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IN DEEP WATER

The emerging threat of deep sea mining

Hydrothermal vents
at Dom João De Castro
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Mauve stinger jellyfish, Azores
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EXECUTIVE SUMMARY

The oceans are facing more threats now than at any time in history. Yet a nascent industry is ramping up to exert yet more pressure on marine life: deep sea mining. A handful of governments and companies have been granted licences to explore for deep sea mining in ecologically sensitive waters, and the industry is positioning its development as inevitable, but deep sea mining isn't happening anywhere in the global oceans – yet.

Opening up a new industrial frontier in the largest ecosystem on Earth and undermining an important carbon sink carries significant environmental risks, especially in light of the biodiversity and climate crises facing the natural world and specifically our ocean. Rather, we need a strong Global Ocean Treaty that puts conservation, and not exploitation, at the heart of how governments approach the ocean.

Key findings

- Deep sea mining risks severe and potentially irreversible environmental harm, both at the mine sites and beyond. The deep ocean's biodiversity and ecosystem functioning is barely understood and robust risk mitigation is not possible.

- Deep sea mining would undermine progress towards UN Sustainable Development Goal (SDG) 12, which aims to ensure sustainable consumption and production patterns, as well as SDG 14, which aims to conserve and sustainably use the oceans, seas and marine resources for sustainable development.

- By impacting on natural processes that store carbon, deep sea mining could even make climate change worse by releasing carbon stored in deep sea sediments or disrupting the processes which help 'scavenge' carbon and deliver it to those sediments. Deep sea sediments are known to be an important long-term store of 'blue carbon', the carbon that is naturally absorbed by marine life, a proportion of which is carried down to the sea floor as those creatures die. Voices from the fishing sector are also joining environmental groups in warning of the severe risks to fisheries, amplifying calls for a moratorium on deep sea mining.

- The deep sea mining industry has already identified that environmental concerns, especially the destruction of endemic ecosystems, are significant blocks to the development of the industry. Minutes of industry meetings released following Freedom of Information requests in the UK acknowledge that "[a]ll agreed that environmental concerns are the biggest blocker to progress."[1]

- The deep sea mining industry presents its development as essential for a low-carbon future, yet this claim is not substantiated by actors in the renewable energy, electric vehicle or battery sectors. Such arguments ignore calls for a move from the endless exploitation of resources to a transformational and circular economy.

- Deep sea mining is currently regulated by the International Seabed Authority (ISA), but important limits in the ISA's mandate, as well as concerns with its environmental management in practice,[2] underscore the problems with the current fragmented system of ocean governance. The ISA is unable to conserve deep sea environments from cumulative stresses or protect marine life in the broader ocean that could be impacted by deep sea mining. This highlights the need for governments to agree a strong Global Ocean Treaty at the UN next year, to put protection at the heart of managing international waters.

- Exploration licences for deep sea mining have already been granted before a framework of comprehensive protection and a network of sanctuaries has been put in place in international waters. The ISA has never yet turned down a licence application,[3] even to explore places of high ecological significance like the Lost City near the Mid-Atlantic Ridge,[4] which has been identified as an ecologically important area under the UN Convention on Biological Diversity and which meets criteria for UNESCO World Heritage status.

- The ISA has consistently sided with development of deep sea mining over marine protection, and is used by mining companies seeking to exploit the seabed as an avenue to gain diplomatic support from governments. Corporations have begun speaking on behalf of government delegations at ISA meetings, and some government applications for exploration contracts have even been prepared and funded by deep sea mining companies.

Madeira Rockfish, Azores
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INTRODUCTION

We know more about the surface of Mars and the moon than about the deep ocean.

From underwater mountains providing oases for sea creatures to towering spires resembling sunken cities, the deep ocean is full of mysteries. As the largest habitable space on Earth, the deep ocean is home to ancient coral reefs sustaining the oldest known lifeforms, trenches deep enough to hold Mount Everest and mysterious animals that can live for hundreds of years. Scientists discover new species on practically every voyage down to the depths.

Yet this unique living world that we barely understand is under threat from the nascent deep sea mining industry. Deep sea mining risks inevitable, severe and irreversible environmental damage to our oceans and marine life.

Right now, we are at a crucial moment in history. Governments and corporations have been granted licences to explore for deep sea mining in ecologically sensitive waters, and the industry is positioning its development as essential and inevitable – but the threshold of actually mining the deep sea is yet to be crossed.

If mining begins, industrial-scale mining machines will enter our oceans and destroy unique underwater worlds – affecting not just the weird and wonderful creatures living in the depths, but putting the ocean creatures swimming across our global oceans at risk. By impacting on natural processes that store carbon, deep sea mining could even make climate change worse.

Today, there is very little standing between the natural wonders of the deep ocean and these mining machines. Current ocean law focuses more on the right to exploit marine resources found in international waters and the seabed than on a duty to protect them. A plethora of sectoral and regional bodies cover specific activities on parts of the high seas, resulting in a fragmented system with scant mandate or expertise to protect the health of the global oceans.

The agency responsible for regulating deep sea mining, the International Seabed Authority (ISA), is currently focused on paving the way for commercial deep sea mining,[5] and appears to be putting profit over protection – including by selling access to unique wonders of the deep sea to governments and corporations for mining exploration. The ISA is unable to protect the deep ocean from multiple other pressures, such as bottom fishing. The environmental impacts of deep sea mining are not necessarily restricted to the seabed: marine life in shallower waters could also be put at risk by knock-on ecological disturbances.

Spiral tube worm, Azores
© Greenpeace / Gavin Newman

Without proper protection of the deep sea, we could destroy species and ecosystems yet to even be discovered. Deep sea fishing is a prime example of where industry has exploited before scientists had the chance to explore. Cold-water coral reefs that were devastated by the bottom trawling that began in the 1960s have shown little evidence of recovery after decades,[6] depriving us of valuable knowledge about these fragile ecosystems and the highly diverse wildlife they supported.

Over the next 12 months, governments have an opportunity to put protection at the heart of ocean governance, through a new Global Ocean Treaty.[7] Currently under negotiation at the UN, this new treaty could enable the creation of a global network of ocean sanctuaries – putting vast areas of international waters off-limits to extractive industries – and set gold standards for assessing the environmental impact of extractive activities to prevent the wholesale plunder of the global oceans. A strong Global Ocean Treaty can help protect the hidden treasures of the deep sea from reckless exploitation.

But the ISA is advocating for a weaker Global Ocean Treaty,[8] one that would be less able to overcome the fragmented ocean governance that is driving marine life to the brink. The risks of deep sea mining and serious flaws in the industry's regulation expose the inadequacy of the current governance of the ocean, and provide a compelling rationale for why governments must agree a strong Global Ocean Treaty in 2020 to protect the oceans for future generations.

STATE OF PLAY

Ever since the discovery of metals and minerals on the seabed by seafaring expeditions in the 1870s, interest in the possibility of mining minerals from the deep ocean has waxed and waned. Several governments and corporations – including many fossil fuel companies – began to pursue deep sea mining in the 1970s, but technological shortcomings, changing metal prices and deadlocked international negotiations led many of the major mining companies to abandon their quest.

A handful of governments maintained an interest in mining the deep sea for copper, cobalt, nickel and other metals, and six 'pioneer claims' for minerals exploration were issued in 1984, each relating to an area of 75,000km^2. Those claims were transferred into official leases when the International Seabed Authority (ISA) was created in 1994, under the UN Convention on the Law of the Sea, as the legal entity responsible for regulating deep sea mining in the international seabed (legally known as 'the Area' and referred to in this report as 'the international Area').[9] Regulations governing exploration were completed in 2012, leading to the ISA granting new licences. Combined with the technological advances made by the offshore oil and gas industries over the last decade, this has seen deep sea mining evolve from a troubled concept to an imminent development.

