

Mineral Resources: Geology, Exploration, Economics and Environment
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Lecture - 53
Mineral Economics (Contd.)

Welcome.

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National Mineral Policy of India – an overview (Res. Policy, 1997, 23, 91-96)

Mines and Minerals Regulation & Development Act (MMRD Act)

- Schedule-A: exclusively by the state – Coal, Fe ore, oil, manganese, chrome, gypsum, sulfur, gold, diamond, copper, lead & zinc, molybdenum, tungsten, and atomic energy min.
- Schedule-B: to be progressively state owned, all other minerals except minor minerals
- Schedule-C: minor minerals ordinarily to be developed by private sector

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So, we will continue our discussion on the National Mineral Policy and we have just seen what are the different aspects or the critical or the points on which the national mineral policy must address.

So, that it remains as a document where all the issues have been addressed and can be referred to whenever there is a need and there are legal and political issues. And just on that backdrop let us just browse through the national mineral policy of India. This is the policy which we have been revising and reformulating this policy for a good number of years. I will not go into the very details of it. The national mineral policy is available on the site of the ministry of mines Government of India for a detailed reading and to look at the different aspects that it covers.

So, without getting into the history of it, there are also acts which are very much a part of it or have been subsidiary to the national mineral policy. Like the Mines and Minerals

Regulation and Development Act MMRD Act of Government of India. So, when we were discussing about this classification of the mineral resources, we could see here the schedule A, schedule B and schedule C.

So, schedule A is exclusively by the state; coal, iron ore, oil, manganese, chrome, gypsum, sulfur and that means, which has to be done by the state means actually it is the government. And copper lead and zinc molybdenum of course, in the recent past there has been quite a lot of restructuring and taking over of many of the statutory bodies by a private owned companies. So, these are the materials for example, coal in India is not mined by any private owned company it is by the coal India limited.

And the iron ore trailing and all as we know is they are expensive initially and with later on some of the private companies also coming. Schedule B to be progressively state owned; all other minerals except minor minerals. Schedule C; the minor minerals ordinarily to be developed by private sector.

So, the schedule A is important say for example, even atomic energy mineral like uranium or like the rare earths resources which are available like the monazite sand in the sea beaches. So, these are all to be owned by the government and their exploitation has to be done by the government agencies.

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Objectives:

- to explore for mineral wealth on land and offshore
- Development of mineral resources taking into account the national and strategic considerations, ensure adequate supply and best use keeping in view the present need and future requirement
- Promote necessary linkages for smooth and uninterrupted development of the mineral industry
- promote research and development in mineral sector
- ensure establishment of appropriate educational and training facilities for human resource development to meet the manpower requirement in the mineral sector
- Minimize adverse effects of mineral development
- Ensure conduct of mining operations

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And the objective of the national mineral policy of India that India is endowed with lots of mineral resources. And at this present we are not very sure whether we have been able to explore the mineral to the fullest extent or we have been able to discover mineral deposits keeping in pace the rate of discoveries by many other developed countries in the world.

So, the objective is definitely to explore for mineral wealth both in land and offshore. Development of mineral resources taking into account the national and strategic considerations ensure adequate supply and best use keeping in view the present need of and the future requirement and promoting the necessary linkages for smooth and uninterrupted development of mineral industry. Here, even though the mineral industry is being taken as a standalone industry; by its own right has a mineral industry its it definitely has a linkage with other related industry where the downstream process are carried out many of the technologies are developed.

So, this necessary link has to be promoted although it should be in such a way that any of the shocks that is coming into the related industry should not effect the mineral industry. Promote research and development in mineral sector; this is one of the major objectives of the Indian national mineral policy for the exploration of mineral resources to use the state of the art technology and promote research.

Ensure establishment of appropriate educational and training facilities for human resource development to meet the manpower requirement in the mineral sector which is one of the very important aspects and minimize adverse effects of mineral development. Here the environment comes to consideration that all the adverse effect that is caused by mining have to be mitigated or minimized or has to be seen that they do not adversely affect the environment.

