfaced. Kiwis Against Seabed Mining, supported by other groups, called for a moratorium on seabed mining in October 2013. In light of these decisions, it makes more sense than ever, offering time for a civil and proper process to take place. The other options for Government would be to do nothing, which would be fine by us, as the bar has clearly been set high enough to stop applications in the absence of information. Or it could bend to commercial pressure and roll back its legislation to favour industry, lower environmental standards and reduce the ability for we, the people, to have a say in the health of our oceans. That would be entirely unacceptable.

### **Chief Minister must rule out destructive open cut seabed mining in the Territory**

Australian Marine Conservation Society, 3 March 2015

A coalition of groups, including the Australian Marine Conservation Society (AMCS), Environment Centre NT and Protect Arnhem Land have called on Chief Minister Adam Giles to permanently ban seabed mining in the Northern Territory. The existing moratorium on seabed mining in NT waters introduced by the previous Territory government is set to expire this week, on 6 March. "Open cut sea bed mining is like taking a giant grinder to the sea floor, destroying the habitats of our precious marine life and smothering fish feeding and nursery grounds," Jacqueline Taylor, AMCS Northern Marine Campaigner said.

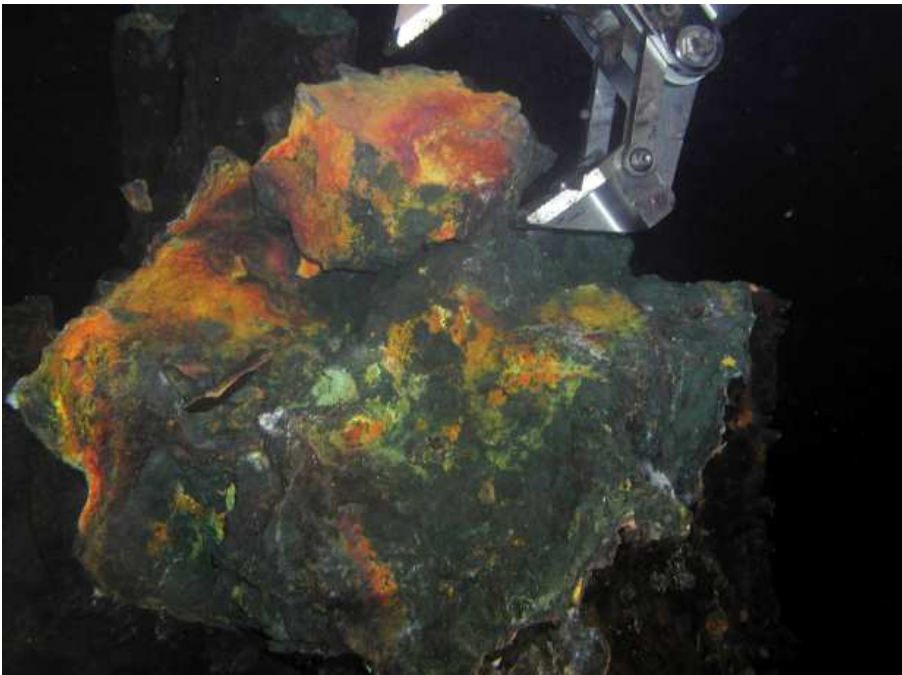
"The moratorium on seabed mining was first put in place to protect precious places such as Roper River mouth, the seagrass beds and islands of the Gulf near Borroloola, and Elcho Island from open cut seabed mining. We now need a permanent ban. "When Chief Minister Giles supported a ban on open cut seabed mining he was right in saying that the mining was unproven science and could damage the environment. "We have major problems with pollution and failed remediation of mines on land in the Northern Territory. We can't pretend that open cut mines on the seafloor can be safely managed without massive damage to the marine environment." Protect Arnhem Land representative, Helena Gulwa said "many Traditional Owners and residents of West Arnhem Land are concerned about damage that seabed mining would have on our sea country and the coastal environ-

ment. These areas are rich in cultural and historical sites, tribal burial grounds, dreaming and song lines.

“Areas like seagrasses and mangroves, support turtles and dugongs and are vital to the culture and livelihoods of our communities. “We’re concerned about the future of our children and the future for Australians. The government must permanently ban seabed mining. Mining companies keep coming back wanting access to sea country and we need protection,” said Helena Gulwa. Environment Centre NT Acting Director Anna Boustead said “destroying the seafloor habitat that our marine life and communities depend on is short term thinking at its worst. The Northern Territory has some of the healthiest tropical seas in the world but they won’t stay that way unless we manage them carefully by protecting them from destructive activities such as seabed mining.” David Morris of the NT Environment Defenders Office said “the Government can easily make the ban permanent. That would be consistent with the bipartisan position up until now that seabed mining is too destructive for our seas.”

### **Nautilus on track to seafloor production, but funding challenge remains**

Peter Koven, Financial Post, March 3, 2015



Nautilus Minerals via Bloomberg News A "hand" of a remote operated vehicle, ROV, picks up a piece of rich gold-copper ore recovered from the seafloor in 1,700m of water in the Bismarck Sea offshore New Ireland, Papua New Guinea in April, 2006.

The investment community has always been a bit skeptical of Nautilus Minerals Inc. When you’re trying to be the first company to ever mine minerals off the ocean floor, it’s only natural that some people won’t believe it until they see it. But that day should be coming soon, chief executive Mike Johnston said in an interview. Nautilus settled a key dispute with the government of Papua New Guinea (PNG) last year, and since then, progress has moved quickly on the Solwara 1 project. The company expects to have all its undersea mining tools ready to go by the middle of next year. It has also entered a charter agreement for a massive mining vessel, which it expects to receive in late 2017. After that, Nautilus expects to start digging up copper and precious metals almost right away. “As soon as we’re happy everything has been incorporated onto the vessel and it’s working as it should, we’ll bring it straight down to PNG. The government’s very eager to get the vessel as early as we can and get the mine in production,” Mr. Johnston said.



Of course, one big barrier remains: capital. Nautilus has spent about US\$180 million to date, but will need significantly more money – potentially around \$200 million. That is almost as much as the company’s current market capitalization. Raising that amount through equity, if it can be done, would be extremely dilutive. But Mr. Johnston maintained the company has a number of other options. Royalty and streaming companies were interested in Solwara 1 before the government dispute, and he thinks they might get interested again now that it is settled. The state of Papua New Guinea has an option to boost its stake in the project, and the company is looking at potential joint ventures with mining companies, service providers, or offshore oil and gas firms. There is still skepticism out there, but Mr. Johnston said the PDAC crowd is getting genuinely excited about his story. “It’s a lot more exciting than going to Caterpillar and buying some trucks,” he joked.

### **Fears that a seabed mining 'marine industrial revolution' could wipe out habitats worldwide**

Tom Bawden, The Independent, 27 February 2015

The world’s oceans are poised for a seabed mining frenzy amid a “marine industrial revolution” that threatens to destroy habitats and wipe out species, an expert has warned. Some industry estimates claim as much as a third of future mineral production could come from beneath the oceans. More than 25 exploration permits have been granted, covering 1.2 million square kilometres of seabed, an area five times the size of the UK, much of it in the Pacific Ocean. They cover a range of minerals, from gold and silver to copper, nickel and rare earth metals used in mobile phones, laptops and solar panels. Although the mining is yet to begin, numerous projects are preparing to launch in the next few years, raising concerns among scientists and campaigners that they could wreak havoc on wildlife. Furthermore, the more general and rapid industrialisation of the oceans – through fish farms, offshore wind turbines and shipping – means sea life may not be able to escape the environmental devastation suffered by the land for much longer, warns Dr Douglas McCauley, of the University of California, Santa Barbara.



Some industry estimates claim as much as a third of future mineral production could come from beneath the oceans

What is particularly concerning is that the oceans seem to be in a transition phase, moving from a position in which most of the damage comes from harvesting – such as depleting fish stocks – to one where the habitat is being degraded, which poses a deeper threat, said Dr McCauley. He likens the transition to one in which animals are hunted individually to one in which their homes are ravaged. “It is impossible not to be concerned about seabed mining when this much of the ocean is at stake,” Dr McCauley told The Independent. “Our starting assumption ought to be that excavating the floor of the ocean is not going to be great for species that called that seabed home,” said Dr

McCauley, who has just completed a study into “human-caused animal loss in the oceans”. Greenpeace International oceans campaigner Richard Page was even clearer about the dangers. “The last thing our polluted, over-fished, carbon-warmed, acidifying oceans need is a new industry destroying the seabed. What they do need, urgently, is a global network of marine reserves to act as sanctuaries,” he said.

