

REMARKS BY MICHAEL W. LODGE, SECRETARY-GENERAL OF THE INTERNATIONAL SEABED AUTHORITY TO THE 88th MEETING OF THE OCEAN STUDIES BOARD (JOINT SESSION WITH THE BOARD ON EARTH SCIENCES AND RESOURCES) OF THE NATIONAL ACADEMIES OF SCIENCE

Washington DC, 14 November 2017

It is a tremendous pleasure for me to have the opportunity to talk to the Ocean Studies Board about deep seabed mining.

Larry Mayer has been asking me to come to OSB for a couple of years now, but somehow, we have never quite managed to get our calendars in sync. I'm very glad that we finally managed to find a date that works for everybody and that we can do it in Washington DC. As it turns out, it is probably better that I speak now, rather than two years ago. For one thing, deep seabed mining is such a dynamic sector right now that I have much more of interest to say on the topic than I would have done two years ago. For another, I am able to speak now in my capacity as Secretary-General of the International Seabed Authority.

So, deep seabed mining ... note that I say deep seabed, not seabed mining, because seabed mining per se is something that has been around for centuries. Shallow water mining and dredging for tin, gold, sand and gravel and even diamonds is nothing new and adds up to a massive industry with billions of tonnes moved every year. I'll return to this later, because it does become somewhat relevant when we consider the likely scale and impact of deep seabed mining.

I am sure that the idea of deep seabed mining conjures up many different impressions. For some it is something that was talked about in the 1960s, but never happened. For others, it was (and still is) the deal breaker that prevented the United States from joining the Law of the Sea Convention. And for some others it is one of the greatest threats to the marine environment that we are likely to face in the future.

I don't think any of these views really represents the reality of where we are today. So, what I want to do today is give you an overview of the current status of deep seabed mining from the perspective of the International Seabed Authority, as regulator, and then take a few minutes to identify what I see as some of the main factors that need to come into alignment in order for this industry to take off.

There are several factors that distinguish deep seabed mining from any other type of mining. The great depths at which resources are found is an obvious factor that makes for great technological and operational challenges. Distance from shore is another factor that creates logistic and operational challenges. The need for specialized processing technology is another factor, and all of these add a great deal of expense, uncertainty and most of all risk to prospective deep-sea mining ventures. But expense and risk are nothing new to either the offshore or the mining industry, and the construction cost of terrestrial mines is also very high.

The one factor that distinguishes deep seabed mining from any other extractive activity is the nature of the underlying legal regime established by the Law of the Sea Convention.

Seafloor minerals are the only example of a global resource that is under international management by an international organization. As such, the International Seabed Authority represents a unique experiment in international relations. For many States, it fulfils a vision that there should be an international agreement to ensure that the mineral wealth of the deep seabed would not be appropriated by a few technologically advanced countries, but would be shared between all countries, including the landlocked and disadvantaged countries, as the common heritage of mankind.

Now I cannot deny that the experiment is not yet proven. Commercial production of seafloor minerals has not started and no financial benefits have yet accrued to the international community.

But compared to where we were in 1982, and even compared to where we were in 1994, when the Authority was established in Kingston, Jamaica, we have surely come a very long way.

First and foremost, there is almost universal acceptance of the legitimacy of the LOSC regime. As of 2017, the Authority has 168 member States, including the European Union and all the major maritime powers, with the exception of the United States. In large part, credit for this must be given to the 1994 Implementation Agreement on Part XI of the LOSC, which reset the provisions of Part XI to reflect profound political changes since 1982, as well as meeting every single one of the Reagan administration's objections to the 1982 regime.

It is accepted, therefore, that, in accordance with the Convention, exploration for and exploitation of seabed minerals in the Area may only be carried out under a contract with the Authority, and subject to its rules, regulations and procedures. Contracts may be issued to both public and private mining enterprises provided they are sponsored by a State Party to the Convention and meet certain standards of technological and financial capacity. Ultimately, the economic benefits from deep seabed mining, most likely in the form of royalties paid to the Authority, are to be shared for the 'benefit of mankind as a whole', with particular emphasis on the developing countries that lack the technology and capital to carry out seabed mining for themselves.

