SUSTAINABLE MINING AND GEOINFORMATION

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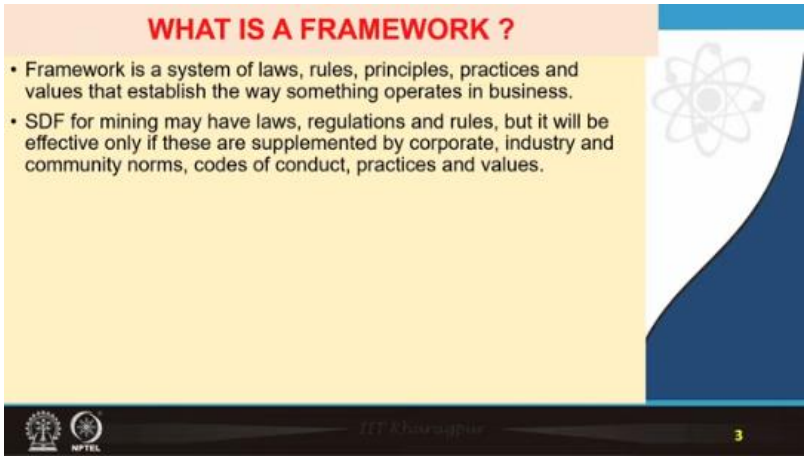
Week – 06

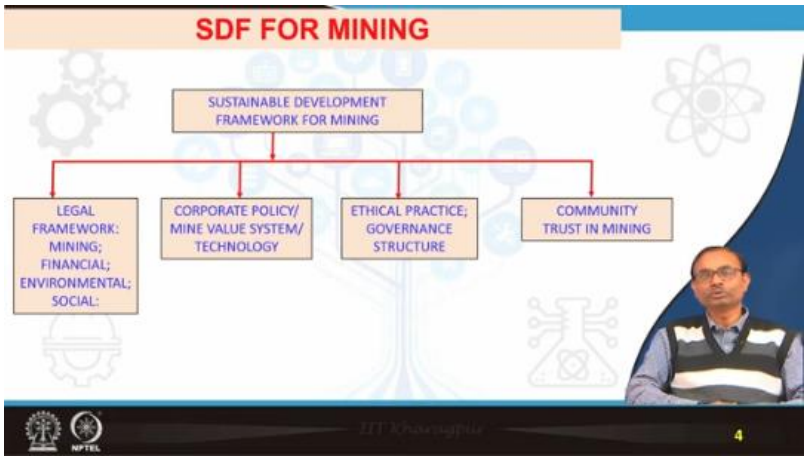
Lecture 30: SDF for Mining Industry-II

Welcome students to lecture thirty of the NPTEL online certificate course on sustainable mining and geoinformation. As I told you in the last class, we will continue our lecture on the Sustainable Development Framework for the Indian mining industry, and this is the second lecture on this topic. In the last class, we also discussed the same topic, and today, we are continuing on the same topic, and we will discuss the topic more in the Indian context.

The concept covered during this class is the same; it is the sustainable development framework parameter for the Indian mining industry.



Now, what is a framework? For your informational knowledge, when we say a framework, it means or refers to a system of laws, rules, principles, practices, and values that establish the way something operates in a business or an industry. The sustainable development framework (SDF) with respect to mining industry, it will consist of laws, regulations and rules, but this legislation is not the only thing. The sustainable development will not be effective only with this regulation. It will be effective if the regulation is supplemented by corporate, industry and community norms and practices, their course of conduct, their value system. So, both the legislation from the government side, the practices, values, SOPs from the industry and the relationship of industrial practices with government as well as the community; all these things when they are systematically codified that is what we are referring to as a framework.



Today, we talk about the sustainable development framework for the mining industry. With respect to the sustainable development for mining, what are the components or constituents? One is the legislation that is the legal framework on which the mining industry runs, the financial reporting of the mining industry, the environmental legislation,

and legislation with respect to the social component of the mining industry. All these legislations have to be complied by the mining industry. So, this is the legal framework. Then we have the corporate policy. Many mining industries are part of big industrial conglomerates. Let us say, Tata Steel or Vedanta. They are multi business kind of industry. They have a corporate policy and then there is a mining unit. So, mining industry is not isolated from their corporate. So, the corporate policy have to be complementary for the sustainable development. So, what is the corporate policy with respect to the sustainable development that is also important. Value system, principle on which mines is believing that is also important. All technologies, which are practiced in the industry, are part of sustainable development because by using technological advancement, we can achieve economic growth and thus sustainable development. The third thing is the ethical practices and governance system. The mining business has to be ethical; there has to be transparency, zero tolerance against corruption; there has to be a commitment to worker safety and the safety and development of the community. So, a governance structure, institutional mechanism should be there. Departments through which the company policy for the environment, for the community, and for the safety of the people are implemented have to be institutionalized. That is the governance structure. Last issue is community trust in mining. A mining company should have interaction with the community, and mining companies should have positive attitude towards the community, and on that basis, the community will have confidence and trust in mining. So, if all these things are together, it will lead to sustainable development of the mining sector.