Proposed methods vary, but much of it will involve scooping up mineral-rich polymetallic “nodules” – tennis ball-sized chunks of rock – and breaking them up on the surface to release the minerals. The waters off Papua New Guinea, New Zealand, Namibia, Mexico, Peru and Hawaii are thought to be mineral-rich. David Cameron has said he wants Britain to be at the forefront of the seabed mining industry, which he claimed could be worth up to £40bn to the UK over the next 30 years. The Government has teamed up with US defence giant Lockheed Martin and secured a licence to explore an area twice the size of Wales in the Pacific Ocean. Meanwhile, the world’s first deep-sea mining robot is being built by Newcastle engineering firm, Soil Machine Dynamics. It will be used by a Canadian firm, which could start extracting copper and gold off the coast of Papua New Guinea next year. A spokesman for the Department for Business, Innovation and Skills said: “Our partnership... remains an exciting prospect that has real potential to be a new source of valuable metals – including rare earth elements – that are vital to many new innovations such as mobile phones and new carbon technologies. However, commercial exploitation remains some years away and can only proceed after proper survey and evaluation of environmental impacts.”

### **Seabed Mining: Long on Promises, Short on Delivery**

*If you think miners or developers on land struggle with environmental legislators, spare a thought for those looking to develop resources under the ocean via seabed mining.*

by Stuart Burns, Metal Miner on February 26, 2015

The International Seabed Authority, a UN agency, has so far issued 26 exploration licenses to governments and companies enabling them to operate in international waters but none of them have reached commercial realization. Even in national waters governments are coming down on the side of the environmental lobby when new applications are being put forward. After leading the way in supporting early proposals, the New Zealand environmental regulators have recently turned down an application from an ocean mining firm Chatham Rock to develop a site off the coast, some 450 kilometers southeast of Wellington, the FT reports. The site in question is said to be rich in phosphate, used in fertilizer manufacturing, and said to hold enough to meet 25 years of New Zealand’s current consumption.

Chatham Rock have invested \$33 million over seven years researching the environmental impact and developing the extraction processes. It is not hyperbole to say the ocean floor is the last great mineral reserve on the planet. Polymetric nodules, sometimes called Manganese nodules, sea floor massive sulfides and cobalt rich ferromanganese crusts between them hold many times the availability of certain metals as there is on land. One of the largest deposits is the Clarion-Clipperton Zone. The CCZ covers an area of around 9 million square kilometers, approximately the size of Europe, and is located in the Pacific between Mexico and Hawaii according to World Ocean Review.

Although concentration of nodules varies on average, one square meter in the Clarion-Clipperton Zone contains around 15 kilograms of manganese nodules (33 lbs. per 10 square feet). Especially rich areas can have up to 75 kilograms. The total mass of manganese nodules is calculated to be around 21 billion metric tons. Environmental bodies worry that too little is known about fragile seabed ecosystems and allowing seabed mining could cause environmental damage on an unprece-

dented (and mostly unseen) scale. Sediment stirred up by dredging processes would be returned to the seabed after separation of the nodules but could cause plumes that would settle over a wide area. They may well be right, but that probably won't stop the industry from eventually moving forward.

Metallic resources are too finite on land and the quantity available for exploitation in the oceans is too vast for an effective moratorium to last. Technology will play a part as ways are found to collect nodules, typically between the size of a potato and a football, but leave minimal disturbance of the surrounding seabed. It's a tall order; some of the richest resources are up to 6500 meters (20,000 ft.) below the surface. New technologies are being developed but investment is hampered by uncertainty among investors over environmental hurdles. Ultimately a way forward will have to be found, as available resources on the surface are exhausted but leaving mining companies to their own regulation is not the way forward as anyone who has witnessed the degradation caused by Canada's tar sands projects or China's rare earth mining will acknowledge.

### **NZ Decision on Seabed Mining should set a Standard for Pacific Countries**

Hera Hoi, EMTV via PNG Mine Watch, February 25, 2015

Following the denial of the second sea bed mining proposal in New Zealand by the Environmental Protection Agency (EPA) this month, the mining industry has called on the government to reconsider, rather 'soften' their new legislation on the matter. EPA had appointed a Decision-Making Committee (DMC) which announced its decision earlier this month, rejecting Chatham Rock Phosphate's application 'for a marine consent to mine phosphorate nodules on the Chatham Rise'. They were rejected on the grounds of posing high risk to the natural ecosystems in the undersea world. While the rejection was welcomed by environmentalists and many other local groups which are highly concerned about the vulnerable 'undersea ecosystems', Chatham Rock Phosphate was not as overjoyed considering the monetary losses they had made in the process.

Chatham Rock Phosphate's managing director Chris Castle expressed his grave disappointment when the decision was announced. "To say we are bitterly disappointed is an understatement. This will make it even harder, if not impossible for companies to attract capital for new projects in New Zealand," a shocked Castle said in statement. A Greenpeace report contributor, Richard Page via Financial Times, in the simplest way explained the dangers of seabed mining. "It is difficult to contain mining waste on land. Imagine the problems of stopping the spread of pollution in an ocean environment. The local communities have every right to be, and indeed should be, concerned." Rejecting the second seabed mine application in less than one year is considered risky, as in a span of seven years there was about \$100 million spent on both projects put together. Considering they had to reel in investors for this two failed projects is merely disappointing for the business world and their confidence in doing further businesses in New Zealand. Phil McCabe, the chairman of Kiwi's Against Seabed Mining, New Zealand Herald, proposes two reasons for the companies overestimating their ability to obtain marine licenses for this untested industry, and losses occurring for investors.

"First, the companies could not prove their proposals were environmentally and economically acceptable," said McCabe. "Second, the government underestimated the complexities involved in introducing into the marine environment what has been a wholly terrestrial commercial activity. It might be that large-scale mining in the marine environment is inappropriate for New Zealand altogether." Meanwhile the UN agency, International Seabed Authority, has so far issued about 26 exploration licenses to governments and companies enabling them to operate in international waters. Whilst the seabed mining industry is still in its development stages, New Zealand, Namibia and Papua New Guinea have already awarded national licenses. So far New Zealand has been successful in denying two applications for Sea Bed mining in their waters. Canadian-based company Nauti-

lus were, however, successful in getting a licence from the Papua New Guinea Government for their Solwara 1 project in the Bismarck Sea. Despite vocal protests from around the world, Nautilus is well underway to opening the first ever sea bed mine.

### **Nautilus commissions auxiliary cutter in UK**

Post-Courier, February 25, 2015



The operator of the world's first deep sea mine, Nautilus Minerals Inc (Nautilus), has announced the commissioning and factory acceptance testing of its third and final seafloor production tool (SPT), the auxiliary cutter, commenced at soil machine dynamics' facility at Newcastle upon Tyne, UK, for the Solwara 1 project in PNG. In a statement released yesterday by Nautilus, chief executive officer (CEO) Mike Johnston said; "We are very excited that the commissioning of the final of the three SPTs has begun. "With the bulk cutter and the collecting machine having already begun factory acceptance testing and now with the auxiliary cutter underway, we are on track to complete this testing phase and take delivery of the three SPTs in Q4 2015." Mr Johnston said the auxiliary cutter will weigh in at 250 tonnes when fully assembled. He said that it is a preparatory machine that deals with rough terrain and creates benches for the other SPTs to work.

It will operate on tracks with spud assistance and has a boom mounted cutting head for flexibility. Explaining the functions of the SPT; the CEO said the excavation and collection of mineralised material has been split into three individual tasks, which will each be carried out by a different SPT. Mr Johnston added that the auxiliary cutter is designed as the pioneering tool which prepares the rugged sea bed for the more powerful bulk cutter. "These two tools gather the excavated material; the third, the collecting machine, will collect the cut material by drawing it in as seawater slurry with internal pumps and pushing it through a flexible pipe to the subsea pump and on to the vessel via the riser and lifting system" Nautilus said. The Solwara 1 project is the world's first deep sea mining that will be operated by the Canadian based company. The national Government through Eda Copper; a subsidiary of Petromin PNG Holdings Limited, is nominated to hold 30 a percent equity in the project. The project on the waters between the New Ireland and New Britain islands is expected to commence its development starting 2016 onwards.

