

Seabed Resources Management

LIEW JIA EN
LAI CHI HUI
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NUURUL WAHDAH BINTI MOHD SHAHAR
NUR KHAIRUL AFIQAH BINTI KHAIRUL FIZA
MUHAMAD SAIFUL DIN BIN MAT ISA



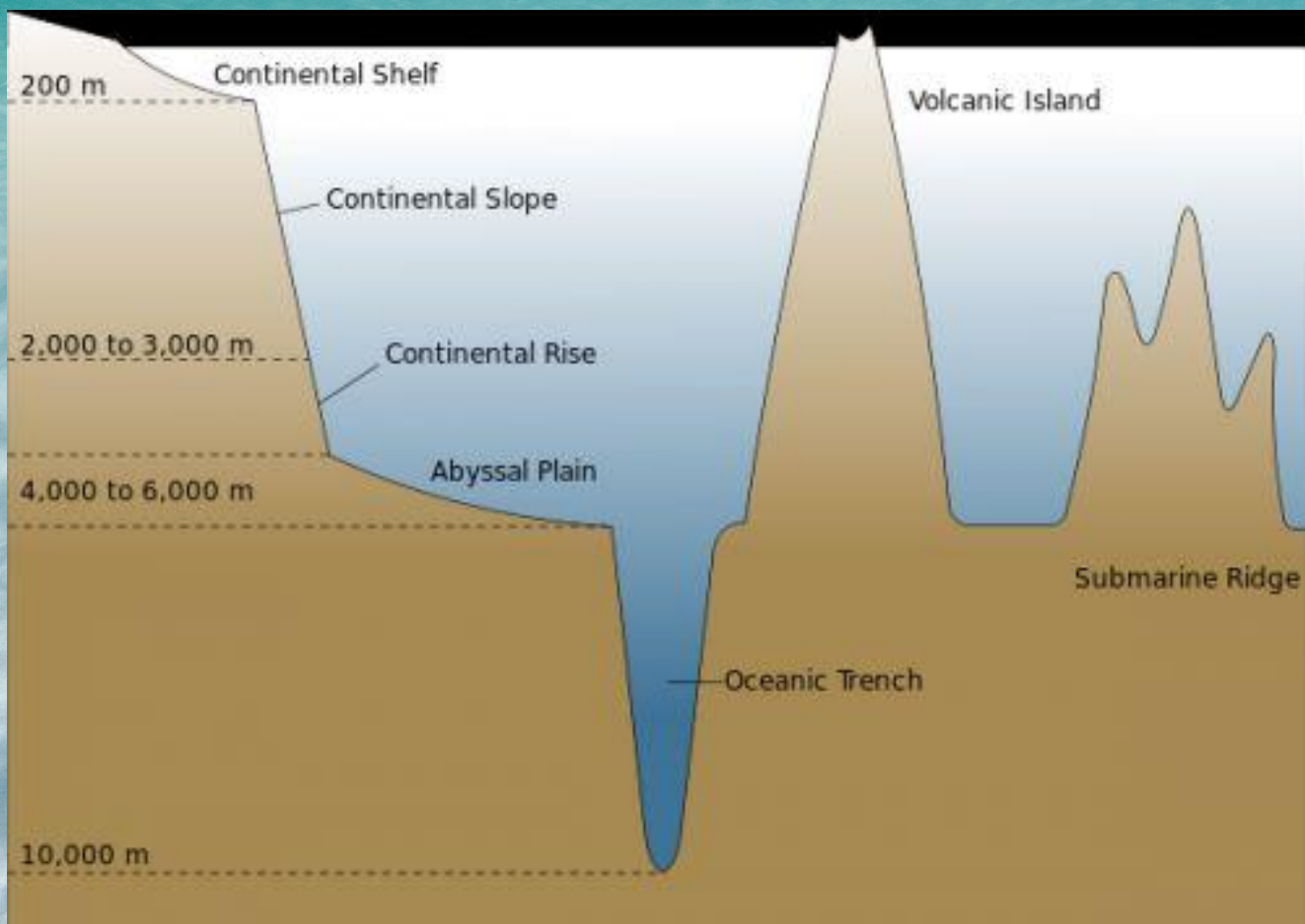
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Introduction to Seabed

The term of seabed refers to the top-surface of the earth in seas and oceans, it also known as the seafloor or ocean floor. This surface has a topography, which is directly related to the nature of its subsurface geology, in the places modified by ocean currents and sedimentary processes. Besides, both topography and subsurface are very important factors in the use of the seabed by humankind. From a resource perspective, humankind could determine how those resources from the seabed may be exploited and its resources distributed or protected by preventing activities such as exploitation.