So, in the last class, I showed you the ICMM principle. In the international arena, ICMM came with 10 principles. We can go through these principles. What are these 10 principles? Maintain ethical business practices and governance; integrate sustainable development principle with corporate decision-making process; respect human rights, respect culture, customs values of community; risk management strategy based on valid data and sound

science; focus on health and safety performance; improvement in the environmental performance; conservation of biodiversity, integrated land use planning; facilitate responsible product design, recycling and disposal of product; contribute to social economic and institutional development of communities ; effective engagement communication and reporting with all stakeholders particularly to the community local community. So, these are the ten principles of the ICMM but as you know ICMM they are international body and their ah perspective is from the international business point of view. It is not necessary that all these ICMM 10 points will be relevant or applicable for the Indian mining industry because India has socio-cultural setup and our regulation, our vision for growth, and vision for development, will have link with our socio-cultural context. So, keeping the socio-economic, cultural context, and Indian context in mind, it is not necessary that all these 10 points will apply to us. We can take some of the important points from those 10 principles.

We can think about those principles while we are developing the sustainable development framework for Indian mining. if you remember the last class, the Hoda committee developed the sustainable development framework. They studied all these things, and they selected 5 important elements or principles from those 10 principles, and as per the committee, they are more relevant to our Indian mining industry. They selected 5 important principles from those 10 principles. So, what are they? One is scientific mining, which is the use and utilization of advanced science and technology for mining. Whether it is the mining methodology, whether it is the advanced equipment and machinery, whether it is the environmental protection technology, or treatment technology. So, science and technology, research and development are very, very important for the mining industry. So, this is one element of our sustainable development framework in the Indian context. Second is the environmental protection and mitigation including measures for protection of biodiversity. For mining industry, environmental protection is very very critical. We all

understand, how mining industry in many cases, is degrading the environment and we have to take environmental protection measures to protect our ecosystem to protect our natural resources and to mitigate our pollution. In this regard, special focus and thrust is to be given to biodiversity. We have to protect our biodiversity. So, this is the second element of the SDF. Third is community and stakeholder engagement. Community is the third most critical element of the SDF. In mining industry, the local community is strongly affected, they have to bear the brunt of the pollution and degradation of the natural resources. So, mining industry has to deal with the community and how they can protect the community, how they can pass on benefit to the community. Further, they have to engage with the community; they have to identify the requirements of the community, what programs, or projects they can execute for the betterment of the community. So, community engagement is one critical element, as per the committee report on the SDF. Then, local socio-economic development in mining areas: What developmental projects the mining industry is executing for the betterment of the local people or the community. That is one critical element. Then transparency and accountability, i.e. Governance in the mining industry. The mining company may do a lot of work on the economy front and on the environmental protection front for the betterment of the local community, but this has to be communicated effectively to the community, to the government, to the regulators, and to the civil society. So, sustainability reporting is also very important. We have to do the socio-economic development work, but at the same time, we have to also communicate to the people and tell them that we are doing so much work, so many projects for you, which will be beneficial for you. This is the sustainability reporting.

Now, we will be talking about all these five sustainable development framework parameters. Scientific mining: If you look at the different mining legislation, they encourage practicing exploration, mining development, and extraction activities based on