So, that is the reason why many of the mining projects sometimes cannot come into operation because objections raised on the basis of seriously or adversely affecting the environment. And the ensure conduct of the mining operations here the issues such as safe mining and mining with adoption of the all the safety measures and all other hazards and the safe mining operations have to be ensured.

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Shortcomings

- prospectors not allowed to survey large areas before fixing targets
- area ceiling not in line with international norms – 25 km² prospecting license is inadequate for airborne geophysics and geochemical prospecting
- Linkage between reconnaissance permit, exploration license and mining lease not transparent (being reviewed)
- rates of mineral royalty though not very high, still not attractive to investors
- scopes for joint ventures in large scale exploration should be encouraged – sometimes the state does not have the necessary fund
- no clear cut policy on infrastructure cost sharing between lessee and beneficiaries
- uniform policy in respect of minor mineral (granite, marble) with high export potential is not existing
- mining still not considered as a major economic activity

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And some of the issues which are also there before in the policy which one can see in details. Initially the policy was not quite encouraging for current foreign investors to come and explore to carry out exploration and the exploitation activities. But there is been quite a lot of the policies have been liberalized or the national mineral policy was laid out. So, that it invites the foreign investors. So, that is how we could see some of the companies in multinational companies like DBSR or BHP and many of the other companies also coming and investing in the Indian mineral sector.

So, some of the short comings of the national mineral policy could be seen in this way. Their prospectors were not allowed to survey large areas before fixing targets. The area ceiling not in line with international norms 25 square kilometers prospecting license is inadequate for airborne geophysics and geochemical prospecting. Linkage between reconnaissance permit, exploration license and mining lease are not transparent; that was still being in review.

Rates of mineral royalty, though not very high, still not attractive to investors. While we are discussing about the taxes that in terms of royalty and the other type of the tax that the mineral agencies have to pay to the government is known as CESS which is essentially the component of the tax which is recovered from the mineral agency which does the exploitation. It is towards all other types of things like infrastructure

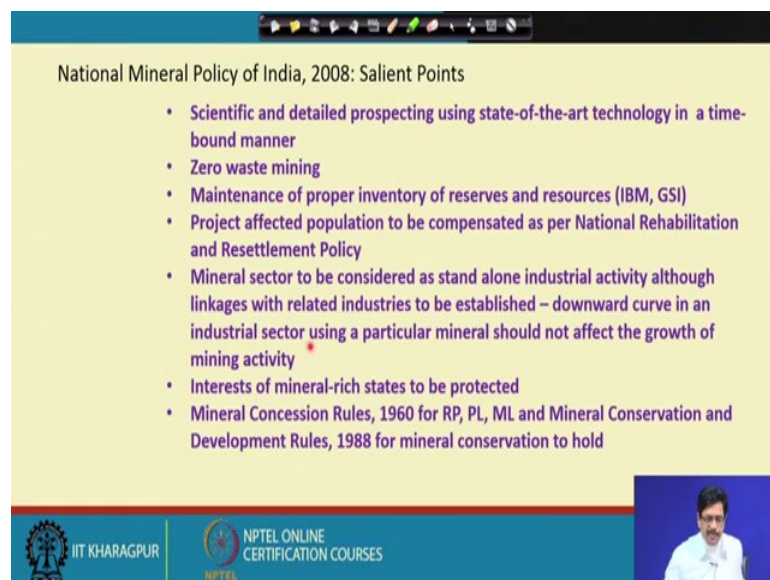
development general development. So, the societal addressing many of the societal issues and all these included is taken as another tax as called as CESS.

So, two of the mineral taxes which are invoked in India are the two which are royalty and CESS. So, the rates that are fixed sometimes may not be very attractive to investors and scope for joint ventures in large scale exploration should be encouraged although it is come off let which can discuss will be discussed in a little while.

