Chapter 14: The Environment

Case Study: Deep-Sea Mining

In 1967, Maltese diplomat Arvid Pardo gave a speech to the United Nations in which he argued that a crucial question for our time would be: ‘Who will control the seabeds?’ Pardo (1968) believed that the seabed contained vast amounts of valuable mineral resources, which would produce great wealth for whoever was able to extract them. He argued that these resources should be seen as a common heritage of humankind, and collectively internationally managed, in order to avoid a situation where seabed mining greatly exacerbates global inequality, through rich countries taking all of the spoils. Pardo’s predictions proved premature; after some early (and expensive) attempts, deep-sea mining was practically abandoned as a project by the early 1980s. However, recent technological developments and growing demand for minerals used in electronic products means that interest in deep-sea mining has increased greatly in the past decade, and it is now very much back on the agenda for many countries and companies. Indeed, some are hailing it as ‘the new gold rush’ (Howard 2016). This phrase evokes the possibility of large profits, but also a desperate scramble to monopolize resources that could cause great environmental damage and significant inequality. Indeed, some environmental lawyers are warning that deep-sea mining is already exhibiting many of the negative features of past gold rushes, ‘including a general disregard for environmental and social impacts, and the marginalization of indigenous peoples and their rights’ (Hunter, Singh, and Aguon 2018). Pardo’s argument from half of a century ago thus now seems highly pertinent. In this case study we will look at some of the key questions raised by deep-sea mining (hereafter: DSM).

First we should say a bit more about DSM itself. The seabed contains precious metals such as gold, silver, and copper, useful metals like zinc and manganese, and rare earth elements that are used in various high-tech devices. These various valuable materials are found in nodules on the seabed, and in mineral-rich rock crusts, especially near hydrothermal vents—cracks in the earth’s surface from which geothermally heated water is emitted. Mining would occur by using either a conveyor belt or hydraulic suction system to bring lumps of rock to the surface, where the valuable materials would be separated out, and the residue dumped back into the sea. Currently, this is at an exploratory stage, and companies are using remotely operated vehicles to collect samples from prospective mine sites. The International Seabed Authority (ISA) issues exploration contracts to companies wishing to investigate the viability of DSM within specified areas that lie beyond the national jurisdiction of states. To date, it has issued 29 such contracts to companies and governments from a range of countries (including the United Kingdom)—half of which were signed since 2014 (see https://www.isa.org.jm/deep-seabed-minerals-contractors). Commercial mining has not yet begun, but many believe that it is not far from being viable. The benefits that might accrue from this are still somewhat uncertain; but the large number of countries and companies willing to put significant investment into exploration shows that many believe that it will prove highly lucrative. This makes a consideration of the ethical and political questions raised by this activity very timely.

The first question we should ask about DSM is what its environmental impacts might be. The answer to this is very uncertain, since our knowledge of the seabed is very limited. However, we do know that many unique creatures live there, which are not found anywhere else on earth—including animals that exist without sunlight and that live in temperatures up to 113°C, next to hydrothermal vents. (For examples of these creatures, see Amos 2018.) Indeed, the deep ocean 'is predicted to hold millions of yet-to-be-described species' (Mengerink et al. 2014). Further, the seabeds act as climate change sinks, due to the way that micro-organisms sequester greenhouse gases such as carbon and methane. The seabeds thus might well be important for both biodiversity and global climate change regulation. DSM could damage both of these, due to the way that it disturbs the seafloor environment. Fragile ecosystems might be destroyed, causing some species to go extinct. Dumping residues back into the sea could also smother sensitive marine organisms. And there is always the risk of industrial equipment leaking oil, or other such accidents. Further, 'recent research suggests that environmental damage caused by DSM activities would be largely irreversible' (Hunter, Singh, and Aguon 2018).