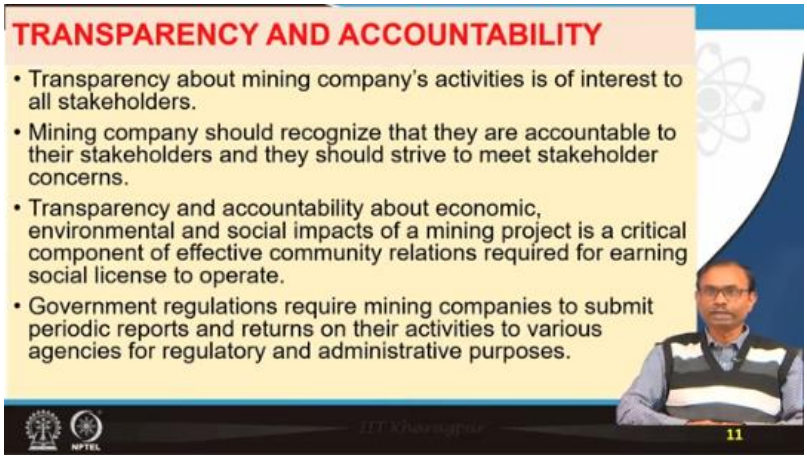
advanced scientific technology. Our legislations always advising and encouraging companies to adopt the best technology for efficient exploration, efficient exploitation of the resource, for proper environmentally sound handling of the mining waste, and for reclamation and revegetation. So, science and technology are the core for efficient mining and for environmentally benign mining. So, advancement of science and technology can be used for systematic development of mineral deposit, conservation of minerals, scientific storage of topsoil, so that the topsoil quality does not deteriorate. Subgrade and sellable minerals we have to conserve because, In the future, they will become resources. The company will generate revenue by selling them. Re-vegetation in the mining areas. Utilization of tailing. Tailing is a waste material that will create pollution. But if you, through R&D and technology development, can convert those tailings to useful products, they will be an asset to the company. Control of air, water, and noise pollution using technology: these are the applications of science and technology for economic mining, environment-friendly mining, and this will lead to the sustainable development.

The second point is environmental protection and biodiversity protection. Mining and environmental regulations in our country have provisions for protecting the environment and minimizing the impact of mining on biodiversity. Normally, environmental impact assessment study is carried out before the start of the mining, but then when the mining is executed, we have to take environmental protection measures for mineral waste management and proper disposal; Control and management of emissions effluent and waste material to comply with the environmental standard that is mandated in the legislation.; We have to carry out reclamation and rehabilitation of mined-out land. We have to go for plantation, vegetation, and the creation of green belt in the mining areas. State and central agencies like the State Pollution Control Board, Central Pollution Control Board, Indian Bureau of Mines, other central government agencies like MOEF, Central Ground Water

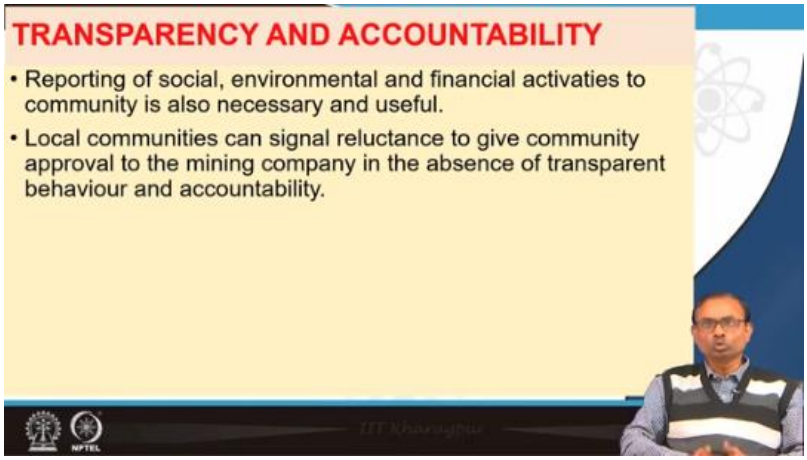
Board, and many government agencies have been mandated to ensure the implementation of environmental laws in mining. The Ministry of Environment, Forest and Climate Change, CPCB, and State Pollution Control Board have been given the mandate.

Now, socio-economic development in the mining areas: Local area socio-economic development is a corporate business obligation, CBO. The mining company has a moral duty, or as per the regulation, they have to create alternate capital, that is the physical infrastructure. They have to develop human capital to compensate for present and future generations in the mining area, in the mining locality, for the loss of natural resources, that is, minerals and the natural physical capital like air, water, and soil. Execution of socio-economic development projects in the mining area will help obtain "social license to operate". So, if the company creates alternate capital in lieu of the loss of natural capital like mineral resources, air, water, and soil. This will help the company obtain a social license to operate. Most mining companies undertake socio-economic development through different mechanisms, particularly through the CSR route.