That in whichever the private sectors are generally are encouraged to invest in the mineral sectors. And there are certain situations in which the private sector can be asked or is encouraged to join hands and with a public private partnership kind of collaboration in the mineral sector itself. And one of the things sited as a short come is no clear cut policy on infrastructure and cost sharing between lessee and beneficiaries it lack uniform policy in respect of minor minerals like these are the things which are our extensively used as polishing and the decorative stones granites and marble with high export potential are not existing.

Mining still not considered as a major economic activity, but I think these are some of the shortcomings when the national mineral policy was formulated.

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National Mineral Policy of India, 2008: Salient Points

- Scientific and detailed prospecting using state-of-the-art technology in a time-bound manner
- Zero waste mining
- Maintenance of proper inventory of reserves and resources (IBM, GSI)
- Project affected population to be compensated as per National Rehabilitation and Resettlement Policy
- Mineral sector to be considered as stand alone industrial activity although linkages with related industries to be established – downward curve in an industrial sector using a particular mineral should not affect the growth of mining activity
- Interests of mineral-rich states to be protected
- Mineral Concession Rules, 1960 for RP, PL, ML and Mineral Conservation and Development Rules, 1988 for mineral conservation to hold

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So, we can have a look on some of the brief points, the salient points of the national mineral policy of India right at this point of time. Then, there is also a latest version,

some of the modifications, but if we look at this the national mineral policy 2008 we could see the salient points at the first mandate of the national mineral policy is to encourage scientific prospecting using the state of the art technology in a time bound manner.

Means it is kind of fixing targets keeping in mind that the country is under explore, there are lots of scope of discovery of many of the important mineral commodities in which there is short supply or the reserve in the Indian context are quite low and most of the requirements are met through imports.

So, there should be a time bound. So, that is how there are many recent programs which have been initiated by the government for a rigorous and more extensive exploration of the different parts of the Indian subcontinent. And the whole policy is that more scientific state of the art method should be utilized.

For example, when we are discussing about the remote sensing technique; the latest remote sensing technique which is the airborne spectro radiometric methods, the hyper spectral method which produces very good quality spectral data on the land surfaces of different characteristics which would be far more useful in exploration of mineral deposits than with conventional satellite imageries,

or the satellite imagery which were obtained by the older spectrometers like the MASS or the other satellites. Another important policy of the national mineral policy is to see that zero waste mining is to be imposed or has to be encouraged.

So, that it helps in proper utilization of the result that we have in addition to that the sustainability issue is also addressed. Maintenance of proper inventory of the reserves and resources; so, the Indian Bureau of Mines is primarily assigned with the job of documentation of all the inventory of the mineral resources in terms of reserves and resources.

And also is the regulatory body to look into the mining practices, safe mining practices and the zero mining waste, zero waste mining that is one of the policies. And geological survey of India being the prime agency which is involved in exploration of the country for mineral resources. Project affected population to be compensated as per the

national rehabilitation and resettlement policy which is one of the important aspects of mining.

Because whenever there is a mining there are the local population sometimes have to be moved and so, in that process if there are any way that the local population are affected; they have to be properly compensated following the national rehabilitation and resettlement policy.

This point also is which we have discussed before mineral sector to be considered as standalone industrial activity although linkages with related industries have to be established. And any time there is a downward curve what we said is a shock or it would be a normal downward curve in the activity of any other particular industries sector which depends on mineral resources. So, the activity of the mineral resources should not get affected. So that with the growth of the mining industry should continue rather unaffected any downward curve in the growth of any other related industry.

So, interests of mineral-rich states to be protected here is the issue of the center and state relationship. Any particular state which is more mineral rich or is producing much more in terms of number of commodities or the value of commodity; so, their interest has to be safeguarded.

The mineral concession rule that is the of 1960 in granting this RP which is the recurrence permit or PL is prospecting license, ML is mining lease and mineral conservation and development rules of mineral conservation to hold. So that means, we do exploitation in such a way that we also think of the future and here also in some of the cases this conservation necessarily mean augmentation of the existing mineral resources.

