MODULE EIA, LESSON 6
MARINE MINERAL RESOURCES: ECONOMIC AND SOCIAL PERSPECTIVES

LECTURE NOTES

Greetings, my name is Saleem Ali. I am the Chair of the Department of Geography and Spatial Sciences at the University of Delaware in the United States, and I'm also a member of the United Nations International Resource Panel. In the next 10 to 15 minutes, I'm going to share with you some general ideas of how social and economic impacts of deep-sea mining can be evaluated, especially in comparison with terrestrial mining.

So we're going to first talk about social impact analysis variables and how those could be measured. We'll also consider economic development indicators at a broad level. We'll then consider comparisons and how those methods could be applied to compare oceanic and terrestrial mining.

And then finally, we will consider forms of capital and how that might figure into potential compensation payments. So this is a graph from a paper published in 2018, which considers social impact analysis of mining projects more broadly. And what we have here are six different categories of social impacts which could be measured.

You've got economic income and security issues, employment and education, land use and territorial aspects of the project development, the demography, which is referring to population movements, environmental health and safety, which is often considered a separate category of impacts. But because there is a clear connection with social issues, it's often an overlap area that's presented in assessments. And then finally, human rights concerns.

And in this particular paper, they analyzed a range of mining projects worldwide, and they considered the positive and the negative aspects in each of these social impact categories. And clearly on the environment and human rights area, the impacts were largely considered to be negative. But in economic and educational areas and income security, there were clearly some positive impacts as well.

So a lot of the social impact analysis is about how we are able to navigate these pros and cons of development and consider the ways in which then compensation mechanisms can be framed. A very powerful tool that has been developed over the past two to three decades to evaluate impacts, especially when you're comparing different kinds of techniques or different kinds of projects, is what we call lifecycle analysis. And lifecycle analysis comes from the field of industrial ecology, where you look at the full product cycle, looking at it from the point of view of origin of the resource.

So in the case of mining, it could be all the way down to the exploration phase of mining, and then through the production cycle, the use of the material and then its disposal or its recycling back into

a circular economy. Understanding that full range of impacts using different metrics allows you to then get a much more systems-oriented perspective on impacts. Often LCA is used in the context of environmental impacts, but it can be used in social impacts as well.

In fact, there is a very large field of social LCA analysis, which is particularly useful for comparing deep sea mining and terrestrial mining projects. This diagram is showing you the schematic from a paper which was published by a few of us to consider the lifecycle impact of carbon emissions related to deep sea mining versus terrestrial mining. But the same tools could also be used for social impact analysis.

So here, we're looking at the LCA or DSM for deep sea mining. And you can see that it starts off from the collection phase, all the way through the process and refinement, and then figuring out at each phase what are going to be the social impacts. So in the case of the ship collection, it could be the impacts on the port facilities, it could be also on potential fishing that may be disrupted as a result of the activity, what kind of mitigation measures might be conducted as a result.

So that kind of a lifecycle analysis approach gives you a much more holistic and much more systems oriented analysis that can be more useful than just a very pointed analysis of specific impacts. Now, this is a diagram specifically showing social lifecycle analysis. Since this module is about the social impacts, I thought I'd give you an example of social impact analysis variables.

This is coming from the Swedish University of Agricultural Sciences, and I found it to be particularly useful because it lays out these different kinds of inventories you would need, the kind of data you would need to collect to do the social risk analysis. You would also put some weighting on different kinds of variables based on how important they are for stakeholders. So it's not just enough to measure the impact, but how much weighting you will give.

And then you would also look at, for example, the social hotspot index, which would be related to the kinds of sensitivity areas that might be there. So for example, indigenous peoples concerns, there could be sacred sites issues and so on. This is especially true, again, more for terrestrial mining and less so for deep-sea mining.

And that's why often in the context of this comparison, we will find that deep sea mining in terms of social impact analysis may not have as much of a deep-rooted impact as terrestrial mining. Of course, the environmental side is where there is much more controversy with comparing the deep-sea mining versus the terrestrial mining arena. So how do we do comparisons in this regard? More broadly, this is just to give you a figurative view of what these comparisons might entail.

The painting is actually representative of how sometimes social impacts are interwoven with the landscape, with terrestrial mining. And this is an example, the painting is from part of Pennsylvania in the United States, where the artist is trying to show how a large mine, which is shown from that mountain top, is integrated into a community with playgrounds and so on. There is this kind of fear factor sort of looming over the town of what could happen with risks, but the community has figured out a way to navigate those risks and integrate themselves.

So that's how we need to think about the comparison between the terrestrial and the deep-sea community, because you do not have that same kind of close proximity of communities to the mining site itself. The communities are going to be on shore and the actual mining is, of course, being done in the deep sea, where there is no human population. In the cases of coastal mining or where some deep-sea deposits might be closer to coastal areas, that would be a different story.

But for the Clarion-Clipperton zone, where most of the deep-sea mining activities are proposed in the short term, that is going to be less of a concern, except for in the context of fishing. So these are just some four areas that we should be conscious of with reference to deep sea mining and its social impact. First, there is this general sense that there is no displacement of human population or property, so you don't have property rights regimes as you do with terrestrial mining.

In terrestrial mining, often you have to dislocate populations where the deposit is and there are resettlement programs which have to be developed. That's not going to be the case with deep-sea mining in terms of human habitation. Second, you have occupational risk issues that terrestrial mining has, especially with reference to individual miners who have to go underground at times or have to work in open pits, and so the occupational hazard is considerable.

Whereas with deep sea mining, the occupational hazard is of being at sea oftentimes and of the refining equipment itself and how that's managed. But the actual mining is going to be done remotely with machinery. So while there are going to be risks in terms of the vessel itself, it's not going to be of the same level as large contingents of miners going into the pit or into the underground deposit tunnels and so on.