So far, the ISA has issued 29 exploration leases for polymetallic nodules, seafloor massive sulphides and cobalt-rich ferromanganese crusts – covering around one million square kilometres of the international seabed – to sponsoring states including the UK, China, France, Belgium, India, Germany and Russia, which work with corporate contractors. Seventeen of these contracts are for exploration for polymetallic nodules in the Clarion-Clipperton Fracture Zone (16) and Central Indian Ocean Basin (1). There are seven contracts for exploration for seafloor massive sulphides in the South West Indian Ridge, Central Indian Ridge and the Mid-Atlantic Ridge, and five contracts for exploration for cobalt-rich crusts in the Western Pacific Ocean.[10]

Despite the growing interest in recent years, deep sea mining is not happening anywhere on the international seabed – yet. Before any commercial mining can take place, the ISA has to complete the Mining Code by agreeing exploitation regulations. The Mining Code is the set of rules, regulations and procedures that will regulate all aspects of deep sea mining – prospecting, exploration and exploitation – on the international seabed. The exploitation regulations, including environmental issues, are not the only part of the framework that still needs to be developed: the ISA also needs to further develop proposals on the level of fees and royalties that contractors will have to pay. The ISA is aiming to finalise the Mining Code by July 2020;

Several members of Nautilus' senior staff are now working for DeepGreen, which has become one of the most vocal proponents for deep sea mining and is working with shipping giant Maersk and mining giant Glencore

however, observers have highlighted slow progress to date, including on politically contentious issues, which is likely to push back this deadline.

While steps need to be completed before any deep sea mining can occur in the international Area, it should be noted that Japan Oil, Gas and Metals National Corp (JOGMEC) has successfully deployed excavators to extract ore rich in zinc, gold, copper and lead from depths of 1,600m in waters close to Okinawa within the Exclusive Economic Zone of Japan.[11] Another venture, the Solwara-1 project, was predicted to get underway in spring 2019 in Papua New Guinea's waters by Canadian company Nautilus Minerals Inc, although repeated setbacks and spiralling costs have halted progress, with Nautilus filing for insolvency protection just months before operations were supposed to begin.[12] Nautilus has since been delisted from the Toronto Stock Exchange,[13] with its Solwara-1 project advertised for sale.[14] The company's financial woes, which have led to the loss of its ambitiously named New Era ship,[15] reflect the high risks associated with deep sea mining for investors. The Prime Minister of Papua New Guinea, whose predecessor signed a deal with Nautilus to mine in the country's waters, has described this as "a deal that should not have happened".[16]

Technical setbacks have not been limited to projects in national waters: Global Sea Mineral Resources (GSR), part of Belgian dredging company DEME, has had to indefinitely delay a test of its prototype Patania II nodule collector after damage was caused to a critical power cable just weeks before the machine was due to be tested in the Pacific Ocean at depths of 4,000m.[17]

Few of the mining majors remain involved in deep sea mining: Anglo-American divested from Nautilus' operations in Papua New Guinea in 2018 to focus on its "largest and greatest potential resource assets",[18] while the company contracted to explore the largest area of international seabed is a subsidiary of weapons manufacturer giant Lockheed Martin. Several members of Nautilus' senior staff are now working for DeepGreen,[19] which has become one of the most vocal proponents for deep sea mining and is working with shipping giant Maersk and mining giant Glencore.[20]

While public support for ocean protection has surged in recent years in light of plastic pollution campaigns and the popularity of the BBC documentary *Blue Planet II*, several of the governments talking up their commitments to marine protection are simultaneously investing in deep sea mining. The European Commission sees deep sea mining as fitting into its 'blue growth strategy', with EU investments in deep sea mining-related projects and innovation streams totalling €65m between 2012–16; more recent investments have had a greater focus on technology to facilitate deep sea mining than on environmental protection.[21]

In Germany, the Federal Ministry for Economic Affairs and Energy (BMWi) has supported industrial initiatives on deep sea mining both politically and financially for several years and is setting an important course for the further development of the sector.[22] Similarly, while the UK government pursues a 'Blue Belt' policy of marine protected areas, a government minister recently told parliament that Lockheed Martin's subsidiary UK Seabed Resources (UKSR) "made reference to the helpfulness of the British Government as it pursued its licence" for exploratory activity,[23] and as Christopher Williams from UKSR told British MPs in autumn 2018, the company receives diplomatic support from the UK government at the ISA.[24]

In Belgium, the Minister of Economic Affairs who supported Global Sea Mineral Resources' application became an advisor to the company after his term in office ended, and has, in that capacity, joined the Belgian delegation to the ISA on at least one occasion.[25] However, following civil society pressure, the Belgian government released an environmental impact assessment (EIA) for activities carried out under its exploration contracts in 2018,[26] demonstrating political sensitivities to public debate on the environmental impact of deep sea mining. That EIA soon became outdated as the project suffered setbacks, showing the technical difficulties of operating in the deep sea.[27]

Unearthed analysis reveals the key governments and companies pursuing deep sea mining[28]

Governments granted contracts for deep sea mining exploration, by largest area

1	China = 161,211.2km | 263 licences
2	UK = 133,285.6km | 2 licences
3	Korea = 87,803.37km | 257 licences
4	Russia = 87,581.73km | 233 licences
5	Germany = 86,920.16km | 102 licences

Contractors for deep sea mining exploration, by largest area:

1	UK Seabed Resources Ltd (Lockheed Martin subsidiary) = 133,285.6km | 2 licences
2	COMRA (China) = 88,104km | 255 licences
3	Government of the Republic of Korea = 87,803.37km | 257 licences
4	BGR (Germany) = 86,920.16km | 102 licences
5	Government of India – MoES = 85,987.05km | 102 licences
6	IFREMER (France) = 85,058.64km | 103 licences

Black coral, Azores seabed
© Greenpeace / Gavin Newman

'Biodiversity loss from deep sea mining will be unavoidable'

Lion's mane jellyfish, Arctic Ocean
© Alexander Semenov

THE ENVIRONMENTAL RISKS OF DEEP SEA MINING

The prospect of deep sea mining has been met with stark warnings from scientists and prominent conservationists, who have highlighted the risk of irreversible damage to ecosystems – including to those that we do not yet fully understand.[29] Opening up a new industrial frontier in the largest ecosystem on Earth and undermining an important carbon sink carries significant environmental risks,[30] especially in light of the biodiversity and climate crises facing our oceans and the natural world more generally.

Deep sea mining could cause severe and potentially irreversible environmental harm both at the mine sites and throughout broader ocean areas. The deep seabed underlying the open ocean was until recently thought to be relatively devoid of life, but deep sea research continues to reveal that this is not the case.