It is accepted also, because it is explicit in the Convention, that there can be no claim to sovereignty over any part of the international seabed Area and no appropriation of the mineral resources. These are important fundamental issues that have a profound impact for investment in deep seabed mining. In fact, one could contrast the certainty offered by the Law of the Sea regime with the current debate on utilization of resources in outer space, which is grappling with fundamental issues of sovereignty and recognition of private rights.

Over the 24 years of its existence, the Authority has done a pretty good job of building up its institutional capacity to manage deep seabed mining. On the one hand, it is a lean, efficient and low-cost institution that exercises no more powers than are strictly necessary to perform the functions expected of it by its member States. On the other hand, an evolutionary approach has

been taken to the stepwise development of a regulatory regime that has permitted exploration to proceed in a systematic manner.

Status of Exploration Activity

Exploration for deep seabed minerals has been taking place for many years, much of it in the form of Marine Scientific Research carried out by governments and publicly-funded international research programmes. Even before the LOSC was adopted, consortia from the United States and several other developed economies, had been conducting extensive exploration campaigns for polymetallic nodules deposits.

In putting the deep seabed under international management, one of the most important achievements of the Convention was to provide a mechanism to protect the acquired rights of these pioneer investors. After the establishment of the Authority in 1994, these rights were further guaranteed when the former pioneer investors were granted the automatic right to a 15-year contract with the Authority under the Convention regime. Recently, in 2016, these contracts were further extended for a period of five years, which will take them through to 2021.

Between 2002 and 2010, the pace of activity declined. Most of the pioneer investors substantially reduced their exploration programmes in light of general uncertainty surrounding the future of deep seabed mining. There were no new technologies in sight and very little commercial interest on the part of investors. During this period, the Authority made strenuous efforts to promote marine scientific research, especially on environmental matters. Importantly, the Authority also developed regulations governing prospecting and exploration for new resources, including polymetallic sulphides and cobalt-rich crusts.

In fact, the adoption of regulations for these two resources in 2010 was to be a milestone in the life of the Authority. It opened the door to a new round of claims for exploration sites for resources other than polymetallic nodules and a renewed interest in commercial prospects for deep seabed mining.

The period between 2011 and 2015 saw a dramatic increase in interest, particularly from the private sector. In total, 18 contracts were approved in a four-year period between 2011 and 2015. Up to 2011, most exploration activity had been in the form of state-funded research programmes, with contracts held by governments or government agencies. After 2011, most investment has come from the private sector. Initially, this was in the form of relatively small and speculative companies operating through developing countries, but more recently large-scale multinational operators such as Keppel in Singapore, Lockheed Martin in the UK and DEME Group in Belgium have made significant investments.

The situation as of today is that the Authority has approved a total of 29 contracts for exploration covering more than 1.3 million square kilometres of the seabed. Contractors include States, state entities and private corporations sponsored both by developed and developing States.

Exploration work is taking place simultaneously in the Pacific, Indian and Atlantic oceans. This map shows the general distribution of the exploration claims that have been made. By far the area of most intense activity remains the Clarion-Clipperton Zone in the Central Pacific where 16 contractors are exploring for polymetallic nodules. Although no mining has yet taken place in the CCZ, the more than 30 years of research that has taken place represents a major contribution to marine science and a better understanding of deep sea ecosystems.

The Future

All the indications are that we are at a decisive point in the long history of attempts to mine the deep seabed. We are on the threshold of a new industry. But to go beyond this point requires tremendous financial investment and involves considerable risk.

So, for the last part of my intervention, I want to look to the future and offer a brief assessment of the commercial challenges for deep seabed mining. In my view, five fundamental aspects need to come into alignment, some of which we can control, but some of which are outside our control.