### **Phil McCabe: Seabed mining rebuffs send right message**

The New Zealand Herald, Feb 24, 2015

Among the fallout from the Environmental Protection Agency denial of a second application to mine the seabed for minerals in New Zealand waters, there have been cries from the mining industry and friends that our new legislation needs softening. Really? Let's go back a few steps. The exploitation of mineral resources in our exclusive economic zone (EEZ) has been a major part of this

Government's economic growth plan. It established the Environmental Protection Agency (EPA) as an independent body to create public confidence in the decision-making process for activities such as mining, and its EEZ legislation was, in part, written to enable the industry to establish itself here. The Government was aware of potential environmental effects. Then-Environment Minister Amy Adams described the new laws as sending "a clear message to companies operating in the EEZ that New Zealanders value their oceans".



People at Piha beach raise awareness of the threat of seabed mining. Photo / Michael Craig

When Trans Tasman Resources failed the EPA test in its bid to mine the ironsands in the South Taranaki Bight, both then-Conservation Minister Nick Smith and Energy and Resources Minister Simon Bridges defended their "robust" framework. Mr Bridges said our "world best practice" legislation had led to a decision that "shows that we have a strong process with very high environmental hurdles that have to be met". But he also warned: "Not everyone can jump that high." This was the case with both seabed mining applications. Globally, the industry called "seabed mining" is still very much in development, an untested technology with no comparable projects anywhere else on Earth. The New Zealand Government opened our waters to this novel industry and the high levels of uncertainty have shone through with these negative decisions, at the expense of investors.

About \$100 million was spent over seven years on the two failed proposals, during which time they reeled in willing investors. But did the companies over-promise their ability to get marine licences for this untested industry? In the light of two failed applications under a regulatory framework designed to enable them, there are only two possible conclusions that can be drawn. First, the companies could not prove their proposals were environmentally and economically acceptable. Second, the Government underestimated the complexities involved in introducing into the marine environment what has been a wholly terrestrial commercial activity. It might be that large-scale mining in the marine environment is inappropriate for New Zealand altogether. The EPA's Chatham Rise decision states that the environmental effects on a rare and vulnerable ecosystem were a "major concern" and that economic benefits to New Zealand were "modest at best". In both applications, the EPA found the economic benefits wanting. The royalties payable would have been minimal for a resource 100 per cent owned by New Zealand.

What of the future investor in all of this and of the cries of New Zealand being "closed for business"? Such scaremongering by industry groups is disingenuous and self-serving. Yes, these two decisions send a signal - but not that New Zealand is "closed for business". That's insulting to the many sustainable businesses operating successfully in New Zealand. They send the right signal: that New Zealand will not accept high-risk developments that damage the environment and ecosystems while providing relatively little economic benefit. New Zealand is, and should be, open to smart, sustainable, value-adding investments that provide jobs and livelihoods well into the future without



compromising our values, environment, and our way of life. The regulators and the legislation have done their job and delivered the best long-term outcome for New Zealand in fending off two unacceptably inappropriate and risky ventures. Given Mr Smith has confirmed he is considering amending the legislation, we trust he will consult with all stakeholders across the community, from iwi to fishing interests and coastal communities.

- Phil McCabe is the chairman of Kiwis Against Seabed Mining

### **Solwara-1 seabed mining project brings controversy to Papua New Guinea**

*Precise takes a look at the proposed Solwara-1 seabed mining project and the potential detrimental effects on the environment.* Precise Consultants/UK, February 2015

There's a battle going on today in the oceans surrounding Papua New Guinea. In the red corner – the native population, and in the blue – the renowned mining company Nautilus Minerals. Let's set the scene. Deep, deep down on the sea floor, according to researchers Helen Rosenbaum and Natalie Lowrey (Deep Sea Mining – the Pacific experiment), “lie thousands of hydrothermal vent formations...like underwater hot springs, spouting black clouds of metal sulphides. The foci of Deep Sea Mining are the deposits laid down over thousands of years around the hydrothermal vents. The metal sulphide particles settling around the vents develop into huge mounds. These are known as Sea-floor Massive Sulphides. They can grow to millions of tonnes in mass. They are rich in zinc, copper, silver, gold, rare earths and other minerals.”

And that's is what Nautilus Minerals wants. The world's first licence to operate a deep sea mine has been granted in Papua New Guinea to the Canadian company. It has established project Solwara 1 which aims to mine the Bismark seabed for high grade copper and gold. But the Papua New Guineans are far from happy about the project, and their campaign has attracted international support. One petition to the PNG government calling for it to ban experimental DSM contains over 24,000 signatures. The issue was presented to the Rio+20 conference in Brazil, has attracted support from New Zealand communities and the Pacific Conference of Churches 10th General Assembly voted to pass a resolution to stop south Pacific deep sea mining altogether.

So why are the local communities up in arms about the project? To be blunt, according to Rosenbaum and Lowrey, “No study to date has investigated the effects of high pressure on the toxicity of chemicals in organisms.” Those organisms include a veritable wealth of incredible sea life – sharks, dolphins, turtles, tuna, octopus and many many others. Dan Jones, a Melanesian studies advocate said, “From Bougainville to Ok Tedi, to Porgera and Ramu Nickel in Madang, the extractive industry continues to cut corners purely to maximise profits causing massive environmental damage and social upheaval which continues to spark social uprising, ecocide and serious conflicts.” Environmentalist David Gwyther says if it goes ahead, potential risks include, “Stocks of tuna and other migratory species (which) may become contaminated by heavy metals and the health of communities and ecosystems across the Pacific could be affected.” Fish is the main source of protein for all New Islanders.

It isn't fair to suggest that Nautilus is not concerned about the impact its mining would have. In fact the company proposed recolonizing species that would not be able to withstand the temperatures created by DSM, in an area two km upstream of Solwara 1. It's also created a special mining tool that significantly reduces the escape of material during cutting, thereby reducing the risk of exposure to toxic fumes. Currently the operation is progressing despite the concerns of environmentalists. Nautilus announced last week that orders are going ahead for completion of the operational base for Solwara 1. The vessel will be 227m in length and 40m wide, able to accommodate 180 people. It is expected to be delivered by the end of 2017.

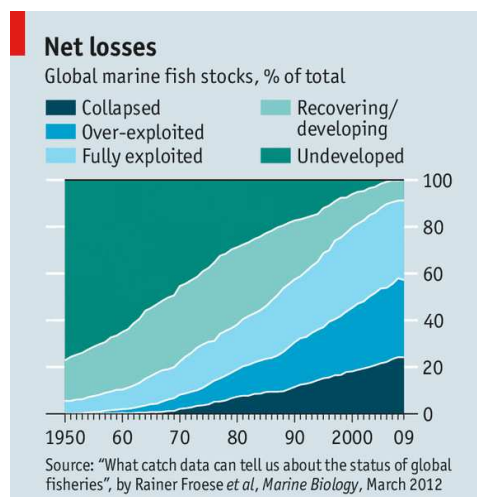
## Governing the high seas in deep water

### Humans are damaging the high seas. Now the oceans are doing harm back

The Economist, Feb 22nd 2014



ABOUT 3 billion people live within 100 miles (160km) of the sea, a number that could double in the next decade as humans flock to coastal cities like gulls. The oceans produce \$3 trillion of goods and services each year and untold value for the Earth's ecology. Life could not exist without these vast water reserves—and, if anything, they are becoming even more important to humans than before. Mining is about to begin under the seabed in the high seas—the regions outside the exclusive economic zones administered by coastal and island nations, which stretch 200 nautical miles (370km) offshore. Nineteen exploratory licences have been issued. New summer shipping lanes are opening across the Arctic Ocean. The genetic resources of marine life promise a pharmaceutical bonanza: the number of patents has been rising at 12% a year. One study found that genetic material from the seas is a hundred times more likely to have anti-cancer properties than that from terrestrial life.



