DEEP SEA MINERALS

2 Deep Sea Minerals and the Green Economy

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8.0 Deep Sea Minerals and the Green Economy

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This volume, together with volume 1 (SPC 2013) on deep sea minerals, provides an integrated examination for policy makers of the key aspects of mineral extraction, including the geological, biological, technical, social, economic, and fiscal components. These volumes have, for the first time, brought together international experts with a broad range of skills and backgrounds related to deep sea minerals. Consolidating this information to support decision making and the regional development of a legislative framework to underpin resource development, both within and beyond national jurisdictions, places the Pacific Island states at the forefront of responsible management of their non-renewable resources.

There are, sadly, many examples of terrestrial mining projects that have resulted in environmental damage, social dislocation, and low economic returns to communities. This history has increased the awareness of potential negative impacts within the communities assessing development projects, as well as in the general population. New industrial endeavours often face stiff opposition, and this is already the case with regard to proposed deep sea mining initiatives. The most advanced deep sea mining project, Nautilus's Solwara 1 in Papua New Guinea, has been the subject of sustained opposition from groups both within and outside the country. Evidence suggests that the developer, Nautilus Minerals, has worked to provide robust scientific information to assess the potential environmental impacts of mineral extraction. Nautilus has, for example, appointed highly qualified and respected academics and researchers and published results in peer-reviewed scientific journals. The company's message, however, does not necessarily reach or appease local people. Consequently, some communities remain unconvinced that the benefits of deep sea mineral extraction outweigh the risks.

People's response to scientific information about industrial risks is based upon their experience and how they view the credibility and trustworthiness of the institution providing the information (Wynne 1992). More is known about bad mining operations than good mining operations, due to the numerous well-publicized examples – including some projects in the Pacific. So, while international companies are trying to convince developing country stakeholders of their commitment to an era of new and greater corporate social responsibility, significant scepticism remains.

As an example, the Pacific Conference of Churches (the Pacific Island fellowship of churches representing more than three-quarters of the region's population) has called for a stop to any activities related to deep sea mining until more research has been undertaken on the potential impacts of both exploration and extraction on the environment. The Conference's General Secretary, Reverend François Pihaatae, urged governments to engage – not merely consult – with their people and ensure that proper studies are made before any work is done (Gibson 2013). Mining companies would argue that this is already happening – and indeed this is a requirement of international law to which Pacific Island states are legally bound to adhere.

8.1 Current prospects for deep sea mineral extraction

Mining companies are preparing to explore and extract minerals from the Pacific's seabed. The first commercial sea-floor massive sulphide mining venture looked on track to start in Papua New Guinea in 2014. However, a financial disagreement between the Papua New Guinea government and the mining company has halted the operation. The company had previously succeeded in obtaining a 20-year licence to mine in the Bismarck Sea, and recent statements by the company's chief executive suggest that they are still committed to the project (Island Business 2013). Other Pacific Island states are granting deep sea mineral exploration licences, and some are actively seeking foreign investment in this new industry. Fiji has issued two deep sea mining exploration licences – one to a South Korean company and another to a multinational company (Woodside 2012). Tonga, the Solomon Islands, and Vanuatu have also granted exploration licences. The Cook Islands has indicated its intention to open an international tender for exploration of parts of its manganese-rich seabed in 2014.

While commercial-scale deep sea mineral extraction within national jurisdictions might be considered to have stalled, progress towards mining within the international seabed area (the Area) is gaining momentum. The International Seabed Authority has, to date, issued 14 exploration contracts and another 5 are awaiting finalization (see http://www.isa.org.jm/). With the recent publication of a study providing a regulatory framework for the mining of manganese nodules within the Area (ISA 2013) the International Seabed Authority has suggested that companies could be in a position to apply for mining licences by 2016 (Shukman 2013).

Manganese nodules. Photo courtesy of IFREMER.