And augmentation necessarily means further exploration and extension of reserves in the existing mining mines that are operating right now. And so, these are all as we have discussed before that any particular mining activity when it starts; the further exploration what goes continues till even the time that the mine is coming to a state of closure.

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National Mineral Policy of India, 2008: Salient Points

- States to facilitate and regulate exploration and mining activities
- Government agencies for development of strategic minerals and Private sector to be the main source of investment in future; concept of Large Area Prospecting License to be introduced for completion of reconnaissance work
- Export of minerals in value added form; domestic mineral industry to attune to international economic scenario
- Design fiscal policy for promotion of mineral exploration and development.
- Increased R&D efforts in the mineral and mining sectors including Deep Sea Mining and production of materials of high purity

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So, states to facilitate and regulate exploration and mining activities. Government agencies for development of strategic minerals and private sector to be main source of investment in future; the concept of large area prospecting license to be introduced for completion of reconnaissance work which we just pointed out as one of the short coming of the previous policy in terms of the area coverage that is giving to the reconnaissance work.

So, that is now being somehow is taken care of and the concept of large area prospecting license is being implemented being introduced for completion of the reconnaissance work. So, in fact, it is actually targeted that it is kind of with a very short or as early as possible to complete the reconnaissance work all the mineralization mineral exploration.

And in this context you could possibly remember that in the concept of the geochemical survey of the whole country or geochemical generation of geochemical anomaly data for the whole country has been taken up into almost nearing completion. And when it the whole concept is if you could have geochemical anomaly on a local scale, we could also produce geochemical anomaly on a much larger magnitude covering the whole country when samples are taken almost at the intervals of 1 plus 1 square kilometer

And not only geochemical; under these kind of work this kind of objectives even the air born geophysical anomaly offering the entire country and with all this kind of processes has been initiated at a different stages and some of them are already available.

Export of minerals in value added forms. So, it will always be encouraged if the value could be added. So, that its quality improves and the export is promoted; domestic mineral industry to attune to international economic scenario which is a complicated issue. But it has to be somehow seen that the domestic industry the mineral industry is in perfect coordination or perfect tune with international economic scenario in terms of demand.

Design of fiscal policy for promotion of mineral exploration and development so, more of financial assistance to companies which is not very well laid out clearly as of now. Increased R and D efforts in the mineral and mining sectors including deep sea mining and production of materials of high purity, deep sea mining is also one of the agenda or one of the points of which we as a country we aspire to be active in this deep sea mining.

Because as I said initially that the possibly a point will come when we have to turn our attention towards the seabed for meeting most of our demands for metals and we have seen that there are some materials like the manganese nodules which occur on the ocean floor in different geographical areas which are also rich sources of nickel and cobalt.

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Law of the Sea Conventions

- Law of the Sea Conventions, 1958
 - Convention on the Territorial Sea and the Contiguous Zone
 - Convention on the High Seas
 - Convention on Fishing and Conservation of the Living Resources of the High Seas
- United Nations Convention on the Law of the Sea (UNCLOS), 1982

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So that the situation about the macroeconomic policy as far as an individual country is concerned; we of course, have to be brief and this issues or these subject are such that it could possibly form a full lecture series. As far as the mineral economics is concerned, the level at which it is practiced; the extensive modeling and the different types of

analysis that is made on the data on mineral resources, production, consumption, demand, international trade and so on.

So, let us see one of the aspects of the macroeconomics of mineral resources when it involves the whole world. And we know that the seabed is endowed with mineral resources, it is not only mineral resources, and the sea is a source of livelihood many other ways offering biological resources and so, many things which we cannot discuss right now.

We will only be concerned about the law of the sea when it applies to exploitation of the mineral resources. So, the seabed is endowed, now the question is that whom does the resource belong? It belongs to the entire human population, the entire world, entire mankind. So, if it is so, then some policies had to be laid out for its exploitation so as to avoid any international conflict or confrontations. So, it has been evolving for quite some time, there were many meetings to evolve the policy uniform policy acceptable to all the countries across the world.