In order to understand the characteristics of the topography and subsurface of the seabed, we need to look at the formation of the seabed, including the outer parts of the Earth's crust below oceanic water and then the nature and processes of the interface between solid or semi-solid earth materials and water column in the sea. Earth's crust consists of continental crust and oceanic crust which also known as continental plate and oceanic plate. The continental crust is very thick 20-40 and relatively light, while oceanic crust is thin 5-15 and considerably denser.

Lastly, the general topography of seabed of the Earth may be described in terms of the continental shelf, the continental slope, the continental rise, the continental margin as well as the deep ocean floor.



Source : Features of the Seafloor, 2017

Malaysia Seabed Area

For the Malaysian Coast Guard's defense and protection purposes, the domestic seas, the territorial sea, the continental shelf, and the Exclusive Economic Zone (EEZ) will be included in Malaysian waters.

Malaysia claims that an Exclusive Economic Zone (EEZ) of 333,671 km² with a distance of 200 nautical miles from its coast. EEZ covers most of the southern part of the South China Sea. Besides, Malaysia has the 29th longest coastline of 4,675 km. The coastline in Malaysia consists of two different sections. The coastline of Peninsular Malaysia to the west is 2,068 km and the coastline to the east is 2,607 km. The land area including Malaysia's inland waters is 330,803 km².



West Malaysia's EEZ (Haller-Trost, 1998)

Except in the case of Sabah and Sarawak, where the territory for the mining or discovery of the territorial sea is limited to 3 nautical miles, the Territorial Sea Act 2012 defines 12 nautical miles as the width of the territorial sea in Malaysia.

Vessels are entitled to an innocent passage across the territorial sea, but this privilege can be temporarily revoked in the name of national security in particular regions. Innocent passage means going through the territorial sea without accessing or continuing in an expeditious and continuous way from internal waters that is not prejudicial to Malaysia's stability, public order or protection. Vessels engaged in fishing, polluting, weapons practices, monitoring exercises, loading or unloading of any product, currency or people smuggling in violation of the customs of Malaysia, tax and immigration forfeit the right to innocent passage.

The Continental Shelf is the normal continuation of the land region to the edge of the continental rim or 200 nautical miles, whichever is larger, from the baseline of the coastal state. By way of the Continental Shelf Act 1966 to explore offshore oil and gas deposits, Malaysia asserted continental shelf rights as early as 1966, which Act has now been amended to conform to the Sea Convention Law 1982.

In accordance with Article 76 of the Convention, with a recent amendment to this Act demarcating the Malaysian continental shelf area, Malaysia hopes to expand jurisdiction to the outer edge of the continental rim in accordance with the principles of the Convention, where coastal States may be allowed to exercise continental shelf rights up to 350 nautical miles from baselines or up to 100 nautical miles from baselines (the line connecting the depth of 2,500 meters).

Marine Coastal and Delta Sustainability for Malaysia

Continental Shelf Act 1966

"An Act relating to the continental shelf of Malaysia, the exploration thereof and the exploitation of its natural resources and for matters connected therewith."

"Continental shelf" means

- (a) throughout the natural prolongation of the land territory of Malaysia to the outer edge of the continental margin
- (b) a distance of 200nm from the baselines from which the breadth of the territorial sea

"Natural resources" means

- (a) the mineral and other natural non-living resources of the sea-bed and subsoil
- (b) living organisms belonging to sedentary species
- (c) "petroleum" includes any mineral oil or relative hydrocarbon and natural gas existing in its natural condition

Rights with respect to continental shelf

- (1) All rights with respect to the exploration of the continental shelf and the exploitation of its natural resources are hereby vested in Malaysia and shall be exercisable by the Federal Government
- (2) No one or no other country may exercise such rights except with the express consent of Malaysia

