MODULE 2, LESSON 4
THE CURRENT STATUS OF EXPLORATION FOR MARINE MINERALS RESOURCES IN THE AREA

LECTURE NOTES

Hello, my name is Joshua Tuhumwire. I'm a member of the Legal and Technical Commission of the International Seabed Authority and today I will be presenting on the current status of the exploration for marine minerals in the area under the ISA deep dive capacity building programme, we'll be looking at the introduction, the regulatory framework, the history and current status, exploration activities, baseline data collection, mineral resources assessment, and challenges.

Under the UN Convention on the Law of the Sea, exploration is undertaken under a contract with the International Seabed Authority. There are regulations that control the exploration activities. Namely, we have regulations on prospecting and exploration for polymetallic nodules in the area. We have regulations on prospecting and exploration for polymetallic sulphides in the Area. And lastly, we have regulations on prospecting and exploration for cobalt rich ferromanganese crusts in the Area. In order to participate in the exploration the applicants can be states, parties, State enterprises, natural juridical persons sponsored by the Member States. The contractor, duration is 15 years with an extension of five year periods. Under these contracts, the requirement of exploration areas being relinquished, namely 50 percent, 20%. And 10%, up to the 15th year. And then we have exploration areas that vary in size, namely for Polynesia nodules. At a maximum of 150,000 square kilometer and reduced to 75,000 square kilometers at the end of the relinquishment for polymetallic sulphides, the area is 10,000 square kilometers and, after relinquishment, the area will not exceed 2,500 square kilometres.

For the cobalt rich crusts the maximum area is 3000 square kilometers and at relinquishment, it will go down to 1000 square kilometers or less. Now in terms of exploration history and the current status, the Pioneers are for exploration in the Area were for Parliament polymanganese nodules, or the PMN and contracts were signed in the year 2001. Then the polymetallic sulphides were in year 2011 and then the cobalt rich crusts was in 2014. To date, we have a total of 31 contracts, of which 19 are for the polymanganese modules, 7 are for the polymetallic sulphides and then the five for the crusts. Now exploration areas are located within the Pacific Ocean and mainly in the area referred to as the Clipperton fracture zone or the CCZ in short, as well as in the Northwest Pacific. The other area of interest is the Indian Ocean and mainly in the central Indian Ocean basin and lastly the other area of exploration is the Atlantic Ocean, largely in the Mid-Atlantic Ridge to the north and also to the South in the South Atlantic.

That slide shows you the contractors of the ISA. It also shows you the spelling States and also shows the years when the contracts were originally signed or when the contracts were extended. This graph shows the trend for the applications of the mineral resources, and as I have said, you can see that interest was first in the polymetallic nodules in 2001 and then you have subsequently the

interests. The colors you see are for extensions in purple and then green for crusts, red sulphides and then lastly blue for nodules. This global map shows the location of the exploration contracts in the Area, and as you can see in the CCZ is where we have 17 Contracts which are for nodules and then in the Northwest Pacific we have also other contracts for nodules as well as in blue as well as in olive green for the crusts. In the Indian Ocean you see, the blocks are the polygons in red and those are for sulphides, as you can see on the legend. And then we also have for nodules; 1 contract for nodules in the Indian Ocean and then lastly in the Atlantic Ocean, we have to the north in red Polygon. Those are contracts for Sulphides and then to the South Atlantic, in olive green, we have our contract for crusts.

This map in the Indian Ocean basically shows the comparison of the contract areas for manganese nodules. Manganese, as I was pointed out, manganese nodules are up to a maximum of 150,000 square kilometers up to 75,000 square kilometers after the final relinquishment. So you see the pink colour that is contract for the Indian government. And what you see in yellow is a reserved area for the International Seabed Authority. To the West you have green colours and then you have pink, pink colors and then you have purple to the South to the southwest and those are smaller contracts areas for the massive sulphides. That map is of the North Pacific Ocean and shows the comparison of the contract areas for manganese crusts. Again, the larger areas, the larger polygons. And then which are in pink for manganese nodules again, pink for the contractors and then the yellow reserved areas and in the region you can see the different colors you have blue, green and you have light yellow. These for the different contractors. Now in terms of exploration activities or the contractors, the thirty-one contractors must carry out exploration activities in accordance to the regulations that they have already mentioned at the outset. The contractors deploy cruises that are special or specifically designed ships that carry specialized equipment or instruments that do the measurements. Now the the ship that you see on the right is, is the Hakurei that is a ship owned by the JOGMEC, the Japanese contractor and as you can see, it is designed for that kind of activity.