But these developments are minor compared with vaster forces reshaping the Earth, both on land and at sea. It has long been clear that people are damaging the oceans—witness the melting of the Arctic ice in summer, the spread of oxygen-starved dead zones and the death of coral reefs. Now, the consequences of that damage are starting to be felt onshore. Thailand provides a vivid example. In the 1990s it cleared coastal mangrove swamps to set up shrimp farms. Ocean storm surges in 2011, no longer cushioned by the mangroves, rushed in to flood the country's industrial heartland, causing billions of dollars of damage.

More serious is the global mismanagement of fish stocks. About 3 billion people get a fifth of their protein from fish, making it a more important protein source than beef. But a vicious cycle has developed as fish stocks decline and fishermen race to grab what they can of the remainder. According to the Food and Agriculture Organisation (FAO), a third of fish stocks in the oceans are over-exploited; some estimates say the proportion is more than half (see chart). One study suggested that stocks of big predatory species—such as tuna, swordfish and marlin—may have fallen by as much as 90% since the 1950s. People could be eating much better, were fishing stocks properly managed. The forests are often called the lungs of the Earth, but the description better fits the oceans. They produce half the world's supply of oxygen, mostly through photosynthesis by aquatic algae and other organisms. But according to a forthcoming report by the Intergovernmental Panel on Climate Change (IPCC; the group of scientists who advise governments on global warming), concentrations of chlorophyll (which helps make oxygen) have fallen by 9-12% in 1998-2010 in the North Pacific, Indian and North Atlantic Oceans.

Climate change may be the reason. At the moment, the oceans are moderating the impact of global warming—though that may not last. Warm water rises, so an increase in sea temperatures tends to separate cold and warm water into more distinct layers, with shallower mixed layers in between. That seems to lower the quantity of nutrients available for aquatic algae, and to lead to decreased chlorophyll concentrations. Changes in the oceans, therefore, may mean less oxygen will be produced. This cannot be good news, though scientists are still debating the likely consequences. The world is not about to suffocate. But the result could be lower oxygen concentrations in the oceans and changes to the climate because the counterpart of less oxygen is more carbon—adding to the build-up of greenhouse gases. In short, the decades of damage wreaked on the oceans are now damaging the terrestrial environment.

### **A tragedy foretold**

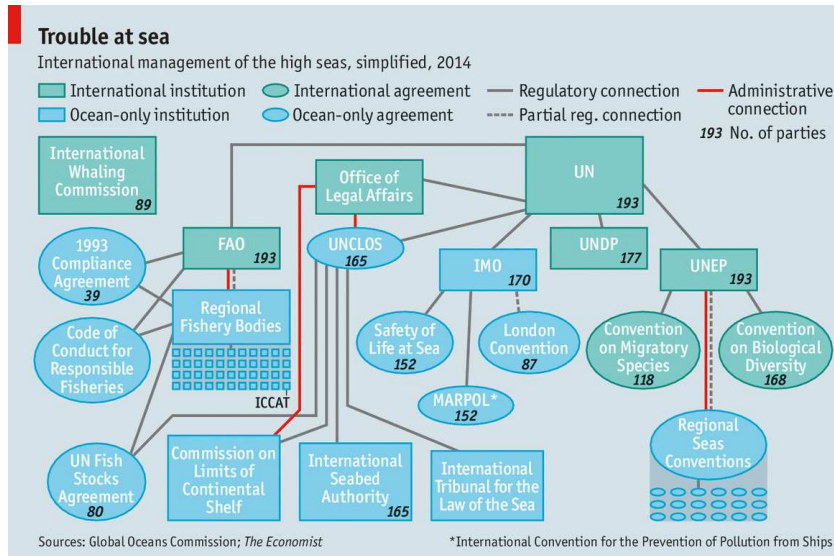
The oceans exemplify the “tragedy of the commons”—the depletion of commonly held property by individual users, who harm their own long-term interests as a result. For decades scientists warned that the European Union's fishing quotas were too high, and for decades fishing lobbyists persuaded politicians to ignore them. Now what everyone knew would happen has happened: three-quarters of the fish stocks in European waters are over-exploited and some are close to collapse.

The salient feature of such a tragedy is that the full cost of damaging the system is not borne by those doing the damage. This is most obvious in fishing, but goes further. Invasive species of many kinds are moved around the world by human activity—and do an estimated \$100 billion of damage to oceans each year. Farmers dump excess fertiliser into rivers, which finds its way to the sea; there cyanobacteria (blue-green algae) feed on the nutrients, proliferate madly and reduce oxygen levels, asphyxiating all sea creatures. In 2008, there were over 400 “dead zones” in the oceans. Polluters pump out carbon dioxide, which dissolves in seawater, producing carbonic acid. That in turn has increased ocean acidity by over a quarter since the start of the Industrial Revolution. In 2012, scientists found pteropods (a kind of sea snail) in the Southern Ocean with partially dissolved shells. It is sometimes possible to preserve commons by assigning private property rights over them, thus giving users a bigger stake in their long-term health. That is being tried in coastal and island nations' exclusive economic zones. But it does not apply on the high seas. Under international law, fishing there is open to all and minerals count as “the common heritage of mankind”. Here, a mish-mash of international rules and institutions determines the condition of the watery commons.

The high seas are not ungoverned. Almost every country has ratified the UN Convention on the Law of the Sea (UNCLOS), which, in the words of Tommy Koh, president of UNCLOS in the 1980s, is “a constitution for the oceans”. It sets rules for everything from military activities and territorial disputes (like those in the South China Sea) to shipping, deep-sea mining and fishing. Although it came into force only in 1994, it embodies centuries-old customary laws, including the

freedom of the seas, which says the high seas are open to all. UNCLOS took decades to negotiate and is sacrosanct. Even America, which refuses to sign it, abides by its provisions. But UNCLOS has significant faults. It is weak on conservation and the environment, since most of it was negotiated in the 1970s when these topics were barely considered. It has no powers to enforce or punish. America's refusal to sign makes the problem worse: although it behaves in accordance with UNCLOS, it is reluctant to push others to do likewise.

## Alphabet bouillabaisse



A dwindling catch

Specialised bodies have been set up to oversee a few parts of the treaty, such as the International Seabed Authority, which regulates mining beneath the high seas. But for the most part UNCLOS relies on member countries and existing organisations for monitoring and enforcement. The result is a baffling tangle of overlapping authorities (see diagram) that is described by the Global Ocean Commission, a new high-level lobby group, as a “co-ordinated catastrophe”. Individually, some of the institutions work well enough. The International Maritime Organisation, which regulates global shipping, keeps a register of merchant and passenger vessels, which must carry identification numbers. The result is a reasonably law-abiding global industry. It is also responsible for one of the rare success stories of recent decades, the standards applying to routine and accidental discharges of pollution from ships. But even it is flawed. The Institute for Advanced Sustainability Studies, a German think-tank, rates it as the least transparent international organisation. And it is dominated by insiders: contributions, and therefore influence, are weighted by tonnage.

Other institutions look good on paper but are untested. This is the case with the seabed authority, which has drawn up a global regime for deep-sea mining that is more up-to-date than most national mining codes. For once, therefore, countries have settled the rules before an activity gets under way, rather than trying to catch up when the damage starts, as happened with fishing. The problem here is political rather than regulatory: how should mining revenues be distributed? Deep-sea minerals are supposed to be “the common heritage of mankind”. Does that mean everyone is entitled to a part? And how to share it out?

The biggest failure, though, is in the regulation of fishing. Overfishing does more damage to the oceans than all other human activities there put together. In theory, high-seas fishing is overseen by an array of regional bodies. Some cover individual species, such as the International Commission for the Conservation of Atlantic Tunas (ICCAT, also known as the International Conspiracy to Catch All Tuna). Others cover fishing in a particular area, such as the north-east Atlantic or the South Pacific Oceans. They decide what sort of fishing gear may be used, set limits on the quantity of fish that can be caught and how many ships are allowed in an area, and so on.

Here, too, there have been successes. Stocks of north-east Arctic cod are now the highest of any cod species and the highest they have been since 1945—even though the permitted catch is also at record levels. This proves it is possible to have healthy stocks and a healthy fishing industry. But it is a bilateral, not an international, achievement: only Norway and Russia capture these fish and they jointly follow scientists' advice about how much to take. There has also been some progress in controlling the sort of fishing gear that does the most damage. In 1991 the UN banned drift nets longer than 2.5km (these are nets that hang down from the surface; some were 50km long). A series of national and regional restrictions in the 2000s placed limits on “bottom trawling” (hoovering up everything on the seabed)—which most people at the time thought unachievable.