Caney has discussed climate change in the case study to his chapter. Suffice to say that if DSM would cause climate change by disturbing the process by which greenhouse gasses are sequestered within the sea then this would clearly be strong reason against it. For our purposes here, let's imagine that the risks of damage from DSM fall only upon animals and the environment, with no harm to humans. Would we have any reason to refrain from DSM in that case? One's answer to this will crucially depend on whether one believes that animals and other aspects of the environment have intrinsic value, or whether their value comes only from their relation to human interests. Among those holding the former view, some will hold that every individual animal has intrinsic value, while others might deny this but nonetheless argue that diversity of species is valuable, such that we should have particular concern for the lives of endangered species. Advocates of either of these views would hold that reductions in biodiversity and the destruction of seabed ecosystems themselves provide reasons against engaging in DSM.

Even if the environment does have intrinsic value, however, the reasons that this gives us to refrain from damaging practices will sometimes be outweighed. After all, many kinds of human development have some kind of negative environmental impact. One would therefore face the question of whether the benefits of DSM outweigh the environmental costs. This presumably depends on what kinds of human interests are served via mining. Now, at first glance it seems doubtful that precious minerals or elements used in advanced computing technology serve vital human interests or are required in order to fulfil anyone's justice-based entitlements. One might thus doubt that the environmental costs are outweighed by the benefits. On the other hand, general economic growth and improvements in standards of living presumably have some value. Further, some scientists predict that new sources of resources like copper will be needed in the 21st century in order to improve the quality of life of people in developing countries (Beaulieu et al. 2017). And the implementation of green technologies will require mineral resources such as those found on the seabed. Perhaps these factors could justify at least a limited amount of DSM, restricted to certain areas of the sea, thus leaving most of the vast ocean seabed unscathed, even if this limited mining does still cause environmental damage within specific areas. Of course, one might argue in reply that the demand for minerals that we might one day only be able to obtain by DSM simply shows the pressing need for a fundamental change in our way of life, away from resource-intensive lifestyles. We will return to this point at the end of the case study.

So far we have considered how one might respond to the environmental costs of DSM. Further questions are raised by the fact that those costs of DSM are highly uncertain. How should we respond to this kind of uncertainty? Some would argue that we ought to adopt a 'precautionary principle'. The basic idea here is that agents have a responsibility to anticipate potential harms and to act to mitigate them, even when those harms are not certain. Precisely what this entails depends on how this general idea is specified. For example, a very strong version of the precautionary principle can be found in the United Nations World Charter for Nature. This states that activities that pose a significant risk to nature should not proceed unless proponents can positively demonstrate that expected benefits outweigh potential damage. 'Where potential adverse effects are not fully understood, the activities should not proceed' (United Nations 1982, Para 11(b)). The Ocean Foundation's Deep Sea Mining Campaign explicitly adopts this precautionary principle as the basis for its call for an international ban on DSM (see http://www.deepseaminingoutofourdepth.org/about/). One might well question the rationality of this approach, however. Many scientific and technological advances result from activities where the possible negative consequences are not fully certain. Requiring that potential adverse effects of an activity must be 'fully understood', and that the expected benefits must be shown to outweigh all potential costs, might well place an unreasonably high evidential bar in the way of human progress. Further, the research required in order to identify the costs and benefits of DSM might *itself* come with environmental risks, since it will involve invasive kinds of exploration. A strong version of the precautionary principle would seemingly rule out any activities of this kind.

A weaker, and more widely accepted, version of the precautionary principle is found in the 1992 United Nations Framework Convention on Climate Change (also known as the Rio Declaration on Environment and Development): 'Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation' (United Nations 1992, Article 3.3). The point here is that uncertainty about the negative consequences of an activity should not be used as an excuse for not acting to mitigate potential damage. Even if mitigation is costly or straightforward expected value maximization would not require it, precaution demands that it is undertaken. An international group of scientists recently used this version of the precautionary principle as the basis for their call to 'stewardship' of the deep ocean (Mengerink et al. 2014). The implication of this for DSM would be a requirement for more research to be done to ascertain potential environmental costs, and for companies to adopt processes that seek to minimize those costs.