8.2 A framework for sound management

As interest in deep sea minerals has increased in the region and elsewhere, Pacific Island states have remained firm in their commitment to ensuring that this new industry will contribute to the long-term economic sustainability and social development of the host countries and, indeed, the region. As early as 1999, countries in the region convened a workshop in Papua New Guinea to highlight the new opportunities related to offshore minerals. They produced a set of guidelines, the Madang Guidelines (SOPAC 1999), to assist states in formulating effective policy and legislation for offshore mineral development. This early commitment to a regulatory approach to deep sea minerals (supported by the Pacific Islands Forum, the South Pacific Applied Geoscience and Technology Commission (SOPAC), and the Metal Mining Association of Japan) has since been expanded in the SPC-EU Deep Sea Minerals Project's Pacific Islands Regional Legislative and Regulatory Framework (SPC 2012) and is now being implemented through the development of world-leading national statutory regimes.

Pacific Island states recognize the importance of providing effective governance for deep sea mining, encompassing fiscal, social, and environmental regimes. Such governance is essential for ensuring that deep sea mining meets development objectives and provides a stable and transparent climate for investment. Experienced resource companies understand that irresponsible management of these issues reduces the prospect for long-term success and can lead to delays, shutdowns, and even closure of projects (Franks 2012: Table 2).

The SPC-EU Deep Sea Minerals Project, supporting Pacific Island states in developing effective policy and legislative frameworks to assess and manage deep sea mining developments, can also contribute to improving the functioning of regulatory bodies by building capacity across a range of issues. These include contract negotiation (addressed at a workshop in Tonga in 2013) public participation in decision making (addressed at a workshop in Vanuatu in 2013) and fiscal management of resource revenue.

Note that all workshop materials from the SPC-EU Deep Sea Minerals Project are available on the website at http://www.sopac.org/dsm.

Benefits for investors and developers	Benefits for regional, national, and community interests
Provides a healthy investment climate with greater certainty	Attracts good companies capable of compliance
Provides an agreed framework for negotiation	Provides an agreed framework for negotiation
Fosters long-term success by minimizing the potential for conflict-induced delays, shutdowns, or closure	Fosters long-term success by minimizing the potential for conflict-induced delays, shutdowns, or closure
Ensures more efficient and cost-effective project planning and implementation	Provides improved prediction of economic benefits – evolved tax regime, savings strategy, etc.
Increases access to a skilled and motivated work force	Enhances employment and training opportunities for local workers
Leaves a positive legacy beyond the life of the project	Sets high standards for other developments/businesses
Fosters development of best practice, supporting sustainability throughout the project life cycle	Increases environmental awareness, including economic valuation of ecosystems
Fosters development of new technologies and applications	Enhances access to new technology
Ensures compliance with international principles and standards	Ensures compliance with international principles and standards
Minimizes potential for supporting institutional corruption	Minimizes institutional corruption
Enhances overall project risk-reduction and realization of mutually beneficial outcomes	

Table 8.2 Benefits of an effective regional deep sea mining policy regime (adapted from Franks 2012).

Manganese nodules. Photo courtesy of IFREMER.

8.3 Deep sea mining for development

In addition to the need for a strong regulatory framework for deep sea mining, policy makers weighing the economic benefits and costs of deep sea resource development should consider the costs and benefits to society from any social and environmental impacts that result from mining, including damage to other components of natural capital. Otherwise, over the longer term, the development may constitute uneconomic growth, as opposed to true economic growth (UNEP *et al* 2012).

Determining the true value of deep sea minerals when additional factors, such as possible impacts on ecosystem services, are taken into account is challenging. The deep sea environment is one of the least understood regions of the planet. To avoid unintended consequences that might affect society through the loss of unaccounted-for (or unknown) ecosystem services, we need to rapidly increase our knowledge of these environments and to take management decisions that are informed by sound scientific information and guided by the precautionary approach. The value of non-renewable resources should not be measured simply in terms of their ability to generate monetary returns.

Hydrothermal vent fauna, Eastern Lau Basin. Photo courtesy of Chuck Fisher.

Mining is a finite economic activity, often with a short life span. Poorly governed deep sea mining, without consideration of environmental and social impacts, could leave a legacy of problems and lost opportunities long after the gains from development have been consumed. Past examples of resource extraction in the Pacific have damaged the natural capital inherited by today's generation. Natural resources underpin economic development, but in order to maintain natural capital for future generations, management needs to ensure that deep sea mining ends up improving a nation's combined economic, environmental, and social capital by generating net value. Marine mining has the potential to significantly degrade benthic ecosystems (UNEP *et al* 2012). The effective management of these ecosystems and the services they provide requires the application of best environmental practice, as well as spatial planning that includes the establishment of protected areas (Van Dover *et al* 2012).