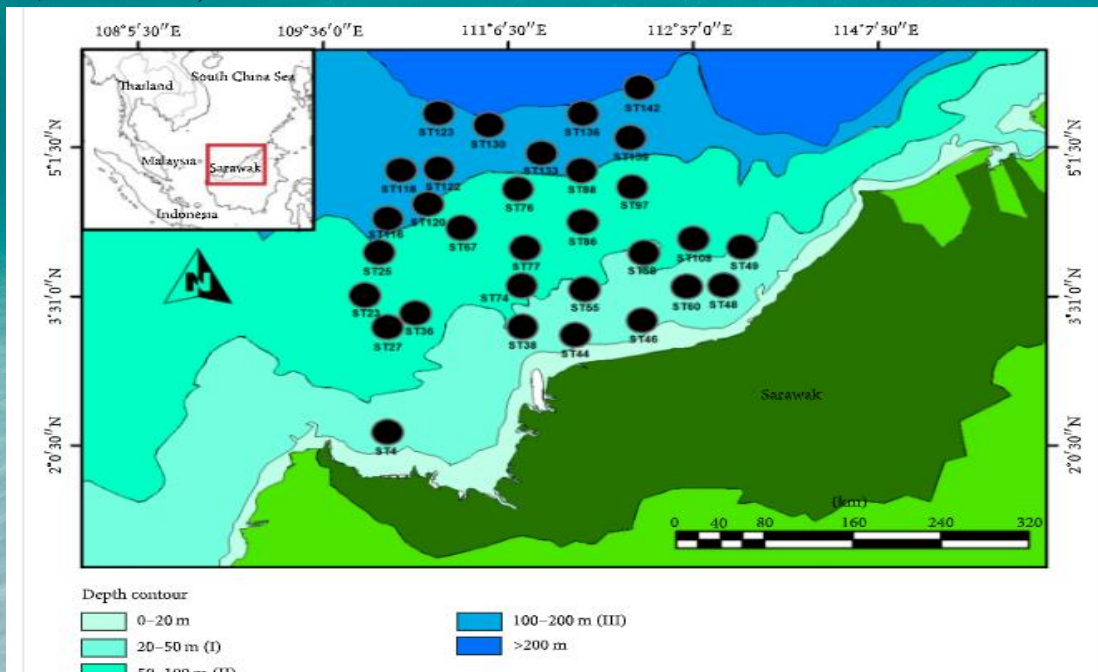
Mining within the continental shelf

- (1) No person shall explore, prospect or bore for or carry on any operations for the getting of petroleum in the sea-bed or subsoil
- (2) For the purposes of the following subsections, the expression "minerals" shall be construed to mean minerals other than petroleum
- (3) No person shall explore, prospect or bore for or carry on any operations for the getting of minerals in the sea-bed or subsoil of the continental shelf except in pursuance of a license issued
- (4) The Minister may grant to any person a license authorizing the person to explore, prospect, bore and mine for and to carry on operations for the getting of minerals in any specified area of the continental shelf
- (5) Every application for a license and every license granted under subsection (4) shall be in such form and subject to the payment of such fees and other payments as may be prescribed by the Minister
- (6) Any person who explores, prospects, bores or mines for, or carries on operations for the recovery of any minerals in the seabed or subsoil of the continental shelf otherwise than in pursuance of a license under subsection (4) shall be guilty of an offence, and shall, be liable to a fine < RM 500k or to imprisonment for < 10 years or to both; and all machinery, tools, plant, buildings and other property together with any minerals or which may be proved to have been obtained from the continental shelf shall be liable to forfeiture

Type of Seabed Resources from Malaysia

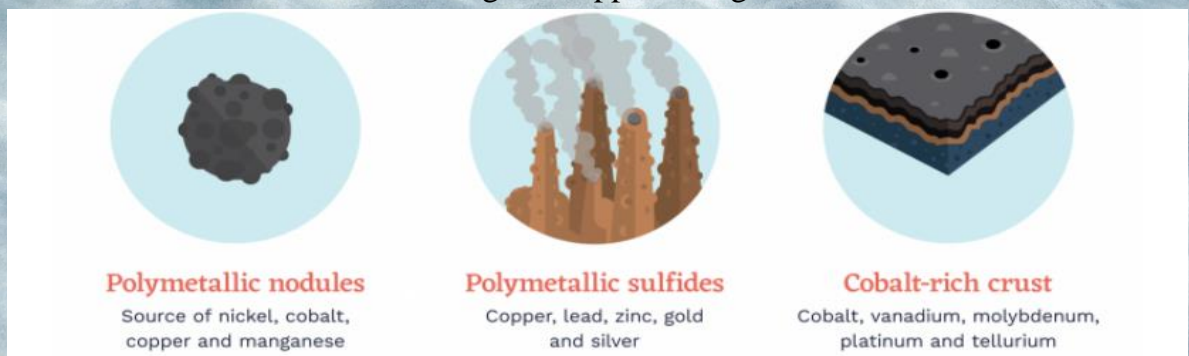
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Thirty-one sediment sampling stations in the continental shelf of Sarawak