Potential harmful effects from deep sea mining include:[31]

- Direct removal of seafloor habitat and organisms
- Release of suspended sediment plumes
- Alteration of substrate and its geochemistry
- Release of toxins and contamination from extraction and removal processes
- Noise and light pollution

Huge swathes of the seabed have already been licensed for mineral exploration, many of them in areas with high biodiversity value.[32] A recent scientific analysis, *Deep-Sea Mining with No Net Loss of Biodiversity – An Impossible Aim*, demonstrates that biodiversity loss from deep sea mining will be unavoidable.[33] The authors also point out that the ecological consequences to deep sea biodiversity are unknown and will have inter-generational consequences. They argue that this makes it hard to see how deep sea mining can be socially or scientifically acceptable, especially in the international seafloor of the Area, which is legally classed as "the common heritage of [hu]mankind." Another paper has questioned the assumption that commercialising the international seabed will benefit all humankind and asks, "Is commercial exploitation of non-renewable resources from the ocean floor today really in the interest of humanity?"[34]

Direct impacts: inevitable and irreversible harm

Remotely operated mining machines moving, drilling and cutting over 1,000m below the surface will inevitably cause direct physical damage to the seabed and loss of biodiversity, risking extinctions of endemic species that may never recover after the destruction of their unique habitat.[35] "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," 15 leading deep sea experts warned in 2017.[36]

Deep sea species, including Greenland sharks and corals, are among the longest-living creatures on Earth, and so are particularly vulnerable to physical disturbance because of their slow growth rates.

There are three main types of deep sea mining: seafloor massive sulphides around hydrothermal vents, polymetallic nodules on abyssal plains, and cobalt-rich crusts on seamounts. While there are differences in the extraction technology and methods planned for extracting different deep sea mineral types, mining activity at any of these sites carries a high risk for marine life and ocean ecosystems.

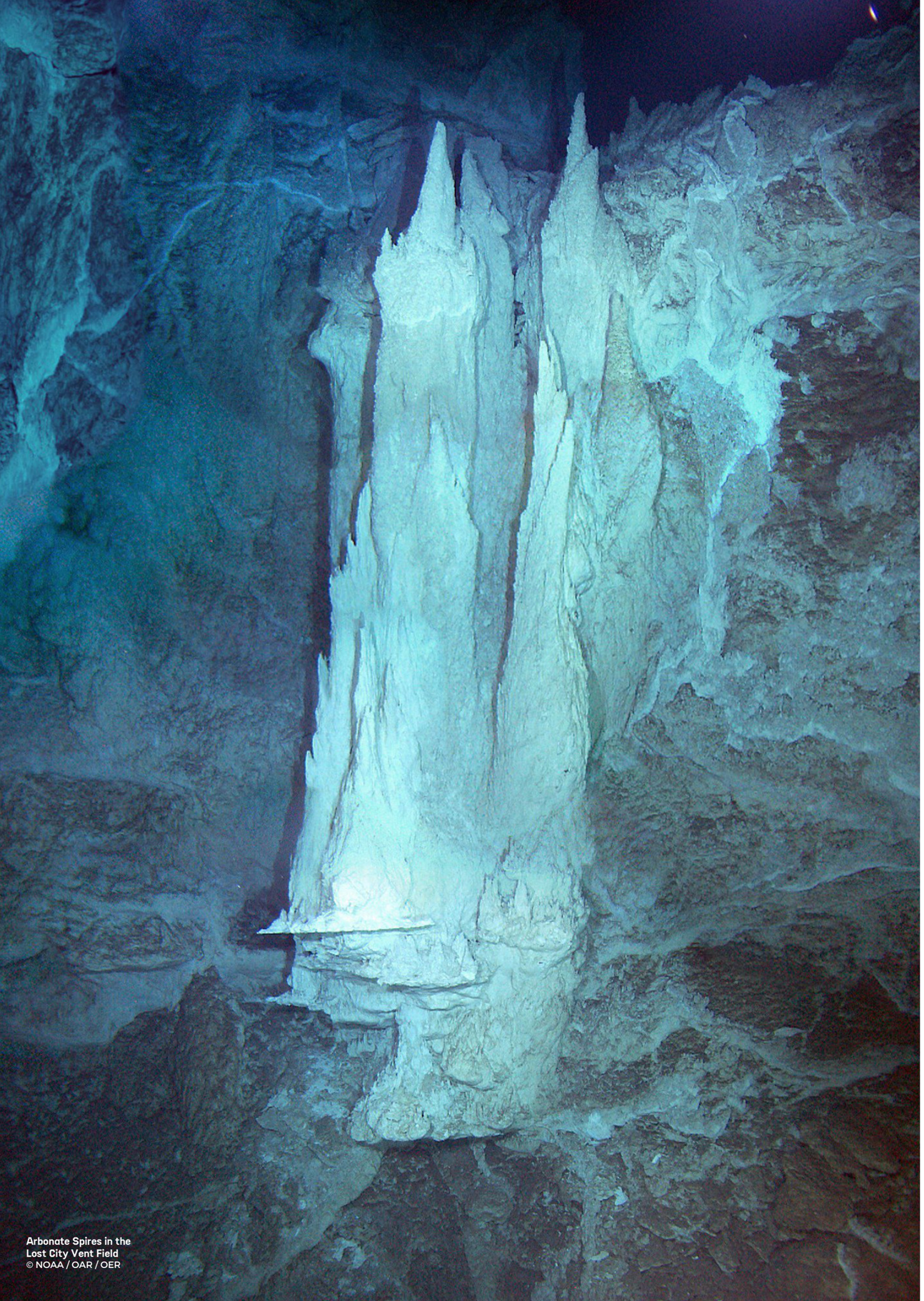
Seafloor massive sulphides around hydrothermal vents

The underwater spires and chimneys of hydrothermal vents were only discovered in the 1970s. The expedition crew that uncovered the presence of vents did even not include a biologist, because nobody thought that marine life could flourish in the extreme environment being investigated.[37] In fact, hydrothermal vents are thriving with life, with around 85% of endemic species found nowhere else in our oceans. Such is their biodiversity that scientists have been able to describe an average of two new vent species for every month in the 25 years since their discovery, including human-sized tubeworms (*Riftia pachyptila*) and the yeti crab (*Kiwa spp.*) that live at depths of 2,600m around vents in the Antarctic Ocean.

These venting chimneys can offer scientific clues to life-forming processes and life on Earth may have originated at hydrothermal vents. Alkaline hydrothermal vents have attracted the interest of NASA, which is keen to study vents to identify chemical signatures that might indicate the possibility of life elsewhere in the solar system.[38]

Despite this growing awareness of the importance of hydrothermal vents, the deep sea mining industry is looking to extract valuable minerals from the seafloor massive sulphide deposits that make up vent chimneys and the associated rubble around them. Nautilus' Solwara-1 project, which was aiming to be the first commercial-scale deep sea mining operation, was targeting hydrothermal vents in Papua New Guinea's waters.[39]

Scientists have warned that as globally rare habitats, hydrothermal vents should be protected, especially in light of our low levels of understanding of the variation of marine life between vent sites – which draws into serious question the ISA's attempts at environmental management on a regional scale.[40] Mining at hydrothermal vents is "predicted to include loss of biological diversity resulting from direct habitat destruction and modification of vent fluid geochemistry",[41] while the International Council for the Exploration of the Sea has highlighted that, "endemic organisms that have been found at vents are particularly at risk from habitat loss and localised extinction with mining activities, as they are expected to remove all large organisms and suitable habitat in the immediate area".[42] Recent research on connectivity between vents also suggests that destroying a discrete community could impact on vents nearby.[43]



Arbonate Spires in the Lost City Vent Field
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CASE STUDY
THE LOST CITY

One of the most iconic battlegrounds for the developing deep sea mining industry is the Lost City Hydrothermal Field, “a treasure of the deep sea”[44] located in the middle of the Atlantic.