First, we need to be sure of the existence of a sufficient resource base to support major capital investment over a long period of time.

In the case of polymetallic nodule deposits, sustained exploration campaigns over many years, and in some cases, decades, have established a high degree of confidence in the resource base. The ISA's own geologic model gives inferred resources of 134 million tonnes of Cobalt and 761 million tonnes of Nickel in the Clarion Clipperton Zone alone – enough to sustain for many decades if not centuries.

Having said that, however, the ISA only recently adopted a mineral classification standard and none of our current contractors has yet publicly demonstrated a formal mineral resource to potential investors. Some are, however, getting close. In the case of seafloor massive sulphides and cobalt rich crusts, we are only in the early stages of exploration and each deposit is radically different in terms of location, water depth, distribution and quality.

Second, mining, of all types, is sensitive to the macro-economic environment. Nickel, copper, cobalt and manganese markets, prices and resource development are inextricably linked to global economic growth and the supply and demand for these commodities. That is partly why deep-sea mining for polymetallic nodules had a massive investment in the early 1970s, when commodity prices rose rapidly, but interest fell off in the late 1980s, due to lower commodities prices and a more pessimistic outlook.

Since then we have seen a commodity boom, driven by China's industrialization, but also a significant market correction. In the long term, demand for key strategic metals is expected to continue to rise both as a result of increased industrialization as well as to support a technological revolution in demand for renewable technology, such as lithium-ion batteries.

Of course, against this, it could be argued that increased demand will increase pressure for more efficient recycling and materials substitution.

The fact is that many different factors are pulling the market in many different directions.

The point is that, to get into production, seabed miners will need to skillfully manage their development and investment requirements through the macro-economic cycle.

The **third aspect** is technology development, and this is where we have seen enormous progress in the past few years. In terms of operational requirements, deep sea mining has much more in common with the offshore industry than the mining industry. Advances in technology – things like dynamic positioning, improved seabed mapping, video imaging, use of ROVs – allow us to work more easily at great depths and technology is no longer the limiting factor that it was in the 1980s and 1990s.

Nautilus Minerals has already developed underwater mining tools. Last month METI and JOGMEC of Japan successfully carried out continuous production of seafloor massive sulphides ore at 1,600 metres, and in May, GSR of Belgium tested its Patania nodule collector system at 5,000 metres.

Technology is not a problem.

Fourth, is the issue of environmental protection. As a regulator, the Authority has the responsibility to protect the marine environment from the harmful impacts of mining and must develop environmental regulations that ensure that exploration and exploitation take place in a manner that recognizes the need to protect the environment, both on the ocean floor and in the water column. Of course, the very fact that no part of the Area may be exploited without permission from the Authority ensures that environmental impacts will be monitored and controlled by an international body. However, this monitoring regime will clearly need to be better articulated and made more robust as development proceeds.

Developers need to be able to predict anticipated impacts of normal operations and understand what are permitted and non-permitted impacts. This will allow them to reduce, mitigate and, as far as possible, prevent harmful impacts and pollution that can affect wider ecosystems and habitats.

Fifth, and last, is the issue that is foremost on the agenda for the Authority at present, and that is the need for a regulatory regime for exploitation.

One of the major changes that was introduced by the 1994 Agreement was to separate exploration and exploitation into two distinct phases and to eliminate the provisions on financial terms of contracts that had been objectionable to the United States and other industrialized countries in 1982. This means that we now have to put in place a workable regulatory framework that incentivizes contractors to commit significant investment and resources to develop exploitation projects while also addressing concerns of State Parties to the Convention, as well as other stakeholders, including environmental groups. Some of the major concerns are around regulatory stability and predictability, and of course, the financial regime.

Much preparatory work has already been done, in the form of technical studies and workshops, and a first consolidated draft of the Mining Code is currently out for public consultation. At its

2017 meetings, the Council of the Authority agreed to fast-track the development of the Code and, as a result, there will be two meetings of the Council in 2018.