Resources of the seabed can be categorised as geological and biological. Geological resources are found on the surface at which mainly as sand and gravel, and deep sea minerals, as well as in the subsurface of the seabed at which mainly as oil and gas. Biological resources in the form of sedentary organisms live on or just below the surface as part of the biodiversity, with species specialized according to available resources, depending on the composition of the surface and subsurface of the seabed, as well as the associated geological processes. Apart from that, the seabed contains variety type of resources that are available for extraction, such as silver, gold, copper, manganese, cobalt and zinc.



Issue Regarding Seabed Mining In Malaysia

The challenges of exploring deep seabed mining can be viewed in several ways. Significant problems may arise from a lack of understanding of the deep sea climate. The deep sea zone is a place full of mysteries. It is not an environment that, due to its depth, the human being is familiar with. Since deep sea exploration takes place, a lot of data from the deep sea region is needed.

Awareness of the deep sea environment and habitats is critical in providing the marine environment with best practices for conservation and safety. This restriction is due to the constraints of competence, finance and technology. High-end technical equipment, machines and ships are needed for deep sea exploration. Deep sea minerals vary in shape and nature, each needs different mining techniques and facilities to deal with their unique habitat and climate. These would ultimately contribute to the incredibly high exploration costs.

At the process site, the minerals that have been mined will then be processed. The method includes the combining, separation, packaging, conversion or modification of minerals until they are ready for export. It is estimated that the expense of these processes is around USD 135 million (RM 544 million). Exploration requires tremendous dedication and efforts from those concerned. The government, stakeholders, academics, legal and technical experts need to work together to establish a plan to build a good framework for the exploration of the deep seabed. Malaysia would have to produce legal and technical experts to manage the exploration when embarking on the exploration.

Malaysia would have to spend a large amount of money if Malaysia plans to partner or fund a business to explore. They have to show their financial stability in the 15-year work plan, or else the Internal Security Act 1960 (ISA) will not consider the application for the exploration contract. Malaysia must also have a good economic strategy, as this will solve the financial problems that will occur when the exploration is launched.

Deep seabed minerals	
Exploration	Exploitation
i) Remote sensing devices (sound data → readable data)	i) Extraction of deep seabed minerals using mechanical or pressurised water drills
ii) Require remotely operated vehicle (ROV) → video camera observes seabed environment	ii) The extracted minerals gathered and separated from the sediments.
	iii) Lifting machine (bucket, riser or pump techniques) will lift up the minerals to the surface of the sea and right into ship.
	iv) Solid materials that are marketable from the extracted minerals (selected, compacted, stored)

(Nik Munirah Nik Fuad, Wan Izatul Asma Wan Talaat, Mohd Hazmi Mohd Rusli, January 19, 2017)