Discovered in 2000 during a National Science Foundation expedition to the Mid-Atlantic Ridge by the research vessel Atlantis, the Lost City has elicited much excitement in the scientific community as the extreme conditions that characterise this hydrothermal vent field have never been seen before in the marine environment.[45] Named for its spectacular array of actively venting, chalky chimneys that resemble an abandoned metropolis, as well as the Atlantis research vessel that discovered it, and its location near the Atlantis Massif seamount and Atlantis Fracture Zone, the Lost City is packed with unusual life forms.[46, 47]

The Lost City is a ‘white smoker’, the result of sea water reacting with magnesium-rich mantle rock that is 1.5 million years old. The reaction releases heat and dissolves some of the minerals in the rock to form hot, alkaline water which can reach 90°C and pH 9-10.8. This rises from fractures in the sea floor and is visible as white plumes. When this hot water, rich in calcium, methane and hydrogen mixes with cooler sea water, it results in carbonate precipitation and the growth of tall chimneys, graceful pinnacles, fragile flanges and beehive-shaped deposits.[48] The core of the Lost City Hydrothermal Field is dominated by Poseidon, an active chimney which towers 60m above the seafloor and is 15m in diameter at its top, making it the largest vent structure discovered so far. Dating shows the Lost City to be the most long-lived submarine hydrothermal system known in the world’s oceans, with carbon dating indicating that venting has been ongoing for at least 30,000 years with individual chimneys active for at least 300 years, and modelling results suggesting that the system could remain active for up to one million years.[49]

The carbonate chimneys of the Lost City are packed full of microbes, their porous interior walls harbouring biofilms dominated by a single phylotype of archaea (microbes that have no cell nucleus) which subsist on hydrogen and methane; whereas the outer walls of the chimneys, where the chemistry is different, are crammed with bacteria which oxidise sulphur and methane to produce energy.[50] The large surface area and highly sculpted forms of the Lost City structures provide multiple pores, cracks and crevices for small creatures to make their home, though many have transparent or translucent shells making them difficult to see with a remotely operated vehicle. Several species of gastropod and amphipod dominate the active chimneys, while rarer, larger animals include crabs, shrimp, sea urchins, eels and a diverse array of corals. A 2005 assessment at the Lost City shows that approximately 58% of the fauna are endemic.[51]

Due to its rarity and importance, the Lost City has been recognised by the international community as an Ecologically and Biologically Significant Area (EBSA) under the Convention on Biological Diversity, and UNESCO recognised its outstanding universal value when identifying potential World Heritage Sites in the high seas.[52] Yet in February 2018, the ISA issued the Polish government with an exploration licence in a 10,000km^2 area that includes the Lost City and overlaps with the EBSA.[53]

The bid was reportedly driven by Poland’s then Deputy Minister of the Environment and Chief National Geologist, Mariusz Orion Jędrysek, who tried unsuccessfully to kickstart hydraulic fracturing, or fracking, for shale gas in Poland – and who in July 2018 became president of the ISA Assembly.[54] The Polish Ministry of the Environment told reporters that investment in exploring this region for mining potential will come from the state budget and a national environment fund (NFOŚiGW).[55] Yet NFOŚiGW officials have not, as of spring 2019, received any information or proposals for co-financing this project.[56]

Scientists have warned that any mining risks destroying this unique ecosystem before it is properly understood. Some have suggested that the precautionary approach be applied so the environment is protected where there is scientific uncertainty and all active vents protected from both direct and indirect mining impacts on account of their vulnerability, their individual and potentially equal importance, as well as their outstanding cultural and scientific value to all humanity.[57, 58]

Rafał Janica from the Polish Geological Institute has described the Lost City as the “holy land for ecologists”,[59] while Professor Gretchen Früh-Green, who was part of the team responsible for its discovery, has highlighted the Lost City’s significance for understanding processes in early Earth. She warns that, “It’s our history, it’s the Earth’s history, and if we perturb it we don’t know how fast it will recover, or what influence the perturbation would have on ocean chemistry.”[60]

According to the High Seas Alliance – a partnership of nearly 40 organisations and groups advocating for a strong Global Ocean Treaty – the allocation of an exploration licence covering the Lost City “illustrates a lack of coordination across ocean governance frameworks, which limits the ISA’s ability to take decisions that are consistent with the precautionary and ecosystem-based approaches.”[61]

Polymetallic nodules on abyssal plains

Vast expanses of abyssal plains lie at depths between 3,000m and 6,000m. While biomass of the abyssal plains is thought to be relatively low, biodiversity there is high. As well as supporting a plethora of microbes, the abyssal plains are home to a multitude of small invertebrate organisms living in or burrowing through the seabed, including nematodes, polychaete worms, crustaceans and molluscs. One of these specially-adapted creatures is a transparent anemone (*Losactis vagabunda*) that tunnels its way through sediment and can eat worms six times its own mass.[62] Another is the 'zombie worm' (*Osedax spp.*), discovered in 2002, which feeds on whale carcasses that have sunk to the ocean depths by releasing an acid capable of dissolving bones. Larger animals living on the abyssal plains include sea cucumbers, brittle stars and urchins.[63]

These deep-water plains also host polymetallic nodules, comprising manganese and iron among other metals. These potato-like nodules form over millions of years, growing to 4–10cm in diameter. Research suggests a correlation between the presence of nodules and species like black coral that are used to indicate vulnerable marine ecosystems, which need protection.[64] Nodules are the focus of the majority of exploration contracts granted by the ISA to date. According to experts, mining these nodules "will do substantial damage to that local environment on the seabed, and that is pretty much unavoidable",[65] and could result in significant habitat loss and the extinction of unique species found nowhere else in our oceans.

The physical recovery of manganese nodules takes millions of years,[66] and we do not know if creatures dependent on nodules can recover after their removal. Researchers who returned to the site of experimental extraction of nodules from the Clarion-Clipperton Fracture Zone (CCFZ) found that tracks made by mining vehicles were still clearly visible 26 years later, and there were fewer and less diverse communities than in undisturbed areas close by.[67] This has led to warnings that mining the deep sea for nodules "could potentially lead to an irreversible loss of some ecosystem functions".[68] A representative of Lockheed Martin subsidiary UK Seabed Resources, which holds the UK contracts in the Pacific, conceded that this study found "extinction within the mining area" for certain organisms, despite presenting this as a "mixed picture" to a parliamentary hearing.[69] A single 20-year mining operation in the CCFZ for polymetallic nodules is expected to directly impact an estimated 8,500km^2 of seabed.[70]

Cobalt-rich crusts on seamounts

Seamounts are undersea mountains rising over a kilometre from the seabed, and have been described as oases because of their highly diverse wildlife. They channel nutrients to surface waters where they support

Humpback whale, Indian Ocean
© Paul Hilton / Greenpeace

the growth of corals, anemones, feather stars and sponges. Volcanic in origin, seamounts also support turtles, cetaceans and fish for feeding, and are used as waypoints by some migratory species. For example, humpback whales migrating from the breeding areas around New Caledonia to the Antarctic may use seamounts along their migration route as foraging areas.[71]

Scientists have recommended that seamounts be classified as vulnerable marine ecosystems[72] and put off limits to trawling, after documented declines in faunal biodiversity, cover and abundance, on seamounts targeted by deep sea fisheries. Deep sea mining is likely to be even more damaging, by destructively removing parts of the crust (top) of the seamount in pursuit of cobalt. There is still much to discover about seamounts, with only about 0.002% of the seamounts that scientists estimate exist having been surveyed.[73]

While no exploitation is yet licensed in the international Area, the exploration licences already granted do allow contractors to potentially carry out 'test mining' at the seafloor that will have environmental impacts. At a recent industry conference, a supply chain company boasted that its sampling system technology for polymetallic nodules enables contractors to stay below the threshold for an environmental impact statement, by alerting them in real-time when impacts are close to reaching the 10,000km^2 surface area that requires this assessment.[74]

Broader ocean impacts

Machines cutting and collecting on the seafloor will create sediment plumes, potentially smothering seafloor habitats for kilometres around the mining site. Surface vessels would discharge smothering and potentially toxic plumes into the water column, spreading water containing suspended particles – which could impact on a far greater range of ocean species beyond deep sea creatures. Depending on where plumes are released, this pollution could travel hundreds or even thousands of kilometres.