And what is presently available as a document is a or is the thing is the Law of Sea is as per the United Nations Convention on the Law of the Sea UNCLOS, 1982; highlighted this point possibly about more than 90 countries have been signatory to this particular document.

And it is to be implemented, there are many issues for example, whenever we are talking about the resources of the seabed, then naturally the countries which are land locked which do not have any coastline also comes and whether they could have any share of this particular resources or not that is although it needs to be addressed, but has no such clear cut consensus seem to be achieved so far although things are being laid out.

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Jurisdictional Zones in the Law of the Sea

- Internal Waters
- Territorial Sea
- Contiguous Zone
- Exclusive Economic Zone
- Continental Shelf
- High Seas
- The International Seabed

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So, the Law of the Sea will consider certain things that as far as the coastline or the disclosed countries that have a coastline. These kinds of restrictions or the stipulations could be made what could be considered internal water or territorial water and the contiguous zone and the exclusive economic zone in which the country will be given right to explore and exploit whatever resources are available within that particular zone; the continental shelf, high seas and the international seabed.

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Ocean Zones

The diagram illustrates the spatial relationship between various ocean zones starting from the Mainland. The Territorial Sea extends 12 nm from the Mainland. The Contiguous Zone extends another 12 nm from the end of the Territorial Sea. The Exclusive Economic Zone (EEZ) extends 200 nm from the Mainland. The Continental Shelf is shown as a sloping area extending from the end of the Contiguous Zone. The Cont Slope and Cont Rise are also indicated. The Deep Seabed is the area beyond the Continental Shelf.

Mainland
Territorial Sea
Contiguous Zone
200 nm
EEZ
12 nm
12 nm
Cont Shelf
Cont Slope
Cont Rise
Deep Seabed

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So, this particular diagram would make it clear. In the sketch as you could see here this is the mainland and this is the dotted line represent the sea surface. And as per the cognition the first 12 nautical miles from the shore will be considered as the territorial sea in which the country has a full right of itself and any no element or no foreign element is allowed in that.

And another 12 nautical miles is considered as the as labeled as a contiguous zone. And continental shelf we all know as geologist that the very shallow slope which extends for variable width from the shore in terms of 10s of kilometers from the shore and it is the continental shelf. And then the continental slope which is a which actually demarcates the boundary of a particular continent here and this is a very high slope and these are all with many types of features which you have read in our physical geology text books and this is the continental rise and this is the deep seabed. So, this 200 nautical mile from the shore is defined as the exclusive economic zone.

And then this is the deep seabed. So, it will also be very interesting to see the many of the country which are very close neighbours like India, Srilanka or India, Pakistan or many other countries. So, they would be even be shorter than 200 nautical miles from their respective boundaries. So, they will have to come to kind of agreement and demarcate the areas of and the distance up to which they will be exacting their exclusive economic right and these are the exclusive economic zone.

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Jurisdictional Zones

- Internal Waters
 - flows automatically from sovereignty exercised over land territory
- Territorial Sea (up to 12 seamiles)
 - full sovereignty except for rights of innocent passage
- Contiguous Zone (up to 24 seamiles)
 - territory outside the territorial sea where coastal states may exercise the control necessary to punish or prevent infringements of its customs, fiscal, immigration or sanitary laws and regulation within its territory or territorial sea

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And so, the internal water that flows automatically from sovereignty exercised over the land territorial sea up to 12 nautical miles or sea miles. Contiguous zones the territory outside the territorial sea where coastal states may exercise the control that necessary to punish or prevent infringements like that I was telling about foreign elements; not getting in to the details of it. So, up another 12 nautical miles; that means, from the shore to 24 nautical miles is the contiguous zone.