But the overall record is disastrous. Two-thirds of fish stocks on the high seas are over-exploited—twice as much as in parts of oceans under national jurisdiction. Illegal and unreported fishing is worth \$10 billion-24 billion a year—about a quarter of the total catch. According to the World Bank, the mismanagement of fisheries costs \$50 billion or more a year, meaning that the fishing industry would reap at least that much in efficiency gains if it were properly managed. Most regional fishery bodies have too little money to combat illegal fishermen. They do not know how many vessels are in their waters because there is no global register of fishing boats. Their rules only bind their members; outsiders can break them with impunity.

An expert review of ICCAT, the tuna commission, ordered by the organisation itself concluded that it was “an international disgrace”. A survey by the FAO found that over half the countries reporting on surveillance and enforcement on the high seas said they could not control vessels sailing under their flags. Even if they wanted to, then, it is not clear that regional fishery bodies or individual countries could make much difference. But it is far from clear that many really want to. Almost all are dominated by fishing interests. The exceptions are the organisation for Antarctica, where scientific researchers are influential, and the International Whaling Commission, which admitted environmentalists early on. Not by coincidence, these are the two that have taken conservation most seriously.

### **Empty promises**

Countries could do more to stop vessels suspected of illegal fishing from docking in their harbours—but they don't. The FAO's attempt to set up a voluntary register of high-seas fishing boats has been becalmed for years. The UN has a fish-stocks agreement that imposes stricter demands than regional fishery bodies. It requires signatories to impose tough sanctions on ships that break the rules. But only 80 countries have ratified it, compared with the 165 parties to UNCLOS. One study found that 28 nations, which together account for 40% of the world's catch, are failing to meet most of the requirements of an FAO code of conduct which they have signed up to. It is not merely that particular institutions are weak. The system itself is dysfunctional. There are organisations for fishing, mining and shipping, but none for the oceans as a whole.

Regional seas organisations, whose main responsibility is to cut pollution, generally do not cover the same areas as regional fishery bodies, and the two rarely work well together. (In the north-east Atlantic, the one case where the boundaries coincide, they have done a lot.) Dozens of organisations play some role in the oceans (including 16 in the UN alone) but the outfit that is supposed to coordinate them, called UN-Oceans, is an ad-hoc body without oversight authority. There are no proper arrangements for monitoring, assessing or reporting on how the various organisations are doing—and no one to tell them if they are failing. Pressure for change is finally building up. According to David Miliband, a former British foreign secretary who is now co-chairman of the Global Ocean Commission, the current mess is a “terrible betrayal” of current and future generations. “We need a new approach to the economics and governance of the high seas,” he says.





plainpicture A dwindling catch

That could take different forms. Environmentalists want a moratorium on overfished stocks, which on the high seas would mean most of them. They also want regional bodies to demand impact assessments before issuing fishing licences. The UN Development Programme says rich countries should switch some of the staggering \$35 billion a year they spend subsidising fishing on the high seas (through things like cheap fuel and vessel-buy-back programmes) to creating marine reserves—protected areas like national parks. Others focus on institutional reform. The European Union and 77 developing countries want an “implementing agreement” to strengthen the environmental and conservation provisions of UNCLOS. They had hoped to start what will doubtless be lengthy negotiations at a UN conference in Rio de Janeiro in 2012. But opposition from Russia and America forced a postponement; talks are now supposed to start by August 2015.

Still others say that efforts should be concentrated on improving the regional bodies, by giving them more money, greater enforcement powers and mandates that include the overall health of their bits of the ocean. The German Advisory Council on Global Change, a think-tank set up by the government, argues for an entirely new UN body, a World Oceans Organisation, which it hopes would increase awareness of ocean mismanagement among governments, and simplify and streamline the current organisational tangle. According to Elinor Ostrom, who won the Nobel prize for economics in 2009, to avoid a tragedy of the commons requires giving everyone entitled to use them a say in running them; setting clear boundaries to keep out those who are not entitled; appointing monitors who are trusted by users; and having straightforward mechanisms to resolve conflicts. At the moment, the governance of the high seas meets none of those criteria. Changes to high-seas management would still do nothing for two of the worst problems, both caused on land: acidification and pollution. But they are the best and perhaps only hope of improving the condition of half of the Earth’s surface.

### **Seabed mining dreams shattered by New Zealand latest decision**

Cecilia Jamasmie, mining.com, February 22, 2015

The latest setback to seabed mining has alarmed companies involved in deep sea mining projects. New Zealand’s recent decision to oppose another deep sea mining venture off its coasts has poured cold water on advocates of searching for and digging up valuable minerals including copper, gold

and manganese from the ocean floor. A decision-making committee appointed by the country's Environmental Agency (EPA) thwarted Chatham Rock Phosphate Limited's plans on Feb. 11. The authority argued that mining off the coast of Canterbury — where the operation was proposed — would cause "significant and permanent adverse effects" on the location's seabed. The case became the second mine application refused in less than a year. Last June the same body refused Trans Tasman Resources' (TTR) application to mine iron sands off the North Island's west coast, which would have become the country's first operation of its kind.

While applauded by environmentalists, the latest setback to seabed mining has alarmed companies involved in the resources extraction model. While applauded by environmentalists, the latest setback to seabed mining has alarmed companies involved in the resources extraction model and pushed the New Zealand government to consider changing legislation to ensure it doesn't block economic development. "To say we are bitterly disappointed is an understatement. We are aghast," Chatham Rock's managing director Chris Castle told *The New Zealand Herald*. "The entire government process, and the EPA in particular, seems afraid to say yes to any project that involves any kind of environmental impact and that is simply not good enough if we are to provide a future for our country's young people."

### **UN support**

Meanwhile, the United Nations' International Seabed Authority (ISA) continues supporting the activity. It has so far issued 26 exploration licences to governments and companies, authorizing them to operate in international waters. According to the Sunday edition of *Financial Times* (subs. required), New Zealand, Namibia and Papua New Guinea have also granted licences for seabed mining exploration, while diamond giant De Beers uses ships for extracting the precious gems off the coast of Namibia, at depths of up to 140 metres. But it is Canada's Nautilus Minerals the one leading the race to open the first seabed mine. In a deal arranged outside the ISA system, the company overcame several difficulties until it reached last year an agreement with the Papua New Guinea government to move forward with its Solwara 1 gold, copper and silver underwater project, located in the Bismarck Sea.

### **Deep sea mining hopes hit by New Zealand decision**

Jamie Smyth, *Financial Times*, February 22, 2015

A decision to block a deep sea mining venture off the New Zealand coast has cast a shadow over an emerging global industry that proponents say could revolutionise how minerals are extracted. The sea floor is rich in copper, nickel, manganese, cobalt, zinc and a host of other minerals used in technology products. Improvements in undersea extraction technology have now put these within reach of miners. New Zealand has led the way in developing sea floor mining. But progress has now stalled following this month's rejection by environmental regulators of a proposed project by Chatham Rock Phosphate off the coast of Canterbury, the second mine application refused within a year. The decisions were welcomed by green groups, who fret that mining would damage vulnerable undersea ecosystems, which are relatively underexplored. But their delight is not shared by companies eyeing deep sea prospects. "To say we are bitterly disappointed is an understatement," said Chris Castle, Chatham Rock Phosphate's managing director. "This will make it even harder, if not impossible for companies to attract capital for new projects in New Zealand."

For almost 20 years deep sea mining has been flagged as a commercial opportunity. David Cameron, UK prime minister, claims it could be worth £40bn to the UK over a 30-year period. The International Seabed Authority, a UN agency, has so far issued 26 exploration licences to governments and companies enabling them to operate in international waters. New Zealand, Namibia and Papua New Guinea have awarded national licences for seabed mining exploration. De Beers uses ships to

recover diamonds off the coast of Namibia at depths of up to 140 metres. But scant deep sea mining has taken place. The world's largest mining groups are sidelined, apparently deterred by the uncertainty of both economics and the environmental impact of the activity, which has prompted authorities to order moratoriums on mining in Namibia and the Australian state of Northern Territory. Richard Page, contributor to a Greenpeace report on sea floor mining, says:

“It is difficult to contain mining waste on land. Imagine the problems of stopping the spread of pollution in an ocean environment. The local communities have every right to be, and indeed should be, concerned.” Campaigners say cutting into the ocean floor or dredging to recover minerals that will be pumped on to a floating processing vessel will kill marine life and smother neighbouring areas with sediment or plumes. New Zealand's Environmental Protection Agency concluded that Chatham Rock's proposed phosphate mining project near Canterbury would cause “significant and permanent adverse effects on the existing benthic [sea floor] environment”. The decision has alarmed proponents of sea floor mining and prompted the New Zealand government to consider amending legislation to ensure it is not a barrier to economic development.