Noise generated by machinery also risks harming and disturbing marine mammals and other marine creatures, including causing temporary or permanent damage to hearing, while artificial floodlighting of operations could cause permanent disruption to sea creatures adapted to very low levels of natural light in the deep ocean.

Unknowns of deep sea make responsible risk mitigation impossible

A research group stated in 2018 that managing the risks of commercial deep sea mining is not possible, from either a financial or ecological perspective.[75] In addition to these known threats, the significant gaps in scientific understanding make it incredibly difficult to carry out effective baseline and impact assessments for the deep sea. The deep ocean makes up more than 95% of the habitable space on the planet, but only around 0.0001% of the deep seafloor has been investigated.[76] Biologists discover new species on nearly every expedition into the depths; elusive beaked whales and yeti crabs have only been discovered within the last 20 years. There is still much to learn about the chemical, physical and biological processes within the deep sea and their relevance to the health of our oceans more generally, as well as how they are affected by growing climate change and ocean acidification. Pursuing mining risks disturbing deep sea habitats irreparably before we fully understand what is down there – and makes it irresponsible to claim that safe management is possible. Scientists have warned that, "it is impossible to predict genetic or demographic connectivity for species that have yet to be described".[77] We are also only beginning to learn about the role of the deep sea in sequestering and storing carbon.

The need for governments to take a precautionary approach to deep sea mining exploration was underlined by the Seabed Disputes Chamber of the International Tribunal for the Law of the Sea, whose Advisory Opinion in 2011 found that governments sponsoring contracts for nodules and sulphides exploration have a direct obligation to apply a precautionary approach in case of "threats of serious or irreversible damage", and that this "applies in situations where scientific evidence concerning the scope and potential negative impact of the activity in question is insufficient but where there are plausible indications of potential risks".[78]

Why does this matter for humans?

Beyond the intrinsic value of seas thriving with diverse life, healthy oceans play an integral role in the global carbon cycle and are essential to guaranteeing food security and livelihoods for billions of people worldwide. Deep sea mining risks disrupting fisheries by disturbing habitats, polluting the water column and interfering with the ocean food chain. The UK Subsea Mining Capability Statement April 2017, released under Freedom of Information, notes that, "The activities involved in subsea mining could have detrimental impacts on localised populations as well as an impact on world oceans through the potential extinction of unique species which form the first rung of the food chain."[80] Scientists have warned that, "Communities that rely on fish stocks for subsistence could be particularly vulnerable to the impacts of seabed mining."[81] Fishing sector stakeholders such as the Long Distance Fleet Advisory Council of the EU have called for a moratorium on deep sea mining in international waters, "given the serious concerns expressed by scientists and representatives of the civil society, and the likelihood of negative and potentially severe impacts of deep-sea mining on fisheries and fish species, other marine species and the marine environment".[82]

Medical researchers have also issued warnings that deep sea mining could interfere with marine genetic resources found in the deep ocean; there is growing interest in prospecting these for potential use in medicines, for example as new antibiotics or drugs to tackle cancer.[83]

Mining poses an additional climate risk of releasing carbon stored in deep sea sediments and of disrupting the natural processes that add to those stores. Deep sea sediments are known to be an important long-term store of 'blue carbon', the carbon that is naturally absorbed by marine life, a proportion of which is carried down to the sea floor as those creatures die. Scientists have warned that deep sea mining could physically disturb the sediment, disrupt carbon sequestration and re-suspend stored carbon into the water. Deep sea mining therefore risks affecting the longevity and rate of carbon burial in deep sea sediments,[84]

"We remain largely ignorant of how deep-ocean ecosystems change in response to human activities and natural variations, and of the consequences of these changes. It is reasonable to assume that recovery periods are likely to be decades long, and that at least in localized areas, these ecosystems may never recover."
– Then ISA Deputy Secretary-General Michael Lodge [79]

while research suggests that hydrothermal vents, one of the focuses for the mining industry, could be globally important for distributing organic carbon to deep sea sediments.[85]

The UK government, despite holding licences covering more of the international seabed than any government apart from China, has acknowledged these threats, describing how the deep sea habitats considered for mining "provide ecosystem services, such as nutrient cycling and carbon dioxide storage, which have far reaching benefits in terms of climate regulation and food production".[86] In fact, its Ministry of Defence lists "Uncontrolled seabed mining destabilises marine ecosystems" as a marker of its worst-case future "fragmentation" scenario, in its most recent Global Strategic Risks report.[87]

World-renowned conservationists have also voiced strong concerns about opening up the seabed to mining. David Attenborough described the prospect of deep sea mining as "heartbreaking" and "so deeply tragic… that humanity will just plough on with no regard for the consequences because they don't know what they are".[88] In the recently aired Blue Planet Live, Chris Packham warned, "If we don't treat the ocean with care, what could we lose before we even know it's there?" Oceanographer Sylvia Earle has described deep sea mining as a "land grab" and asked, "What are we sacrificing by looking at the deep sea with dollar signs on the few tangible materials that we know are there? We haven't begun to truly explore the ocean before we have started aiming to exploit it."[89]

In April 2018, 50 NGOs from across the globe called on the ISA to debate fundamental questions about the need for deep sea mining and its long-term consequences for the planet and humankind.[90] The group urged the ISA to undertake a full assessment of more sustainable alternatives and ensure the findings are fed into the debate in an open and transparent manner. In the meantime, they said, the ISA should stop granting contracts for deep sea mining exploration and should not issue contracts for exploitation.

There is also growing political momentum against the pursuit of deep sea mining. In January 2018, the Azorean government highlighted unacceptable risks in response to Portugal's consideration of Nautilus' bid to mine in Azorean waters, telling a debate at the European Parliament, "With science, with clarity and with participation, our position might change but – for now – deep-sea mining? No, thank you."[91] This followed a call from the European Parliament for an international moratorium on deep sea mining,[92] while in the UK, a cross-party committee of MPs which gathered evidence from industry as well as scientists and conservationists concluded that, "Deep sea mining would have catastrophic impacts on habitats and species on seafloor sites and there is little evidence that mitigation measures such as setting aside areas of the seabed will work to mitigate the damage."[93] More recently, the former president of the ISA Council and Assembly, and now UN Special Envoy for Oceans, Peter Thomson, cited calls for a 10-year moratorium on deep sea mining to coincide with the UN Decade of Ocean Science (2020–30), posing the question: "Why wouldn't we give that decade its full run before we start even thinking about disturbing the seabed of the high seas? We are talking a moratorium [on deep sea mining] of 10 years in that case."[94]

"What are we sacrificing by looking at the deep sea with dollar signs on the few tangible materials that we know are there? We haven't begun to truly explore the ocean before we have started aiming to exploit it." – Sylvia Earle, Oceanographer

