01 | **FACT SHEET:** WHAT IS DEEP SEA MINING?

Canadian mining company Nautilus Minerals Inc. has staked its reputation on developing the world's first deep sea mining (DSM) operation. The Bismarck Sea in Papua New Guinea has been marked out as the testing ground for this unprecedented technology.

Many other companies – from Japan, China, Korea, the UK, Canada, USA, Germany, Australia and the Russian Federation – are waiting to see if Nautilus can successfully bring metals from sea floor to smelter before taking the plunge themselves. They've already taken out exploration licences covering over 1.5 million square kilometres of the Pacific Ocean floor. In addition, exploration licences now also cover vast areas of the Atlantic and Indian Ocean.

DSM exploration is occurring in the absence of regulatory regimes or conservation areas to protect the unique and little-known ecosystems of the deep sea. It is also occurring without meaningful participation in decision-making processes by the communities who will be affected by DSM. Furthermore, the limited scientific research conducted to date provides no assurance that the health of coastal communities and the fisheries on which they depend can be guaranteed.

Three forms of DSM have attracted the attention of companies – the mining of deposits of seafloor massive sulphides (SMS) also known as polymetallic sulphides, cobalt-rich crusts and polymetallic nodules. SMS are arguably the most alluring to miners with high concentrations of zinc, copper, silver, gold, lead and rare earths. The mining of SMS is also likely to be the most contentious causing the greatest environmental impact.

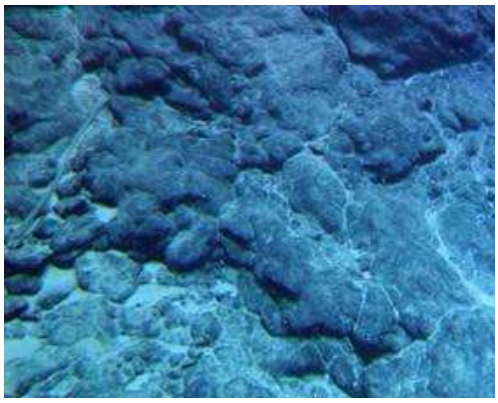
Polymetallic Sulphides

Hydrothermal vents, found on deep sea landforms called mid-ocean ridges and back-arc basins, support some of the rarest and most unique ecological communities known to science. Here organisms derive their energy from sulphide chemicals in extremely hot, mineralized vent fluids. Most species discovered at vents are new to science, and the vents support high concentrations of life forms relative to other deep-sea habitats.

Ecosystem Impacts: Mining of hydrothermal vents will result in direct and indirect impacts. Each mining operation would directly destroy thousands of hydrothermal vent formations and their unique ecosystems. Life forms destroyed may well be endemic, meaning that they only occur at the vent that has been mined and nowhere else. This alone should provide sufficient reason to not approve DSM projects. But there are many other risks such as the toxicity of metals that will be released into the ocean water potentially finding their way into the food chain contaminating the seafood eaten by local

communities and affecting fisheries of local, national and regional importance.[1]

Mining is also expected to alter the activity of the vents and the impacts of this are unknown but of high risk in seismically active areas such as the Bismarck Sea where Nautilus Minerals' Solwara 1 project is located.



Cobalt-rich Crusts

Cobalt-rich Ferromanganese crusts develop on rock surfaces in the deep ocean that are free of sediment. These are mainly on underwater mountains known as seamounts that build up very slowly at a rate of about 1 mm to 5 mm each million years. Crusts of economic interest occur at depths of about 800m to 2,500m on seamounts largely in the Pacific Ocean.

Ecosystem Impacts: Technologically, the mining of cobalt crusts is complex, and environmentally probably even more damaging than other forms of DSM. Cobalt crust mining would involve cutting 5-8 cm of the crust on the top of seamounts, and could thus have a significant impact on corals, sponges and other organisms. The sediment plumes created could also impact organisms some distance from the mining operations.

Polymetallic Nodules

Manganese nodules are formed from deposits of manganese and iron oxides. They also contain nickel, copper, and cobalt, as well as traces of other metals (notably rare earth elements) important to high-tech industries. Manganese nodules occur over extensive areas of underwater plains known as abyssal plains at depths of 4,000 m to 6,500 m. They grow extremely slowly: several centimetres every million years.

Ecosystem Impacts: The potential scale of the impacts of this type of mining is huge. In the central eastern Pacific alone, exploration leaseholds have been issued across several thousand kilometres between Hawaii and Mexico of the deep seabed in what is known as the Clarion-Clipperton Fracture Zone [See *03 | FACT SHEET: Where do they want to mine?].*

[1] See report: Out of Our Depth: Mining the Ocean Floor in Papua New Guinea, http://www.deepseaminingoutofourdepth.org/wp-content/uploads/Out-Of-Our-Depth-low-res.pdf