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Jurisdictional Zones

- **Exclusive Economic Zone/Continental Shelf**
 - Coastal States can establish a 200-nautical-mile Exclusive Economic Zone (EEZ)/a claim for a continental shelf is not necessary
 - The Coastal state have the right for the use of the living and non-living natural resources, to use the EEZ and the continental shelf for other economic purposes and the right to construct, authorize and regulate the construction of artificial islands and certain installations and structures
 - in EEZs , all states have freedom of navigation and overflight , as well as freedom to lay submarine cables and pipelines

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And the different jurisdictional zones, the exclusive economic zone or the continental shelf which is 200 nautical miles or the end of the shelf whichever is shorter; The Coastal state have the right for the use of the living and the nonliving natural resources, to use the exclusive economic zone and the continental shelf for other economic purposes.

The right to construct authorizes and regulates the construction of artificial islands and certain installations and structures. In the exclusive economic zones all states have freedom to navigation and over flight as well as freedom to lay submarine cables and pipelines.

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Legal Definition of Continental Shelf (based on Art. 76 LOSC)

- Continental Shelf extends to:
 - 200 miles from the baselines or
 - to the outer edge of the continental margin ... whichever is further

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These are of course not within and the continental shelf it extends to 200 miles from the baseline or to the outer edge of the continental margin whichever is further. This is based on the Law of the Sea convention.

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Important agreements reached at UNCLOS III

- Every State has the right to establish the breadth of its territorial sea up to a limit not exceeding 12 nautical miles.
- Contiguous zone up to 24 nautical miles from the shoreline for purposes of enforcement of customs, fiscal, immigration, or sanitary laws.
- Exclusive economic zone up to 200 nautical miles from the shoreline for purposes of exploring and exploiting, conserving and managing the natural resources, whether living or non-living, of the waters superjacent to the sea-bed and of the sea-bed and its subsoil.
- The resources of the seabed and ocean floor and subsoil thereof beyond the limits of national jurisdiction are the common heritage of mankind.
- An International Seabed Authority will organize, carry out, and control activities associated with the exploitation of the resources of the international seabed.
- A parallel system will be established for exploring and exploiting the international seabed, one involving private and state ventures and the other involving the Authority.
- A so-called Enterprise will carry out activities in the international seabed for the Authority and will be responsible for transporting, processing, and marketing minerals recovered from the international seabed.

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So, the important agreements which have been reached in the United Nations Conventions and Law of the Sea that is that every state has the right to establish the breadth of its territorial sea up to a limit of 12 nautical miles; contiguous zone of 24

nautical miles from the shoreline for the purpose of enforcement of customs, fiscal immigration and sanitary laws.

EEZ upto 200 nautical miles from the shoreline for purpose of exploring and exploiting, conserving and managing the natural resources; Resources of the sea bed and the ocean floor subsoil they are thereof beyond the limits of the national jurisdiction are the common heritage of mankind. So, here anything which is beyond the 200 nautical miles will have to be under some kind of an international statutory body. So, here comes the creation of these bodies which is the international seabed authority. So, the international seabed authority has been formed to look into, to regulate the exploration and exploitation of resources which have beyond the exclusive economic zone.

So, it is almost like in a way very much in line with in a particular government when any particular mineral agency wants to do exploration work or mining work, it has to apply for the permit and for the license and the government grants that particular permit or the license under certain restrictions and clauses guided by the national mineral policy and other clauses of law of the land.

This overall is a similar way that international seabed authority is the agency who will grant permit to a particular country for delineating the particular area in terms of several hundreds of square kilometers or so. There are some specific rules and the country which will be doing the exploration and the exploitation have to pay in terms of money to that the particular seabed authority and will be allowed to exploit and then the part of it also has to be the particular country whatever is the area that is granted, it will be allowed to exploit a particular part of it not the whole.

And for the rest of it to be left for future and there are so many other detailed clauses there in that which will be possibly discussing later in our classes. Without getting into much of a scope of a very detailed discussion on the Law of the Sea, but these are some of the salient features. And this Law of this Sea is an example of what we can have as a policy the international policy like what we have a national mineral policy in a national prospective.

Thank you very much. We will again continue discussion on mineral economics.