Plant life of the Azores sea bed
© Greenpeace / Gavin Newman

Asia's largest lead and zinc mine in China
© Greenpeace / Ke Lin

INDUSTRY ATTEMPTS TO OWN THE FUTURE

The deep sea mining industry has already identified that environmental concerns, especially the destruction of endemic ecosystems, are significant blocks to progress. UK Seabed Resources acknowledged, for example, "the principal risk is that the collection of polymetallic nodules from the seabed is either environmentally or commercially not viable",[95] while minutes of a UK deep sea mining stakeholder meeting in 2016, released following Freedom of Information requests from Unearthed, Greenpeace UK's investigative news platform, states that, "All agreed that environmental concerns are the biggest blocker to progress."[96]

The deep sea mining industry appears to have resolved to gain political acceptability for its significant environmental costs by framing the industry as essential for the development of a low-carbon, high-tech future. Echoes of the *modus operandi* of the oil industry are clear: an early awareness of potentially catastrophic environmental outcomes from its operations, coupled with a strategy of developing under the public's radar until the industry has successfully persuaded politicians that it is essential for economic prosperity. For example, Gerard Barron, CEO & chairman of mining company DeepGreen Metals, told governments: "Personally, I get very uncomfortable when people describe us as deepsea miners. At DeepGreen, we don't think of ourselves as developing a mining business. We are in the transition business – we want to help the world transition away from fossil fuels with the smallest possible climate change and environmental impact. This is the global public good we hope to create."[97] Former Nautilus CEO Mike Johnston was quoted as describing it as "inevitable that we will eventually recover essential resources from the seafloor" given the presence of "metals essential for the green economy".[98] Global Sea Mineral Resources (GSR), the deep sea exploratory division of Belgian company DEME, has recently approached organisations working on climate change, with its briefing note reading: "As we work towards a decarbonised economy, demand for rare minerals is increasing exponentially and inexorably. GSR recognises that satisfying that demand through terrestrial mining is untenable and will irreparably damage our planet... The deep-sea presents a viable alternative to this." UK Seabed Resources has also presented its interest in deep sea mining in terms of securing supply for "clean energy applications such as electric vehicles".[99]

The deep sea mining industry's purported striving for a low-carbon future belies an extremely selective approach to concern for environmental sustainability, and is riding on the back of a serious and ongoing discussion about resource needs for renewables storage and electric vehicle batteries to push its own narrow financial interests. These claims in the deep sea mining industry's political and public communications have not been substantiated or endorsed by low-carbon industry players from the renewable energy, electric vehicles or batteries sectors. Indeed, some major battery manufacturing companies like Tesla and Panasonic have committed to phasing out cobalt, one of the target metals for deep sea mining, over the coming decade.[100]

The Institute for Sustainable Futures (ISF) concluded in its 2016 report on renewables and deep sea mining that, "A transition towards a 100% renewable energy supply – often referred as the 'energy revolution' – can take place without deep-sea mining. Even with the projected very high demand growth rates under the most ambitious energy scenarios, the projected increase in cumulative demand – all within the range of known terrestrial resources – does not require deep-sea mining activity."[101] The One Earth Climate Model launched in 2019 also demonstrates global transition pathways to 100% renewable energy that are compatible with the Paris Agreement's limit of a 1.5°C temperature rise and do not open up new frontiers for metal or mineral extraction, relying much more on recycling and resource-efficient design.[102]

The UN has warned of the risks of continued resource exploitation and has called for a transformation to a sustainable economy, including reducing use of raw materials, recycling and a circular economy,[103] while the Deep Sea Conservation Coalition (DSCC), a coalition of over 80 NGOs, has also noted that in order to keep in line with the UN 2030 Agenda, the priority global approach to the consumption of mineral resources should be one of sustainability, reuse, improved product design and recycling of materials.[104] This focus on redesign, reduction of demand, and reuse, rather than further extraction, also counteracts the deep sea mining industry's attempts to narrow the debate to a false dichotomy between continuing to source lithium-ion battery metals from existing terrestrial sources, where workers and surrounding communities often suffer human rights abuses, and opening up a new mining frontier in the deep ocean that risks widespread environmental destruction.

Defending human rights and conserving the environment in order to provide clean air, food security and climate protection are intrinsically linked; yet the activities of extractive industries worldwide have undermined both. Indeed, marine geochemist Professor David Cronan, from Imperial College London, has questioned the positioning of deep sea mining as a replacement for terrestrial mining, telling the Financial Times, "Deep sea mining will never put land mining out of business but I think the two will develop in tandem."[105] In other words, deep sea mining would add to, rather than replace, terrestrial mining. To overcome the human rights abuses and environmental destruction

within the extractive industries, governments and industry must urgently step up efforts to address the nexus of resource extraction and consumption, human rights and environmental impacts.

Human rights organisation Amnesty International has also called out this disingenuous dilemma, acknowledging that the projected demand for cobalt, manganese and lithium has led to growing interest in deep sea mining but affirming that "[c]ompanies who overlook human rights concerns as they clean up their energy sources are presenting their customers with a false choice; people or planet. This approach is gravely flawed."[106] Amnesty, which is collaborating with Greenpeace USA to identify and map human rights and environmental impacts throughout the battery lifecycle, including critical points of intervention needed to produce an ethical battery, recently issued a call to electric vehicles and electronics companies to act on human rights *and* the environment in their battery supply chains, putting the onus on industry leaders to use their "resources and expertise to create energy solutions that are truly clean and fair" rather than compromise on either fundamental rights or planetary health.[107]

As the lead author on the 2016 ISF report and global renewable energy expert, Dr Sven Teske, commented more recently "[t]he responsible materials transition will need to be scaled up just as ambitiously as the 100 percent renewable energy transition."[108] His statement accompanied the launch of a 2019 study for Earthworks that highlighted how "[r]ecycling of metals from end-of-life batteries was found to have the greatest opportunity to reduce primary demand for battery metals, including cobalt, lithium, nickel and manganese,"[109] which in conjunction with more "responsible sourcing are the key strategies to promote environmental stewardship and the respect of human rights in the supply chain".[110] With only 20% of the close to 50 million tonnes of e-waste produced annually,[111] the debate over deep sea mining cannot be separated from wider discussions on resource use and consumption in the future. Ultimately, the serious discussion that needs to take place about resources for a low-carbon and high-tech future cannot be reduced to a narrow and baseless interpretation of economic or technological needs, which by all appearances is simply serving the business interests of the deep sea mining industry.

Electronic waste in Beijing
© Greenpeace / Yan Tu

LACK OF ADEQUATE PROTECTION FROM THE ISA

Deep sea mining in the global ocean is regulated by the International Seabed Authority (ISA), a UN body. However, key gaps in the ISA's mandate and structure, and its failures in practice to adequately protect unique and important marine biodiversity, demonstrate that the status quo of ocean governance is not capable of protecting the oceans for future generations.