Thirdly, there's the cultural connectivity aspect which in the case of terrestrial mining is very acute because human populations have lived many times on the surface where the mine deposits are. We saw this especially with Aboriginal heritage in Australia very recently where there was a sacred site that got desecrated by a large mine. You do not have that close connectivity to archaeological heritage in the case of deep-sea mining.

Though there may be some cultural connectivity for seafaring communities and their sense of spirituality that's linked to those areas, but it will not be of the same kind in terms of archaeological heritage. There may be in some cases shipwrecks which could be disturbed, so there could be cultural heritage in those terms in certain parts of the ocean and those have to be considered. There is a whole field of maritime archaeology which should be considered in that regard.

But finally, fishing and open access, that is going to be the biggest concern in terms of comparative social impacts between terrestrial and deep-sea mining because fishing in open areas already we have a concern with the tragedy of the commons where open access and not having very clear governance mechanisms around fishing can lead to problems. So what you may have if there are any impacts on fisheries of deep sea mining activity that could lead to pressure in other areas where there is more abundant fishing available and so that could create some kind of disruptions which will need to be very carefully managed accordingly. So fishing will no doubt be one of the key areas of much closer social impact analysis and defining the evaluative processes therein.

Now a good way to consider the different economic perspectives around deep-sea mining and its comparison with other forms of mining is what we call the five capitals approach. And these five capitals are human capital, natural capital in terms of environmental services and so on, financial capital, physical capital and social capital. And this pentagon lays out some of these areas in terms of their nexus with different kinds of material and financial flows.

So if you're thinking about deep sea mining and the kind of physical capital that's going to be needed there's going to be an entire industry that goes into the construction of that physical capital. There's a research and development enterprise which may well go into that whereby people will be able to explore the deep sea and so a lot of that kind of maritime infrastructure development would be part of the economic opportunities as well as potentially the costs of undertaking such activity. In terms of the social capital this would be very interesting to consider with collaborations that are required according to the International Seabed Authority between sponsoring states and the private sector.

So that the model of development with the International Seabed Authority has the potential to generate social capital and collaborations between players which might not otherwise be involved. This is especially true of small island developing states who might not have had opportunities to engage in such collaborations. So they will potentially have more power than they would otherwise with reference to terrestrial mining because they do not have to have the resource themselves to engage in such collaborations.

The human capital is the labor force often that's going to be needed. In this case the livelihood impacts are going to be much less than they would be for terrestrial mining. You do not have as much employment opportunity directly but then there may well be more high-end high-paid jobs in terms of research and development and engagement and enforcement efforts therein.

And then you've got the opportunity for financial capital being generated and the ways in which there will be potentially this whole industry of recycling of metals and batteries which is what is proposed with deep sea mining that circular economy will eventually be created. And so there will be some very interesting aspects of how global markets connect to this kind of a new circular economy of battery metals which is proposed by many of the contractors who are involved in deep sea mining activities. And therein how that's going to be developed we will see based on the financing mechanisms that evolve.

So the deep sea mining economic linkages they can be considered in terms of this nested Venn diagram where the environment is the ultimate set and the society and the economy are subsets therein. And we need to think about how deep sea mining is then going to connect with terrestrial mining especially in terms of the loss of revenue that would happen for terrestrial mining countries under the law of the sea convention and something that you will cover in other modules. Clearly there are provisions for compensation mechanisms that come from that kind of impact that might occur.

So countries which have large reserves of metals that will now get sourced from the deep sea what could be the impact on those economies. However it's important to consider the positive

opportunities that may happen from diversification of those economies. So a country like the Democratic Republic of Congo which currently supplies almost 70 percent of the world's cobalt would have an opportunity to now diversify if they're getting compensation potentially so that they can move away from just being so dependent on a mineral economy which itself distorts a lot of the economic profile of a country if there is so much dependence on one particular industry.

Then you have also the economic linkages with the blue economy which will be worth considering as the United Nations system considers the way in which we use the ocean in a more sustainable way. We have to consider both the positive and negative aspects of TSM on the blue economy. The positive aspects could be the involvement of small island developing states and how they could use the revenues from deep sea mining to develop their own economies in other areas and that's certainly the approach that countries like Nauru and Tonga have proposed but it could also potentially backfire if it is not managed well.

So that's going to be key in terms of the linkage to the blue economy. Thirdly there could be revenues from sponsoring states which might not have direct resource base that is very important to consider. So you have also countries like Belgium and the developed world who are involved in deep sea mining sponsorship potentially.

How we consider the ways in which these countries which do not have a large resource space themselves but host companies, what would be the impact in those countries directly of those financial flows coming through. So that should be an important part of the analysis. And then finally there is an opportunity for an ecosystem service net ecosystem service analysis to consider economic linkages.

So there could be negative and positive aspects on ecosystem services provided. Clearly there is a concern in terms of the impact on the deep sea ecosystem and if that is going to for example disrupt certain organisms that provide nature-based services we would need to account for those. Whether that has to do with the way in which carbon is cycled through the ocean or whether it has to do with other kinds of nutrient flows that will be part of that ecosystem service evaluation and that should be part of some kind of a natural capital accounting mechanism.

Similarly deep-sea mining can also be considered in the context of carbon accounting. If it can help with a greener transition to battery metals being used for renewable energy technologies then it also has that acceleration impact in terms of carbon accounting that could be very beneficial as well if it's considered in those systems. But then there is also the actual operational carbon accounting that is worth considering when you compare the metals being sourced from deep sea mining versus terrestrial mining in countries.

If they're able to reduce their carbon footprint of extraction by doing deep sea mining that would also go into the carbon accounting framework. So thank you so much for your attention and looking forward to having your engagement online later.