When managing deep sea mining activities in the context of the sustainable use of the oceans, all stakeholders should be considered. These include those with non-commercial, subsistence, and traditional interests or concerns, other commercial interests (for example, oil and gas exploitation and fisheries), and, most importantly, future generations and their right to live in healthy and productive ecosystems. There is growing acknowledgment that human well-being is linked to environmental condition (Naeem *et al* 2009). Deep sea mining management practices should therefore be holistic, based on an integrated overview of all present and future human uses and ecosystem services. Essential questions that should be asked of any deep sea minerals development that is being considered by Pacific Island states include:

- Is the development going to provide significant economic benefit (including, but not limited to, revenues) when all costs, including environmental and social costs, are taken into consideration?
- Is the development going to contribute to local business expansion, enterprise development, employment, and overall strengthening and diversification of the local economy?

Transparency and accountability of mining revenue, as outlined in the Extractive Industries Transparency Initiative (discussed in Chapters 5 and 6), is essential for good governance. Ensuring that national authorities have the ability to regulate

and tax non-renewable resources is of crucial importance to ensuring revenue contributes to sustainable economic growth and development for the society at large.

In addition to developments within the exclusive economic zones and continental shelf of Pacific Islands, states in the region have shown interest in sponsoring seabed mineral activities in areas beyond national jurisdiction. To date, three states – Kiribati, Nauru, and Tonga – have founded or partnered with companies in order to explore for manganese nodules in the Clarion-Clipperton Fracture Zone under contracts issued by the International Seabed Authority (see Text Box). The role of a sponsoring state is to have effective control of the company carrying out the exploration (or mining) work and to take ultimate responsibility for its actions and for any environmental damage that may occur. For this reason, states contemplating engagement in seabed mineral activities beyond national jurisdiction should:

- choose their partner company carefully;
- put in place robust laws and agreements with the company, designed to establish a relationship of effective control;
- implement those laws effectively; and
- ensure that the financial arrangements with the company provide sufficient benefit to the state to justify the costs and risks of sponsorship.

Pacific state mining agreements in the Area

There are two different agreement models:

1. Nauru and Tonga have provided sponsorship to companies that hold contracts with the International Seabed Authority and will perform the seabed mineral activities.
2. Kiribati holds the contract with the International Seabed Authority itself through a state-owned enterprise and will enter into sub-contracts with a company or companies for the performance of the seabed mineral activities.

Under model 1, the company is required to have a local office in the sponsoring state and is bound by the sponsoring state's legislation as well as any agreement made between the state and the company. Under model 2, unless the company is located in the state, the company will not be bound by the state's legislation. The legal relationship will be governed only by an agreement between the state and the company (which should reflect rules and standards no less than those required by the equivalent legislation and the International Seabed Authority's Mining Code).

8.4 Policy innovation for the transition to a green economy

Historically, the market-driven pathway to non-renewable resource development has greatly disadvantaged poor countries, which lack the financial and knowledge capital to manage the development of their natural assets (Daly and Farley 2011). The result has been, on occasion, the undervaluing of non-renewable resources by failing to account for the unavoidable long-term increase in scarcity and uncompensated ecological and social costs (Gowdy and McDaniel 1999: a case study from onshore mining in the Pacific).

Deep sea minerals are one of several potential non-renewable resource prospects that offer an opportunity for both resource-endowed countries and the global community to apply transformative policies to ensure future resource development.

The decisions associated with potential deep sea mining are, of course, subject to political factors and indirect economic considerations. For example, international aid, diplomatic concerns, or other socio-political factors may ultimately sway the decision as to whether a country chooses to proceed with development.

As part of a green economic approach five policy design principles (based on Daly and Farley 2011) could be considered when evaluating potential development. These principles are not specific to deep sea mining. They are, rather, approaches to representing, monitoring, and accounting for global needs and local goals, while ensuring the integrity and health of priceless natural systems.

1. Economic policy does not involve one goal but many. Each goal must be addressed, sometimes by its own policy instrument and always in a coordinated way.