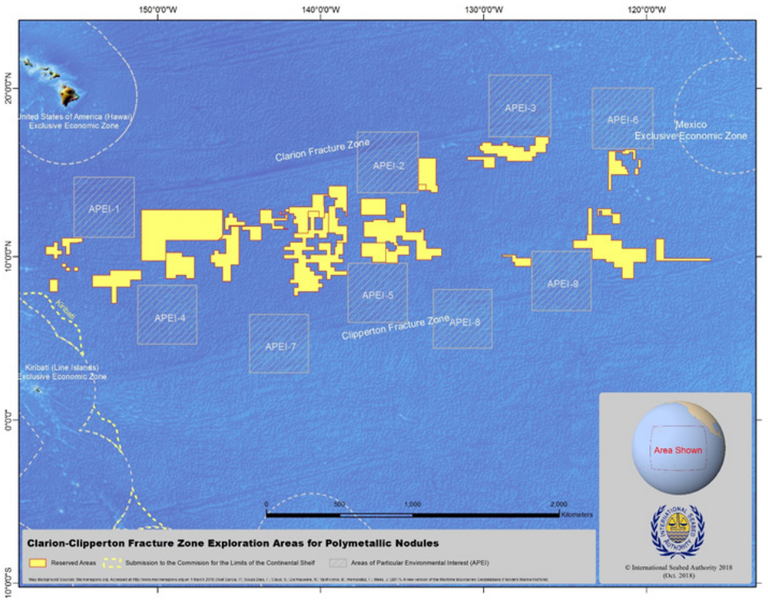
Gaps in governance

The ISA has no mandate to protect deep sea environments from cumulative stresses – whether from other industrial pressures, such as bottom trawling, or from cross-cutting threats associated with climate change and plastic pollution, evidence of which has been found even in the deepest ocean trench.[112] It also has no capacity to protect marine life in the rest of the water column, which could be threatened from toxic plumes, noise and light pollution as a result of deep sea mining. Activities impacting the seabed cannot be responsibly managed without consideration of the overlying waters or of other stressors such as ocean acidification, climate change and pollution.[113] Right now, in the absence of a Global Ocean Treaty, only around 1% of international waters are properly protected from multiple industrial activities through ocean sanctuaries.[114]

Patchy protection

The ISA does place areas off limits to mining, designating Areas of Particular Environmental Interest (APEIs) surrounding a mining site. However, the majority of the APEIs in the Clarion-Clipperton Fracture Zone (CCFZ) were finally designated in areas that "avoid conflict with exploration contracts" rather than in the zones originally recommended by scientists for marine conservation.[115] This history, and the granting of multiple exploration contracts in areas of high biodiversity, casts considerable doubt that the ISA will place a fully representative system of ecologically coherent areas off-limits to mining across the global oceans.[116]

Moreover, scientists have raised concerns over the lack of knowledge about how effective these no-mining areas will be in conserving marine life. Professor Mills from the University of Southampton told British MPs "[w]e do not know whether they are big enough to be useful for recolonisation of the potentially mined sites, and we do not even know what timeframe those ecosystems are reproducing on. We do not even know what role the half substrate of the manganese nodules holds for the life cycle of those organisms living near the seafloor. There are so many unknowns that to start this process not knowing how big, how interconnected, and how long do you need to do this for would be very dangerous."[117] The high levels of unique species at some of the seafloor ecosystems being eyed up for future mining also raises the question: is representative protection even possible for endemic species found nowhere else in the oceans?



Right: APEIs designated in the Clarion-Clipperton Fracture Zone
© ISA 2018

Left: Bird's eye view of the International Seabed Authority 24th Council, March 6 2018
© Francis Dejon, IISD/ENB

Furthermore, APEIs cannot protect parts of the seabed against any of the other human pressures facing the deep ocean. The Royal Society has emphasised that, "environmental sustainability... relies on consideration of the combined influence on ecosystems of multiple activities, such as cable laying and fishing, in addition to deep-sea mining".[118] Nor do the ISA's Regional Environmental Management Plans (REMPs) consider cumulative stresses, and last year, scientists called the Pacific REMP out of date after just six years, in light of new scientific discoveries about the deep sea.[119] The ISA's means to deliver area-based management are therefore no substitute for highly protected 'marine protected areas', also known as marine reserves or ocean sanctuaries, which protect marine life from multiple direct impacts by putting areas of ocean off-limits to industrial activities. The Global Ocean Treaty under negotiation at the UN would be the only forum for governments to put in place comprehensive protection for marine life from the cumulative stresses facing the oceans.

Overriding protection in practice

In practice, the ISA has already granted exploration contracts covering some of the great wonders of the deep ocean. The Lost City for example, discussed above and recently featured in the BBC's Blue Planet II, is a spectacular array of actively venting chimneys which may hold clues to the evolution of life. This hydrothermal vent field has been classified as an Ecologically or Biologically Significant Marine Area (EBSA) under the Convention on Biological Diversity, meeting and rating highly on criteria for uniqueness or rarity; special importance for life-history stages of species; vulnerability, fragility, sensitivity, or slow recovery; and biological productivity, biological diversity, naturalness.[120] The Lost City was also identified by UNESCO as meeting World Heritage status criteria, placing it alongside the Pyramids of Giza, Machu Picchu and the Great Barrier Reef.[121]

Yet in February 2018, the Lost City was included in an area of the Mid-Atlantic Ridge covered by an exploration contract granted by the ISA to the Polish government. During the ISA discussion on this licence application, WWF highlighted concerns about the ISA granting an exploration licence in an area recognised as ecologically important under the Convention on Biological Diversity.[122] A Chinese exploration contract on the South West Indian Ridge also meets the criteria for an EBSA, with a research expedition discovering previously undescribed animal species that had not been found anywhere else on Earth.[123] While EBSAs do not offer legally binding protection, these examples demonstrate the ISA's failure to coordinate with other international bodies to deliver effective environmental protection, despite its claims when addressing the UN negotiations for a Global Ocean Treaty that, "cooperation is occurring on a frequent basis and within the existing legal frameworks".[124]

Indeed, there has been widespread criticism of the environmental impact assessment (EIA) process within the ISA.[125] EIAs are carried out by mining companies and not independently verified,[126] with their substance therefore largely at the discretion of the company. Furthermore, the ISA has inadequate provisions on what to do once EIAs have been received, including how they are reviewed or revised, and there is lack of clarity over what, if any, actions or monitoring are required to address adverse impacts identified by the EIA. For example, EIAs are not passed on to the decision-making body, the ISA Council, so therefore cannot underpin permits granted for contractor activities.

Designed to mine

Despite mining companies[127] and ISA officials making frequent reference to a precautionary approach,[128] the ISA's requirement for evidence of harm has been criticised as contradicting the precautionary principle, a central tenet of international environmental law.[129] ISA exploration regulations state that "[p]rospecting shall not be undertaken if substantial evidence indicates the risk of serious harm to the marine environment",[130] which reverses the precautionary burden of proof and lacks clear definitions of what constitutes "substantial evidence" or "serious harm". Ocean explorer Dr Jon Copley has described this as a "fundamental lacuna" between the ISA and the global nature convention (the Convention on Biological Diversity).[131] Indeed, the ISA Secretary-General's flexible interpretation of proactive conservation has led him to claim that "the default position is that the seabed is off limits to mining except where expressly permitted by the Authority following a rigorous approval process".[132] It is worth noting that, to date, the ISA has never turned down a licence application.[133]

Specific provisions in the ISA set-up have been geared more towards exploitation than protection. Archive documents show that mining giants were lobbying governments in the 1980s to ensure that the UN Convention on the Law of the Sea "should contain a bias in favour of mining production".[134] At the ISA, which manages deep sea mining under the Law of the Sea, the 'two year rule' means that any government has to be allowed to start deep sea mining within two years of putting in a request, abiding by whatever rules are in place at that time.[135] While this 'nuclear option' has never been triggered, as advancements are made in technological capacity for mining the deep sea, the temptation for governments who have invested heavily in capital costs to reap a profit will increase. This fundamental bias towards exploitation at the heart of the ISA means not much stands in the way between fragile deep sea ecosystems and their potential destruction.

