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Undersea mining – the new threat

Humankind has been mining on land for various minerals almost since civilization began. But as land-based minerals and fossil fuels become depleted and prices rise, the search for new sources of supply is turning to our sea floor. Seabed mining once was economically prohibitive but is now made possible through improvements in technology and increased prices, and both exploration and mining is on the increase. Of particular concern is the mining of mineral deposits on or near vulnerable marine ecosystems, such as the mining of sulphide deposits for copper, gold, zinc and silver near undersea hydrothermal vents, which harbor unique marine species and ecosystems.

Current undersea commercial ventures include Nautilus Mineral's Solwara 1 Project, in the Manus basin, mining for sulphide deposits near hydrothermal vents in the territorial waters of Papua New Guinea between the island chains of New Britain and New Ireland. Active hydrothermal vents, where new oceanic crust is formed from undersea volcanic activity, are known to occur in this area. In addition to the fragile life forms they support, these organisms could have yet undiscovered pharmaceutical and biotechnological applications.

Until the 1960s, little thought was given to the oceans as a source for exploitation of mineral resources. Then, manganese nodules found on the ocean floor were conceived to be potentially lucrative by mining companies and the United Nations established the International Seabed Authority (ISA) to regulate deep seabed mining under the UN Convention on the Law of the Sea (UNCLOS). In 1970, the UN General Assembly declared that the seabed beyond the limits of national jurisdiction and its resources are the common heritage of mankind. This was later incorporated in UNCLOS, together with measures aimed at protecting the environment.

However, these measures do not apply to the continental shelf, even though a State's continental shelf may extend up to 350 miles from its coast. Under the ISA, profits from

mining in international waters must be shared with developing countries. As a result of this, and also because of the fact that it is much easier to operate in shallower and more accessible waters, many private ventures choose to undertake mining operations on continental shelf areas within the exclusive economic zones (EEZs) of States. Since each coastal state has sovereignty over their continental shelf and EEZ, controls and regulation on undersea mining vary and are often weak and sometimes non-existent.

Off the coast of Papua New Guinea, the mining operations will focus on mining of sulphide deposits near so-called "black smokers"—undersea hydrothermal vents that spew water which may be as hot as 400°C. The sulphur from these waters supports extraordinary ecosystems which are the only known communities on Earth whose immediate energy source is not sunlight. It is thought that life on Earth may have formed in environments similar to these. The miners will use a strip-mining approach to mine the top 20 metres of the seafloor, using remotely operated underwater mine cutters and pumps to bring ore to the surface onto barges.¹ This cutting and pumping process can result in the release of considerable amounts of fine sediment into the water column—potentially a serious problem for vent organisms that feed by filtering the water in their habitat. Mining on and near these chimneys is likely to smother and contaminate these undersea communities about which we know so little. These biologically rich communities often include species not found elsewhere. Mining operations can also raise concentrated nutrients from the deep sea to the relatively nutrient-poor surface waters of the ocean, causing algal blooms and potentially contaminating waters that support Papua New Guinea's commercial fishing industry, as well as local subsistence fishers.²

There are significant gaps within UNCLOS' deep seabed regime, both because when the regime was negotiated in the early 1980s, little was known about life in the deep sea, and because the regime and its regulations are only applicable to areas beyond the continental shelf. Accordingly, activities taking place on a coastal State's continental shelf are not part of the regulations governing the regime. Further, there are no protected areas in the deep ocean where VMEs may be present, nor a mechanism for procedures once contact is made with VMEs during mining operations.

¹ See J Halfar and R Fujita , " Danger of Deep-Sea Mining " , Science (18 May 2007): 987

² See Tribal Villagers Demand Stop to Deep Sea Mining in Pacific Papua New Guinea a Testing Ground for Controversial Mining Method, 3 July 2007

Right now, the potential environmental impact on vulnerable marine ecosystems (VMEs) due to seabed mining goes largely unchecked. The mining and dredging process destroys the ocean floor, and can have severe detrimental impacts on VMEs, impacting both species and habitats. It may interfere with ecosystem processes and have consequences for other activities such as fishing by destroying important fish habitats.

Ensuring the protection of the full range of ocean biodiversity and in particular the protection of vulnerable marine ecosystems such as hydrothermal vents is an important issue both for the high seas and for waters within country EEZs. Seabed mining poses a considerable threat to marine ecosystems wherever it is conducted. The ISA provides a regulatory regime for seabed mining in the high seas, whereas regulation of seabed mining on the continental shelf within country EEZs is determined by the individual countries in which operations take place. This often falls far short of what is required to protect the marine environment. It is therefore essential to extend protection of the deep seabed to the continental shelves by implementing a suite of measures which are precautionary and developed in accordance with the ecosystem approach.

As with all activities impacting the marine environment, any seabed mining operation must be subject to prior public environmental impact assessment before it can be allowed to proceed. Other measures that have been used and advocated to ensure protection of marine ecosystems from seabed mining include the establishment of marine protected areas, temporary closure of areas, and the introduction interim protection requirements.

Crucial to the application of the ecosystem approach is the establishment of networks of marine reserves – areas where all extractive uses such as seabed mining and fishing are prohibited and other disturbances minimized. The establishment of comprehensive and representative networks of marine reserves covering 40% of the oceans will ensure the protection of the full range of marine ecosystems including those that are rich in minerals and attractive to the seabed mining industry.

Only by the implementation of an adequate regulatory regime and the implementation of a network of fully protected marine reserves can States ensure that seabed mining will not cause untold harm to the marine life living in their waters.