“The act is flawed,” says Alan Eggers, chairman of Trans-Tasman Resources, a company proposing to mine iron sands off the New Zealand coast. Last year the EPA blocked it from mining the sea floor — the first time the regulator had ruled on a seabed mining application. The setback to seabed mining in New Zealand comes as a plan to begin mining copper and gold off the coast of Papua New Guinea moves a step forward. This month Nautilus Minerals, the first company to be awarded a deep sea mining lease anywhere in the world, signed an engines contract for a mining support vessel, which will process minerals off the coast of PNG. The Canadian company, which counts Anglo American among its shareholders, has partnered the PNG government and is on schedule to begin mining at a depth of 1,600m by 2018. Mike Johnston, chief executive of Nautilus Minerals, says: “I believe 30 per cent of the world's mineral production could in the future be mined from the sea floor.”

Nautilus Minerals has also been awarded exploration licences in international waters by the ISA. The UN agency is working on a legal framework to begin issuing sea floor mining leases — a process that could start by 2016. Mining royalties under these licences would be paid to developing countries. Michael Lodge, ISA legal counsel, says: “We have issued exploration licences for areas that cover 1.2m sq km of ocean — about the size of Mexico. In the past, state organisations were the main applicants but in the last three years private companies have become more active.” US defence group Lockheed Martin and G-TEC Sea Mineral Resources, a Belgian company, have both received licences. But companies hoping the ISA is likely to favour commercial exploitation above environmental protection may be disappointed. “We are legally bound to protect the environment, which must take precedence,” Mr Lodge says. “We can only allow commercial exploitation to take place provided there are safeguards.”

### *News Release*

#### **Tuvalu, Kiribati Enact Laws For Responsible Seabed Mining**

Secretariat of the Pacific Community, Suva, Fiji, February 18, 2015

While deep sea mining is yet to commence in the region, Pacific Island countries are proactively developing legal instruments to ensure appropriate management of their deep sea mineral resources, with particular attention to the protection of the marine environment. Tuvalu has become the fourth Pacific country to enact specific legislation for deep sea mineral activities, alongside the Cook Islands, Fiji, and Tonga. With technical assistance from the Secretariat of the Pacific Community, Tuvalu has set new standards, with its Seabed Minerals Act 2014 which requires coastal communi-

ties to not only be consulted prior to the approval of mining projects within Tuvalu's waters, but also for any mining project Tuvalu sponsors in international waters. Tuvalu's Attorney General, Ese Apinelu, said that Parliament is pleased to have contributed to this development, which will strongly enhance the sustainable management of Tuvalu's deep sea resources.

"I'm hopeful that we're witnessing the beginning of a trend that will accelerate new policies and initiatives. I'm thankful for assistance provided by the Deep Sea Minerals Project which has now equipped Tuvalu with a set of tools that will allow us to maximize the benefits of deep sea minerals for our people," Apinelu said. A partnership between SPC and the European Union, the pioneering Deep Sea Minerals Project is assisting Pacific Island states by providing technical advice and assistance to enable them to make informed decisions about deep seabed mining. Deep sea minerals, such as sea floor massive sulphides, cobalt-rich ferromanganese crusts and manganese nodules located in international waters can only be accessed via sponsorship of a state. Kiribati, through its state-owned company, Marawa Research Exploration Ltd., last month signed a contract with the International Seabed Authority and, by doing so, joined Nauru and Tonga—countries that have also signed contracts for exploration in international waters.

This latest contract is for an exploration license for polymetallic nodules in the Clarion Clipperton fracture zone in the east Pacific. Kiribati's Mineral Development Officer, Tebete England, thanked SPC and the EU for their assistance. "This is a great milestone we've achieved. In addition, Kiribati is undertaking public consultation on a draft Deep Sea Mining Policy and is drafting specific deep sea minerals legislation with the assistance of the Deep Sea Minerals Project," England said. The head of the EU Delegation for the Pacific, Ambassador Andrew Jacobs, commended the governments of Tuvalu and Kiribati for these recent achievements. "The formulation of new legislation for Tuvalu and the issuance of an exploration license for Kiribati augurs well for the industry in the region. "These achievements once again reflect the leading role the EU-SPC Deep Sea Minerals Project has in the sustainable management of seabed minerals on the Pacific's ocean floor and we're proud of the project in this regard," Jacobs said.

Deep sea mining has the potential to provide developing island states with much needed revenue to address development issues but this must be balanced against social and environmental considerations, SPC's Geoscience Division Director Mike Petterson said. "SPC will continue to work with the countries to develop the legal instruments required and assist with capacity building and awareness raising programs in this fascinating, emerging area," Professor Petterson said. Progress to improve the governance and management of their deep-sea minerals resources in accordance with international law, with particular attention to the protection of the marine environment and securing equitable financial arrangements for Pacific Island countries and their people of these 15 Pacific Island nations is among the on-ground benefits to Pacific communities to be highlighted during the EU Year for Development 2015.

### **New Zealand: EEZ Act to loosen seabed mining rules?**

Frances Cook, Newstalk ZB, 18 February 2015

It's feared last minute legislation for the Maui gas fields will be used to sneak through a loosening of the rules for seabed mining. The government's today introducing emergency changes to the Exclusive Economic Zone Act, to allow the Maui platforms to keep drilling through the appeal process if anyone objects to the permit being renewed in June. Labour leader Andrew Little says if the permit process had been started before now, there wouldn't have been a problem. "It's a law change required because the minister hasn't kept up with what's required under his portfolio." Green MP Gareth Hughes says it's unclear what will be buried in the fine print. "The signs are it looks like a

big rewrite. The minister wouldn't rule out making it easier for seabed mining companies to apply and I think the worst outcome was if they were to make it easier for their corporate mates."

### **Vanuatu long way off from deep sea mining: Regenvanu**

ABC Radio Australia, 18 February 2015

The Vanuatu government has been handed the first major consultation report on the prospects for deep sea mining, following a national conference designed to gauge public sentiment. The report, prepared by the Pacific Institute of Public Policy, calls for even wider community consultation and for the government to carefully consider the implications of mining the sea. 150 exploration licences have already been granted and massive sulphide deposits have been identified on the seafloor which are thought to contain copper, gold and silver. But Vanuatu's Lands and Natural Resources Minister Ralph Regenvanu says there's a long way to go before any mining licences are granted.

### **New Zealand rejects seabed mine**

The National, February 16th, 2015

New Zealand recently rejected its second underwater mining project due to the potential environmental impact to the seabed off the nation's eastern coast. The Environmental Protection Agency (EPA) refused Chatham Rock Phosphate's application to extract phosphorite, a component used in fertilisers. "The destructive effects of the extraction process ... could not be mitigated by any set of conditions or adaptive management regime that might be reasonably imposed," the EPA said in a statement. "To say we are bitterly disappointed is an understatement. We are aghast," Chatham Rock Phosphate managing director Chris Castle said in a statement, as shares in the company plummeted 92 per cent to a lifetime closing low of NZ\$0.016 (.3t). Other companies said the EPA's decision may diminish interest in seabed mining in New Zealand. "For people on the outside looking in, they'll look at this and think the country is a bit confusing.," said Michael Johnston, chief executive officer of Nautilus, which is working on a deep-sea project off Papua New Guinea and is in talks with New Zealand. "You've got one piece of legislation saying the project is approved and another saying it's been rejected."

### **New Zealand: Chatham phosphate mining consent refused**

Radio New Zealand, February 11, 2015

Shares in Chatham Rock Phosphate have plunged after it was refused a marine consent to mine phosphate from the Chatham Rise seabed. The decision by the Environmental Protection Authority (EPA) was released this morning.