Lack of oversight

The ISA's institutional framework also deprioritises responsible environmental management. Having failed to heed calls for the establishment of a scientific or an environmental committee,[136] environmental considerations are made by the powerful yet secretive Legal and Technical Commission (LTC). This is dominated by geologists, with only three of its 30 members holding biological or ecological expertise.[137] Meeting behind closed doors, the LTC keeps key information about what is being found by contractors in the deep sea confidential – including information about compliance failures.[138] The ISA has long promised that environmental data will be uploaded to a public database, but this has failed to materialise.[139] This is notwithstanding that the ISA only requires the collection of environmental information in the licence area,[140] clearly exposing its fundamental limits in not having the mandate to deal with plumes or pollution that extend into the wider ocean. This exemplifies the shortcomings of the current fragmented governance of the ocean, which a strong Global Ocean Treaty could help to overcome.

The LTC is also the only part of the ISA to see contractors' annual reports on their exploration activities. It provides a summary of these reports to the ISA Council, the decision-making body. However, these summaries are usually limited to a single paragraph; they may vaguely speak of violations, but provide no detail. Council members have complained that they need more information to underpin robust decision-making, especially over whether to allow contractors who are repeat offenders in flouting regulations to mine in future.[141]

This lack of transparency means that even governments that hold exploration licences may not be alerted that the company they have contracted is failing to comply with rules and safeguards when carrying out exploration activity. While sponsoring governments are supposed to have national annual reviews, this is not happening across the board. Ineffective control measures in draft exploitation regulations would also allow mining companies to change their sponsoring state and to pledge, or mortgage, their contracts – rendering selection of contractors and the sponsoring State's controls all but meaningless. Contractors are also reportedly pursuing and funding government applications for ISA licences; according to the World Bank, "DeepGreen prepared and funded Kiribati's application in return for an off-take agreement" in the CCFZ.[142] The application was granted, but the agreement has never been released.

Industry self-reporting and self-regulation is therefore prioritised. The current draft regulations give the contractor, not the ISA, the task of drafting and revising their own environmental documents and conducting their own assessments.[143] This reliance on self-reporting by an industry intent on reaping back high up-front costs is completely inadequate, particularly where the activity would be thousands of metres below the surface.

The ISA's cosy relationship with industry was starkly apparent at an ISA Council meeting in spring 2019, when two companies were permitted to speak on behalf of governments: first DeepGreen, speaking from Nauru's seat;[144] then the President of Global Sea Mineral Resources, taking the floor on behalf of Belgium.[145]

A vested interest for ocean exploitation

Cross-party British MPs have also raised concerns over "a clear conflict of interest" that the ISA, as the body that is supposed to regulate the industry, "stands to benefit from revenues".[146] There is even provision for the ISA to become, in effect, a mining company itself, carrying out deep sea mining on behalf of humanity as "the Enterprise".[147] How revenues from mining would be allocated to benefit the whole of humankind, as legally required, is as yet unresolved – notwithstanding the issue of the risks posed by deep sea mining to our global commons and unique ecosystems that have high endemic biodiversity and are essential for limiting climate change.

This tension inherent in the ISA "acting as poacher and gamekeeper"[148] has worsened with the increasingly pro-mining comments of ISA Secretary-General Michael Lodge, raising questions as to whether the ISA can be an impartial regulator.[149] Lodge argues that "mining and metals are essential to achieving the UN's 2030 sustainable development goals".[150] This is despite strong counter-claims that deep sea mining would undermine progress to SDG 12, which aims to ensure sustainable consumption and production patterns, as well as SDG 14, which aims to conserve and sustainably use the oceans, seas and marine resources for sustainable development.

The ISA is lobbying for a weaker Global Ocean Treaty by insisting that its competence to regulate mining in the seabed in areas beyond national jurisdiction should not be challenged by a comprehensive regime to deliver protection from cumulative impacts. At the first round of formal negotiations for the treaty in September 2018, the ISA told delegates that it has the "exclusive mandate" to regulate access to the Area (international seafloor);[151] in fact, it has no mandate over deep sea fisheries, such as bottom trawling, or the extraction of marine genetic resources. It is therefore incapable of managing the cumulative impacts facing the deep sea and the marine life whose fate is intrinsically linked to deep sea activities.

The ISA also attempted to reassure delegates that the current system of ocean governance provides sufficient protection for wildlife – ignoring the widespread and accelerating declines of marine biodiversity, with only 3% of the ocean not significantly altered by human activity.[152] The ISA struck a negative tone against a comprehensive new treaty, telling governments, "We must be careful ... [that] we do not further fragment the law of the sea and act in a manner that is incompatible with the comprehensive and holistic approach adopted by the framers of the Convention."[153] At this spring's second round of negotiations, the ISA teamed up with the International Maritime Organisation (IMO) to deliver a joint statement defending "the existing legal framework," warning that "tampering with" the responsibilities currently held by sectoral bodies like the ISA and IMO "might open up more questions than answers for the effective conservation and sustainable use of marine biodiversity".[154]

Deep sea mining lays bare the shortcomings and failures of the current fragmented system of international ocean governance, which is failing to protect marine biodiversity from the cumulative pressures facing our oceans. We need a strong Global Ocean Treaty to overcome this patchwork of regional and sectoral bodies, from the ISA to Regional Fisheries Management Organisations, which are geared towards exploitation. The new Global Ocean Treaty under negotiation at the UN can shift this dynamic to put protection at the heart of global ocean governance. This will overcome the focus of existing sectoral bodies, like the ISA, on the short-term exploitation of and long-term damage to our global oceans.

Lion's Mane Jellyfish
© Alexander Semenov

CONCLUSIONS & RECOMMENDATIONS

The prospect of deep sea mining and its high environmental risks to unique ecosystems and deep sea carbon stores starkly illustrates the problems facing our oceans from industrial activity. The shortcomings and limitations of the industry's current regulator, the International Seabed Authority, exemplifies the disjointed, pro-exploitation governance status quo that is failing to provide adequate ocean protection. These two factors strengthen the case for a comprehensive Global Ocean Treaty that can create a network of ocean sanctuaries protected from cumulative pressures, and establish gold standards for Environmental Impact Assessments, taking into account the multiple threats facing marine ecosystems.

The ISA is designed to prioritise resource extraction, lacks expertise in protection, and its key Legal and Technical Commission meets behind closed doors; it is also unable to protect the seabed from cumulative threats beyond mining. As with any other international organisation, if enough governments prioritised environmental protection, this could better orientate the ISA towards conservation. However, there remain fundamental limitations in the mandate and design of the ISA, as with other existing regional and sectoral bodies managing activities on the high seas, which necessitate a strong Global Ocean Treaty to put protection at the heart of global ocean governance.

Governments seeking to better protect the oceans must pursue this agenda within the framework of a Global Ocean Treaty that enables the creation of a global network of ecologically coherent, representative ocean sanctuaries. Pursuing deep sea mining is at stark odds with governments' commitments to sustainable development for future generations, and undermines politicians' positioning as leaders on marine conservation.

To protect the ocean from overexploitation and the damage caused by the cumulative impacts of activities such as deep sea mining, and consistent with the precautionary principle and the ecosystem approach, Greenpeace calls for an immediate moratorium on deep sea mining, and recommends:

- **The establishment of a comprehensive network of marine reserves covering at least 30% of the world's oceans by 2030, where all extractive activities are prohibited**
- **Governments should agree a strong Global Ocean Treaty in 2020 that not only enables governments to create ocean sanctuaries across the global oceans, protecting marine life from multiple extractive activities, but also delivers global rules and high standards to protect marine life from the most damaging industries seeking to plunder the global oceans**

Now is the time to defend the deep ocean, putting this new frontier off limits to destructive industry. The deep ocean is the largest habitat on earth, and the least known. We should preserve and study it, not mine it.

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