The most advanced DSM operation is Solwara 1, which aims to harvest gold and copper from the Bismarck Sea, within the territorial waters of Papua New Guinea (PNG). Canadian company Nautilus Minerals was awarded this contract by the government of PNG, but the project has met strong resistance from indigenous communities. Villagers have reported adverse effects from Solwara 1, including 'high incidence of dead fish washing up on shore' and 'a sharp decline in water quality' affecting traditional fishing waters (Hunter, Singh, and Aguon 2018). International law and political theory have traditionally seen states as legitimately controlling all of the natural resources within their territories (see Fine's chapter on sovereignty and borders). The fate of indigenous peoples in the face of activities like DSM challenge this view, and raise questions about what kinds of say such communities should have in relation to activities that affect their way of life.

Most of the deep sea does not lie within any country's territory, however. According to the United Nations Convention on the Law of the Sea, countries that border the sea enjoy an 'Exclusive Economic Zone' that extends 200 nautical miles from the shore. Within this zone, it is up to the relevant country to decide whether to permit mining. Most of the oceans lie beyond any such zone, however. This raises questions about who ought to be permitted to mine in the deep sea, how the resulting resources should be distributed, and who has the authority to make these decisions. Two worries immediately present themselves. First, we might face a 'tragedy of the commons', where it is individually rational for each mining company to extract as many resources as they can, but this leads to rates of extraction that far exceed a sustainable or justifiable level. Chris Armstrong notes that 'a fishing free-for-all on the High Seas has left global fish stocks on the verge of collapse' (Armstrong 2018, p. 6). Something similar could happen with DSM. Second, those with the greatest ability to engage in DSM are likely to be rich countries and companies, such that all of the benefits flow to those who are already wealthy, exacerbating global inequalities. This was one of Pardo's main concerns, as we saw.

One response to this is to adopt a human rights approach, as suggested by Caney in his chapter, which focuses on ensuring that everyone has their basic rights secured. DSM should be prohibited, or companies must pay compensation, if such rights are threatened. But Armstrong (2018, p. 6) argues that in our context this approach is 'unduly permissive. Nobody, after all, currently relies on the extraction of seabed minerals for their subsistence.' This approach would thus grant permission to those with the capacity to engage in DSM soonest to extract as many minerals as they desire. Yet it surely is unfair for the rich to be the main beneficiaries of DSM in international waters, simply due to their greater capacity to take advantage of the opportunity.

Perhaps, then, we should adopt some kind of egalitarian principle, which holds that the benefits and burdens of DSM must be shared equally among the world's population. One way we might seek to promote this is by training and resourcing scientists and companies from developing countries to take part in extraction. This is something that the ISA has actively sought to do, through its 'Endowment Fund' (see https://www.isa.org.jm/contractors/endowment-fund). But we might also distinguish the extraction of minerals from the distribution of benefits. Even if the companies actually engaged in DSM are from developed countries, the licences issued by the ISA that permit this mining might require them to give a significant portion of the proceeds into a common pool that is then distributed on an egalitarian basis. The main obstacles to this will likely be economic and political. Given that it is still unclear how much revenue companies engaged in DSM will ultimately accrue, stringent sharing requirements might lead many to choose not to take the risk, especially since there are very large up-front capital and investment costs. The need to provide sufficient incentives will act as a feasibility constraint on any attempt to harness DSM for egalitarian purposes. On the political side, membership of the ISA is ultimately voluntary, and comes from being party to the United Nations Convention on the Law of the Sea. Significantly, the United States of America refused to ratify that convention, largely due to opposition to the role of the ISA and its perceived threat to American economic interests. This led to certain egalitarian elements within the Convention, such as mandatory technology transfer and taxation on mining being used for wealth redistribution, being watered down. Future attempts to use DSM as a tool in the service of equality are likely to face similar political obstacles. These obstacles are particularly acute in this context precisely because of the need for international agreement regarding DSM if it is to be done in a way that is environmentally sustainable. This in effect gives powerful states such as the USA a veto.