The company wanted to mine three 10 square kilometre blocks per year; mining would have been at depths of up to 450 metres. The authority's decision said the mining would cause significant and permanent adverse effects on the seabed environment. There would have been destructive effects from the extraction process, as well as from the deposit of sediment from the mined area. The authority's general manager of assessments, Sarah Gardner, said mining would destroy the protected stony corals unique to the area. "The picture is that the seabed would be changed so it couldn't return to what the environment is now. "If there's life present that relies on the phosphate nodules or the stony substrate that's present, and that's removed, then that life would not regenerate in the same way." The authority said the economic benefit to New Zealand of mining the area would be modest, at best. The company's shares fell as low as 1 cent each this morning from 20 cents yesterday.



Chatham Rock Phosphate chief executive Chris Castle said he was aghast at the decision which he said was a seriously negative signal for New Zealand business.

Most of the \$33.5 million the company had raised had been invested in the mining application process. "We are disappointed and I think probably more worried about the wider impact of this - both in international marine mining and also for investor perception overseas of how possible it is to do things in New Zealand." Straterra chief executive Chris Baker told *Checkpoint* any mining project has a level of uncertainty, and the decision shows the act governing the Exclusive Economic Zone (EEZ) and continental shelf is flawed. "The act doesn't deal with that uncertainty well enough. The guidelines may be - elements of the act itself need to be changed to enable a project like a mining project, that inherently has uncertainty, to be dealt with in a responsible way." Last month, Chatham Rock Phosphate said it expected to pay annual royalties of \$US6.9 million, and \$US17.4 million a year in income tax, and that the project would earn after-tax profits of \$US673 million over its estimated 15-year life.

Read the full decision by the EPA (PDF, 3.4MB):

[www.epa.govt.nz/eez/EEZ000006/EEZ000006\\_CRP%20Final%20Version%20of%20Decision.pdf](http://www.epa.govt.nz/eez/EEZ000006/EEZ000006_CRP%20Final%20Version%20of%20Decision.pdf)

## O'Neill's 'No Response' to the ELCPNG on Experimental Seabed Mining

by ramunickel, ACT NOW!, February 11, 2015



Picture: Lutheran followers gather in protest against Experimental Seabed Mining

The Prime Minister Peter O'Neil has not responded to the appeal made by more than 2 million Lutherans nationwide, to not go ahead with the said Experimental Seabed Mining (ESM) to happen in Papua New Guinea. A statement signed by the ELCPNG Head Bishop, Rt. Rev. Kiegere Wenge was released right after the Church's 29th synod held on Karkar Island last year (2014), directed to the O'Neill government to let them know that the Lutherans are not in favor of mining the seabed, as it is against biblical scriptures that instruct men to take care of nature. There was no response from the O'Neill government so a letter signed by Reverend Kinim Siloi of the Lutheran church, aimed at the Prime Minister Peter O'Neill was released as a follow up. The letter basically asked Mr O'Neill, who is a Lutheran Church-goer himself, to clarify why he is supporting the Canadian-based Nautilus company despite the church's wishes with 1.2 million objections. Despite the letter getting the local and international media's attention, there was no response from Mr O'Neill. Nonetheless, the Pacific Conference of Churches (PCC) made a statement, confirming the Pacific churches stand

in solidarity with the Lutheran Church of Papua New Guinea against the much rushed ESM. As you might have guessed, there's still no response from Mr O'Neill, the Prime Minister till today.

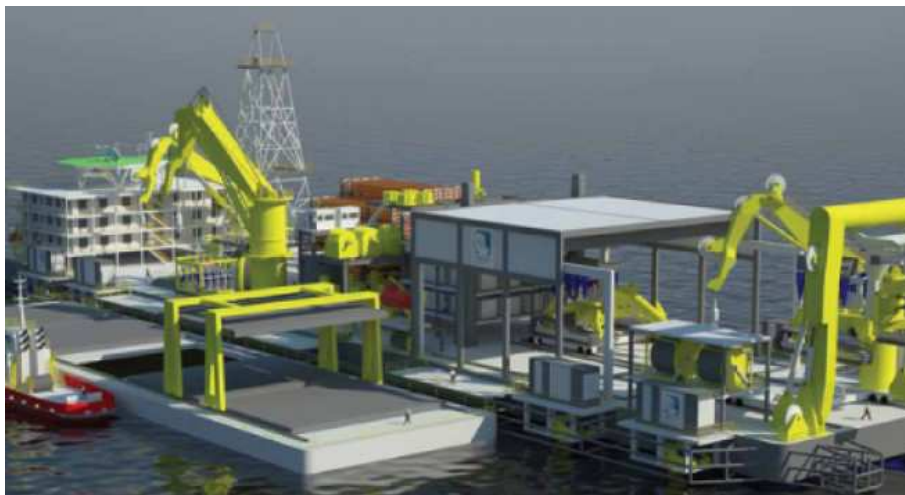
### **Nautilus Minerals Inc.: Vessel Engines and Thruster Packages Awarded**

TORONTO, ONTARIO-(Marketwired - Feb. 9, 2015) - Nautilus Minerals Inc. (*Company* or *Nautilus*) announces that the order for the engines and thruster packages for the Company's production support vessel has been awarded to Rolls Royce Marine of Norway. The order secures the main engines, azimuth and tunnel thrusters and is the first major package to be awarded by the shipyard, Fujian Mawei Shipbuilding Limited. Last year Nautilus announced it had entered into an agreement with Marine Assets Corporation (*MAC*), for the charter of a vessel to be first deployed for use at the Solwara 1 Project (*Project*) and that MAC had entered into a contract with Fujian Mawei Shipbuilding Ltd., to design and construct the vessel in accordance with Nautilus' specifications.

Mike Johnston, Nautilus' CEO, commented "We are excited to see the first order being placed for this high specification machinery as we work towards the completion of our first vessel". The vessel will first serve as the operational base to extract and to transport high grade copper and gold material from the Project site, in the Bismarck Sea of Papua New Guinea. When completed, the vessel will measure 227 metres in length and 40 metres in width with accommodation for up to 180 people and generate approximately 31MW of power. All of the below deck mining equipment will be installed in the vessel during the build process to minimize the equipment integration to be completed following delivery of the vessel. The vessel is expected to be delivered by the end of 2017.

### **Nautilus ends assembly of collecting machine**

Post-Courier, February 02, 2015



THE operator of the Solwara 1 Project in the waters of Bismarck Sea, Nautilus Minerals (Nautilus) has announced the mechanical and hydraulic assembling of its second of three Seafloor Production Tools (SPTs), the collecting machine (CM), has been completed at Soil Machine Dynamics' facility at Newcastle upon Tyne, in the United Kingdom. The company also announced the commissioning of the CM systems has now commenced, according to a statement released at the weekend. Nautilus' chief executive officer (CEO) Mike Johnston said in a statement; "having already completed the assembly of the Bulk Cutter, we are delighted that the assembly of the Collecting Machine has now been completed and commissioning has begun. This is an exciting time for the Company as we continue with the build of the seafloor production equipment while work has also started toward the

build of our production support vessel. We look forward to finalising the assembly of the third and final SPT, the Auxiliary Cutter."

The statement highlighted that the CM is the lightest of the three SPTs, weighing 200 tonnes when fully assembled. It is designed to collect material cut from the seafloor by drawing it in as seawater slurry with internal pumps and pushing it through a flexible pipe to the riser and lifting system and onto the vessel. The world's first ever deep-sea miner said the excavation and collection of mineralised material has been split into three individual tasks, which will each be carried out by a different SPT. The Auxiliary Cutter is designed as the pioneering tool which prepares the rugged sea bed for the more powerful Bulk Cutter. The company said the two tools gather the excavated material; the third, the CM, will collect the cut material by drawing it in as seawater slurry with internal pumps and pushing it through a flexible pipe to the subsea pump and on to the vessel via the Riser and Lifting System. Nautilus is the first company to explore the ocean floor for polymetallic seafloor massive sulphide deposits. Nautilus was granted the first mining lease for such deposits at the prospect known as Solwara 1, in the territorial waters between the New Ireland and New Britain Provinces, where it is aiming to produce copper, gold and silver. The company has also been granted its environmental permit for this site.