They also undertake laboratory tests as part of their plans of work. They do bench tests, they carry out mining tests, they carry out mineral and metallurgical processing. They also undertake new technology research as part of the plans of work. The equipment you see on the right. Is also for job make and it is a mining equipment that is under test on land for the cobalt crusts. That photograph shows you Polymetallic nodules on the seafloor. And polymetallic nodules for manganese, copper, nickel and cobalt mainly, and you can see the nodules on the seafloor. On the right is an index or legdend that shows you the different colors. Show the abundance of the nodules as well as the slope in the black with red showing the highest abundance of nodules on the floor in terms of baseline data collection, it is a requirement by the International Seabed Authority and the contract that baseline data be collected for purposes of assessing the state of the environment when exploration and mining activities have taken place. So that is the purpose and therefore they need to establish that baseline to assess the likely effects of future exploration and mining activities.

In this regard, the ISA has established classes required for the baseline data, namely the physical oceanography, Geological properties and that memory will be geology and sediments, then chemical oceanography, then biological communities, bioturbation and sedimentation and equipment that you see on the right is the patania 2 which has been designed and is owned by the

Global Sea Resources of Belgium and is seafloor harvester. Supposed to harvest or collect polymetallic manganese nodules. It will be tested and once it passes, it's supposed to be collecting the nodules in 2027, as the contractor predicts. Now, when exploration takes place, we need to know, of course, what minerals are there, what quantities of minerals are there, how are they disposed on the on the sea floor or anywhere within the sea and therefore the economic interest really for this exploration is in metals and namely manganese, nickel, copper, molybdenum, which are contained within the polymeric manganese nodules and then copper, zinc, gold and silver which are contained in the polymetallic massive sulphide and then manganese cobalt. Nickle, rare earth elements and platinum, which are contained in the Cobalt ferromanganese crusts.

Estimates for these mineral contents are to be reported according to International Seabed Authority's resource classification system, which itself is best on the Committee for Mineral Reserves, International reporting standards, or CRISCO, of 2013. The photograph you see on the right is of an electric car and basically these metals that are being sold on the seabed are for the green technology revolution, basically for operating or powering electric cars and other energy clean energies aimed at reducing the carbon footprint. This diagram or this figure is a guide to the Mineral resource assessment, whereby the contractors have to report many resources from top to bottom we have increasing levels of confidence in exploration, whereby we have in fact indicated and measured with a higher degree of confidence on the right, we have many reserves and with the modifying factors which are mining, processing, metallurgical, economic, marketing, legal, environmental, infrastructure, social and governmental factors. These will determine whether you have a probable or a proven reserve. Last but not least, the challenges that are faced by the contractors in the exploration in the seabed are, one, the areas where exploration takes place are in the remote geographical locations of the oceans, but also the depths the great water depths at which the minerals are found and this is certainly a major challenge because of safety to the equipment. And then we have a lack of sufficient understanding of the various ecosystems in the seabed where these minerals are found. It is not very well known already, and therefore that poses a major challenge to the environment. The other challenge is that the contractors are required to improve mining, engineering and environmental safeguards. As well as developed green metallurgical processing technologies in order to safeguard the ocean environment.

And lastly there is the volatility of the mineral prices and markets which are also in a competition with the land based mines. We know for all the metals that we have mentioned are already being produced by different countries in the world and certainly there is a concern that when mining finally, picks up or takes off on the seabed. There's going to be an impact on the prices and also on the land based land miners, but that is going to be handled in the current discussions by the International Seabed Authority and its stakeholders. Thank you very much.