The previous paragraph envisaged an egalitarian requirement applying specifically to the benefits and burdens of DSM. Even if this were economically and politically feasible, it might well be a mistake, however. After all, what theories of distributive justice care about is not the distribution of precious minerals or metals in particular, but the overall distribution of resources or well-being or capabilities. Thus, Armstrong argues that the disadvantaged should benefit *more* than equally from resources such as those extracted through DSM, 'if this alleviates broader inequalities in well-being' (Armstrong 2018, p. 6). In other words, 'resource benefits should … be harnessed to redress inequalities in access to wellbeing more broadly' (Armstrong 2017, p. 71). (Caney 2012 makes a similar point regarding climate change.) Of course, the economic and political barriers to realizing this principle would be even greater.

Reflecting on the nature of the benefits gained through DSM might again raise questions about whether we should engage in this activity at all, however. While it could be used as a means to meet people's fundamental entitlements, it is clearly not the only way to do so. Instead, the main benefits would come in the form of greater wealth and further technological advancement. Is this a sufficient justification for engaging in an activity that will undoubtedly have large environmental impacts? Some might think that economic growth, and the continued improvement in standard of living that results from it, is always a strong justification for an activity. But as Caney highlights in his chapter, others argue that the constant pursuit of higher GDP misconceives what matters in life and ultimately will prove ecologically disastrous. Considering the potential impact of DSM, and the nature of the resulting gains, puts this issue into sharp relief. Ultimately, deciding how we ought to regulate and govern DSM requires answering deep questions about what kind of society we want.

References

Amos, J. (2018) ‘Marvels of the Deep and Their Superpowers’, *BBC News*, 4 September 2018. Available at: https://www.bbc.co.uk/news/science-environment-45400954.

Armstrong, C. (2017) *Justice and Natural Resources: An Egalitarian Theory*. Oxford: Oxford University Press.

Armstrong, C. (2018) ‘Resources Outside of the State: Governing the Ocean and Beyond’. *Philosophy Compass* (online first; doi: 10.1111/phc3.12545).

Beaulieu, S. E., Graedel, T. E., and Hannington, M. D. (2017) ‘Should We Mine the Deep Sea Floor?’, *Earth’s Future*, 5(7), 655-8.

Caney, S. (2012) ‘Just Emissions’, *Philosophy and Public Affairs*, 4(2), 255-300.

Howard, B. C. (2016) ‘The Ocean Could Be the New Gold Rush’, *National Geographic*, 13 July 2016. Available at: https://perma.cc/JW9A-DJEZ.

Hunter, J., Singh, P., and Aguon, J. (2018) ‘Broadening Common Heritage: Addressing Gaps in the Deep Sea Mining Regulatory Regime’, *Harvard Environmental Law Review Blog*, 16 April 2018. Available at: http://harvardelr.com/2018/04/16/broadening-common-heritage/.

Mengerink et al. (2014) ‘A Call for Deep-Ocean Stewardship’, *Science*, 344(6185), 696-8.

Pardo, A. (1968) ‘Who Will Control the Seabed?’, *Foreign Affairs*, 47(1), 123-37.

Shukman, D. (2018) 'The Secret on the Ocean Floor', BBC News, 19 February 2018. Available at: https://www.bbc.co.uk/news/resources/idt-sh/deep_sea_mining.

United Nations (1982) ‘World Charter for Nature’. Available at: http://www.un.org/documents/ga/res/37/a37r007.htm.

United Nations (1992) ‘Framework Convention on Climate Change’. Available at: https://unfccc.int/resource/docs/convkp/conveng.pdf.

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