### **Consultations on draft Seabed Mining Policy to resume in April**

By Jonas Cullwick, Vanuatu Daily Post, January 19, 2015

The National Offshore Minerals Committee set up by the Government of Vanuatu is preparing to resume consultations on the Seabed Mining Policy draft at the end of April. These nationwide consultations will continue until the end of June or early July, 2015, according to the Acting Commissioner of Mines at the Geology and Mines Unit, Brooks Rakau. First consultations on the Seabed Mining Policy draft were held during the Vanuatu Deep Sea Minerals Conference at the Chiefs' Nakamal in Port Vila on October 7, 8, and 9, 2014.

### **The reboot of seafloor mining**

#### **Nautilus Minerals is back on track to be the first bona fide seafloor metals miner**

By Kip Keen, Minewb, 6 January 2015

Back in 2012 Nautilus Minerals was in the thick of developing a seafloor mining project in Papua New Guinea (PNG) with the brief blessing of the state. The PNG government had come aboard as a partner with Nautilus to help fund the construction of an underwater mine – a novel concept – targeting seafloor massive sulfide (SMS) deposits in early 2012. But by the middle of that year the project foundered when the PNG government started a fight over contractual obligations with Nautilus including the rights to intellectual property, among other things. Nautilus' stock crumbled. It canceled expensive ship and equipment building contracts. It halted intense exploration for additional SMS deposits. For the next two years Nautilus Minerals was in shackles, unable to meaningfully advance its aim to become the first real miner of metals from the seafloor. The dispute took Nautilus Minerals – and its then newly appointed President and CEO Michael Johnston – down a worm-hole of negotiations and international arbitration. At times it looked like the dispute was intractable. In late 2013 the PNG government ignored the arbitration judgement – which upheld that the PNG government had agreed to pay for a 30% stake in the Solwara I project, Nautilus' leading underwater mine idea. No funds flowed by a deadline set by the judgement and seeing this Nautilus terminated the PNG government's 30% buy-in right.

But in the background Johnston – about as even-keeled and low-key as CEOs come and a veteran of PNG mining – and his team continued meeting the PNG government and eventually sealed a new

deal, much like the old. The PNG government would have a two-stage 30% option on Solwara I, and it would pay \$113 million for the first 15%. Nautilus in return would, as it had said it could, transfer a share of rights to intellectual property covering innovative technology that had been developed in the then, and still, nascent seafloor mining industry. Nautilus would also agree not to seek damages from the state stemming from the two-year long dispute. Of course, ink on agreements like this doesn't really dry until the money flows. It finally did in December and now Nautilus Minerals, and the potential of seafloor mining, are getting a reboot.

### **Nautilus take two**

Johnston spoke with me recently about the agreement and the company's plans. First off, he isn't one to play the blame game. He's not a high-tempered soul that, at least publicly or in interviews, lashes out at PNG for playing slow or sly. Quite the opposite. He sounds understanding. For example, he recalls how the PNG government felt hoodwinked when a Placer Dome gold operation – in which it chose to participate as partner – ended up producing far more gold than was anticipated once in production. “Look at it from the State's point of view,” Johnston says. “If someone told you were going to produce 1 million ounces a year and you produce 1.5 million ounces a year, for two-three-four years, you might say it's a reasonable position to feel like you were undersold on the project.” In this case the state forced the miners to yield to it a greater stake. So PNG can be protective and pushy. Indeed, it forced Nautilus to renegotiate contracts with the junior's suppliers to cut it in as a direct owner of some intellectual property rights covering seafloor mining systems. But at the same time, Johnston argues, the PNG government is proving to be a willing partner, allowing numerous oil & gas projects to go ahead, and supporting mining projects as well, such as Solwara I. “You're going to see a lot of projects moving forward now,” Johnston says. “It's not just our project.”

### **Seafloor mining and exploration**

Which brings us to Solwara I. With the PNG government no longer holding it back, Nautilus is suddenly doing again what it has been trying to do for years: Develop and find more seafloor mining projects. Solwara I – Nautilus' most advanced project – is a gem, if quite modest in size. It's a high-grade copper-gold deposit that Johnston now aims to have in production in 2018. Resources stand at 1mt @ 7.2% copper, 5.0 g/t gold, 23 g/t silver, 0.4 % zinc, indicated; and 1.5mt @ 8.1 % Cu, 6.4 g/t Au, 34 g/t Ag, 0.9% Zn, inferred. The chief risk overhanging Nautilus is proof of concept as this kind of mining has never really been done before. This year Nautilus will start wet-testing much of its seafloor mining equipment, Johnston says. This means finding a suitable location to plunk its mining systems down, somewhere underwater but likely near shore, to test them out for bugs. Meantime, Nautilus has entered into a contract to lease a mining vessel that a Chinese firm will soon start building. The systems are based around a lot of existing technology, so while this has to be considered a high-risk stock with lots yet to prove in its designs – there is also some real comfort in the fact that similar underwater industries have long used much of the technology in question. This is not asteroid mining. It's not outlandishly untried or untested.

Johnston views seafloor mining as doable and Solwara I as a place for it to refine its equipment to mine what could very well prove to be many more SMS deposits to come. “What I think will happen – gazing into a crystal ball here – is these first machines will probably be the worst ones ever built,” he says. “We'll get a lot of learning, probably, from these first ones.” For example, Nautilus may find the cutter head design needs to be slightly different or the power requirements not so great or greater. It's the more theoretical parts of the designs Nautilus will have to tweak. “We've had to make a bunch of assumptions based on engineering work, particularly with regard to the hyperbaric effect, which is the weight of all that water. And it absorbs energy when you're trying to cut the rock.”

His view is that they've been overly conservative on how hard, essentially, it will be to do the actual rock cutting underwater. The assumptions were based on core that was recovered – the harder, more continuous sticks of core. Are they representative, or do they undervalue more friable parts of the deposits which aren't part of assumptions? "I suspect they probably aren't representative," Johnston says. "I wouldn't be at all surprised if we see that we've got too much power in the machines now. The next generation of equipment could probably be a bit smaller in terms of power requirements. Anyway, time will tell." Time will also tell how much potential lies in seafloor mining and by very direct extension Nautilus as a miner, which is leading the way in this untested arena. A lot of the potential lies in deposits like Solwara I – deposits from seafloor vents that dot regions where Earth's tectonic plates meet. There are some 64,000 km of linear plate boundaries on the Planet, Johnston notes, and a lot of interest in their SMS deposits.

"The feedback I get is, if this works the way it's supposed to, there's going to be enormous interest in developing these things." That interest comes from governments, miners and others such as smelters, Johnston says. If Solwara I does work, we can expect that the next seafloor mines will be near Nautilus' first. Indeed, the Solwara I mining license covers around 60-sq.-km of seafloor and Nautilus – before the dispute with PNG erupted – had identified numerous prospects worth following up. There's also other exploration concessions nearby where prospects – dozens of them – look good too. This year it will begin moving some of these – which in a few cases look similar to Solwara I – forward. It's no surprise. This kind of deposit, like their VMS (volcanogenic massive sulphide) brothers and sisters, tend to form in clusters. They can be very high grade, though they tend to be small tonnage-wise in comparison, say, to world-class porphyry deposits.

But, ounce in a while, like VMS deposits, they buck the trend. "Every now and then you get massive ones, like Kidd Creek," Johnston says. "And even with the SMS' known to date, in the mid-Atlantic a number of systems that have been identified by Russian researchers are very large. They are claimed to be on the order of tens of millions of tonnes. There are some very large systems out there." Exploration for SMS deposits has also been fairly limited. Nautilus will restart its exploration program this year. It means rebuilding its geological team that was disbanded during the PNG-Solwara I dispute. "We know we're going to find lots of systems," Johnston says.

"We've already found something like 30 systems. Not all of those systems will be mined. What I say to some of the scientists that we meet: We would think something on the order of one out of 10 or 20 would probably be what you mine. Some of them are too small. Some of them the grade isn't good enough. Some of them will be too active." If Solwara I works as Johnston expects, then Nautilus will presumably be able to line up more deposits to be mined. First these will come near Solwara I. But eventually, should other jurisdictions prove willing to allow seafloor mines, the possibility for a lucrative mining business to grow is obvious. That is, as Johnston describes it, "to basically put a pipeline of projects together which we'll just continue to mine." It may mean significant additions to global metal supply. It may be somewhat disruptive, with smelters favouring new, higher grade, and possibly cleaner concentrates from the seafloor. Time will tell.