Impact of Seabed Mining on Marine Environment

Water Pollution and Destruction of Habitat

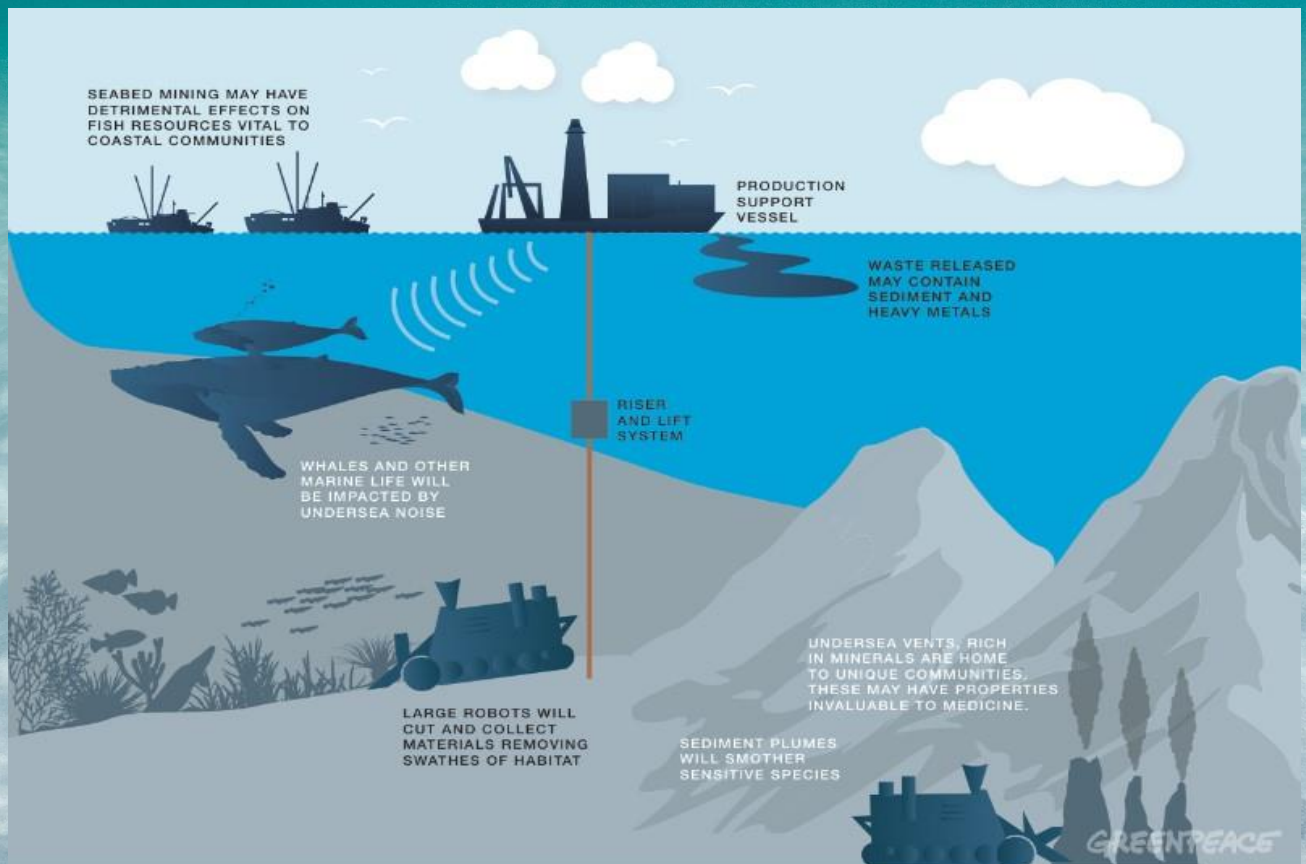
Mining machines grinding up and destroying the habitat of the living organism in the ocean and causes the risking the extinction of unique species. The widespread of disruption to marine life would also impact the whole ocean food chain.

Disturbance of the seafloor

The machines used during mining activities could scrap the seafloor and destroy the habitats of deep-sea organism, causes the loss of species and fragmentation or loss of ecosystem structure and function.

Vibration, Light and Noise Pollution

Some of the sea mammals such as whales, dolphins and sharks could be affected by noise, vibrations and light pollution that are caused by mining equipment, surface vessels, the minerals that are mixed with the seawater will be treated with different salinity and chemicals and the spills of fuel and toxic products that are harmful to the animals. The lights from the machines will affect the feeding and reproductive behaviours of the deep-sea living organism. Those animals will suffer when they lose communication signals between their species.



The Impacts Of Seabed Mining
(Nijmegen, 2017)