In a world defined by such challenges as poverty and inefficient use of raw materials, policies related to the production of minerals from deep sea mining must address each desired goal (for example, poverty reduction and increased efficient use). In the conventional paradigm, the debate is typically reduced to whether the inefficient use of raw materials, such as minerals, should be subsidized to lower their costs and help the poor or raw materials should be taxed to raise their price and promote efficient use. With a green economy approach, one would desire one or more policies that address both issues in a coordinated manner. For instance, a royalty system – developed to promote economically efficient use – would be coordinated with an income distribution system that would help to alleviate poverty. This is exactly the approach taken with proposed carbon taxes.

2. Because of the cumulative impacts of mining, policies should aim to establish the necessary degree of big-picture control, while maintaining critical flexibility to accommodate the need for activity-specific variability.

Mining (whether based on land or in the deep sea) has a net ecological cost. That is, a certain amount of habitat area is impacted. At the national scale, the limiting consideration is cost, in terms of lost ecosystem function and services (food provisioning, quality liveable space, clean water access, etc.) from a country's overall geographic space. This consideration would drive the development of a national policy instrument to limit total habitat impact or loss of ecosystem value, based on considering all mining activities in the country, possibly together with all major activities that affect habitat quality and ecosystem value. This big-picture limit can be implemented in a way that accommodates activity-level variability, such as one specific mining activity being more intense than another. However, the national-level control ensures, possibly through fiscal incentives and/or taxation penalties or other mechanisms, that national-scale environmental quality and ecosystem service value is preserved.

3. Policies should be developed with a generous margin of error when dealing with the biophysical environment and social systems.

When managing the impact of human activities on a natural system, there is a need to factor in the complexity of that system, as well as the usually high levels of uncertainty and, at times, the potential irreversibility of consequences and impacts. Leaving a considerable safety margin between demands on the natural and/or social systems and a best estimate of their capacities to withstand environmental damage is an advisable approach. Operating too near or at system capacity can lead to unexpected and unaffordable costs, manifested in ways that include reduced ecosystem function and usability and degraded societal structure and cohesion. Mining development should be designed to avoid areas of critical biological and ecosystem importance, minimize environmental impacts at every stage, and mitigate unavoidable environmental damage.

Muscat Cove, Fiji. Photo courtesy of Robert and Elyse Brown.

4. Policies should recognize that the starting point is always based on the current policy-making reality, build on existing good environmental and social policies that are effective, reform bad ones, and create new ones only when nothing good exists.

Regardless of whether desired outcomes are quite different from the current state of affairs, the latter is nonetheless the starting point of any policy process. Developing policy instruments focused on potential deep sea mining or, more broadly, on a transformation of the global raw-minerals cycle does not involve starting from a blank slate. Reshaping and transforming existing processes and/or institutions tends to be more effective than abolishing them. For many regions with no conventional mineral endowments, deep sea mining could offer an opportunity to develop and implement long-term policy designed to enable the investments needed for transition to a green economy. The transition could be accomplished most effectively by incorporating and adapting existing regulations, policy processes, and economic frameworks. The market economy and its institutions and processes are solidly present in our highly connected world. This paradigm cannot simply be ignored. However, the opportunity to affect the local-to-global mineral cycle in favour of a more frugal use chain could have a significant impact on the evolution of our economic model and social construct.

5. Policies should be adaptable in consideration of conditions and parameters that are likely to change.

Our world, as a whole, is defined by constant change, and policy should be developed with change in mind. Human impacts on the natural world are enormous. Over time, we are likely to cause new, unforeseen problems and perhaps identify opportunities to avoid other new problems. Ecosystems themselves show considerable variation over natural time scales, from seasons to eons. Natural systems are complex and non-linear. Their histories can be measured and described, but our ability to predict with any real accuracy the long-term effects of given actions is more limited. Although human systems operate in the same way, this is seldom acknowledged, in the hope that we can continue to rely on simple management models.

As society comes to terms with the challenges and opportunities of a reality defined by increasingly scarce natural resources, policy for the management of emerging unconventional resources, such as deep sea minerals, will need to adapt to rapidly changing social and ecological conditions and be responsive to longer-term goals defined by factors of ecological and social sustainability. With fewer and fewer raw mineral resources likely to be discovered, conventional or otherwise, the purpose we assign to their use needs to be tied to specific societal goals, achievable within the limits of actual physical systems, rather than left to the whims of a decoupled market.

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