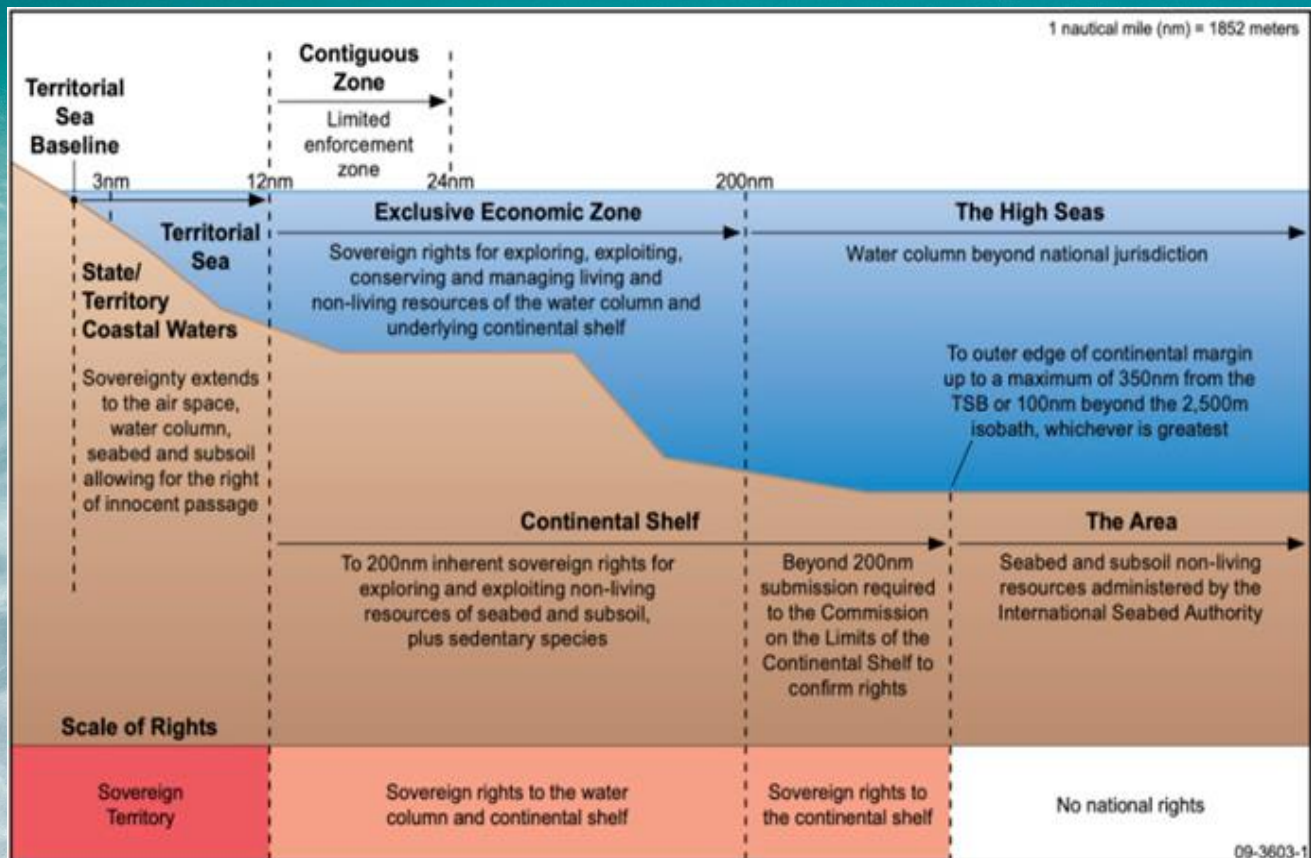
Seafloor environments are vitally important to the health of the oceans:-

1. They transform and store carbon and nutrients from land and the ocean
2. They are biodiversity hotspots
3. They are under threat from a variety of anthropogenic stressors (e.g., mining, oil and gas activities and decommissioning, climate change)

Precautionary Management of Seabed Mining

It is necessary to take precaution measures while doing seabed mining activity. In order to manage the seabed resources we need to identify the effective way of each elements in management plan such as:

1. Need a proper inventory of the available resources through a seabed resources survey.
2. Identification of the alternative sources such as land based river sand.
3. Only zoning of areas where dredging is permitted.
4. There must be a pre-dredging baseline survey and post-dredging monitoring in certain time.
5. Precise positioning of dredge to avoid sensitive areas.
6. Use of dredging equipment that minimize the sedimentation and turbidity.
7. The public education on the adverse impact of seabed mining.
8. Dredging is to be conducted during periods of the lowest biological activity.
9. If dredging is to be carried out near sensitive resource areas, a barrier should be erected to separate them from the dredging site.



Maritime divisions and rights to have resources in seabed (NOAA, 2020)

It is important for Malaysia to enact a set of rules related to deep seabed mining beyond its national jurisdiction. This is to show to the world that Malaysia is committed in protecting the marine environment while exploring the seabed ocean.

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The project by first year students Bachelor of Science (Marine Science),Year 2020 Course Fundamental of Marine Science (MMS3009)



LIEW JIA EN (S59120)

Message : Everyone is responsible in minimizing pollution in ocean.



LAI CHI HUI (S58827)

Message : Every human is responsible for the ocean environment. "We may not like it but do protect it".



NG WOON WEI (S60795)

Message : Be the part of solution not the pollution.



NUURUL WAHDAH BINTI MOHD SHAHAR (S58157)

Message : Together we protect our ocean.



NUR KHAIRUL AFIQAH BINTI KHAIRUL FIZA (S60515)

Message : When we protect our ocean we are protecting our future.



MUHAMAD SAIFUL DIN BIN MAT ISA (S48300)

Message : The beauty and mystery of the ocean, filling our lives with miracles. Take care of the ocean.