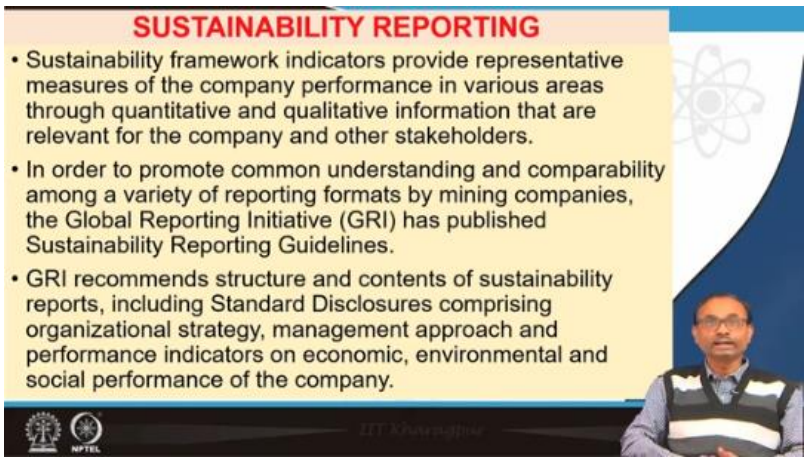
Structured institutional mechanisms and procedures are required for assessing the needs of the community. When we want to develop and execute some developmental project, first we have to assess the need of the community. The company has to plan and prepare for project proposal. Then execution of community development project, who will be executing the development project? Whether the company, whether certain departments of the company? Or it will be done through some NGO or some trust? We have to think about this when you are executing the projects. The projects have to be monitored and evaluated to ascertain their success. Community representatives must be involved in these processes. When we are assessing the need of the community, when we are planning project proposals, preparing project proposal, executing, monitoring and evaluation of the projects; all these stages the community representative should be involved. Performance indicator and reporting requirement needs to be prescribed. Now, as I told, the company itself may do it, they may establish some trust or NGOs can do these activities. Sometimes collaboration with the government agencies also may be helpful or may be desirable.



Transparency and accountability: Transparency about mining companies' activities is of interest to all stakeholder. Mining companies, should recognize that they are accountable to their stakeholders and they should strive to meet the stakeholder concerns, particularly the community. Transparency and accountability about economic, environmental and social impact of a mining project is a critical component of effective community relations required for earning social license to operate. Government regulations require mining companies to submit periodic reports and returns on their activities to various agencies for regulatory and administrative purposes.

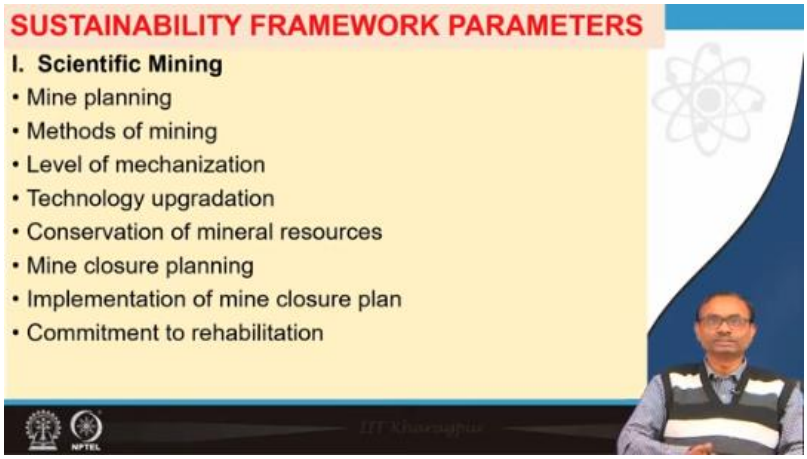


Now reporting of these social performances, environmental performances and financial performances to community is also necessary and it will be helpful for sustainable development. Local communities can signal reluctance to give community approval for the mining company in the absence of transparent behavior and accountability on the part of the mining company or if the company does not communicate with the local community. If the company does not address concerns of the local community or does not provide any information to the community, then the community they can disapprove or hesitate to give the social license to operate. In many such cases, they will be uncooperative and without cooperation of the local community, the mining industry cannot continue.



Sustainability reporting: sustainability framework indicators provide representative measures of the company performances in various areas, like social sector, economic sector, environmental sector, and community sector. And these performance indicators they may be quantitative and qualitative. The performance indicators are relevant for company and other stakeholders including community and government. So, in order to promote common understanding and comparability among a variety of reporting formats by mining companies, the global reporting initiative GRI has published sustainability

reporting guidelines. You can take a look at what are the sustainability reporting guidelines provided by the GRI and many companies or ICMM also they are following these GRI initiatives. GRI recommends structure and contents of sustainability reports including standard disclosures comprising organizational strategy, management approach and performance indicators on economic, environmental and social performance of the company.



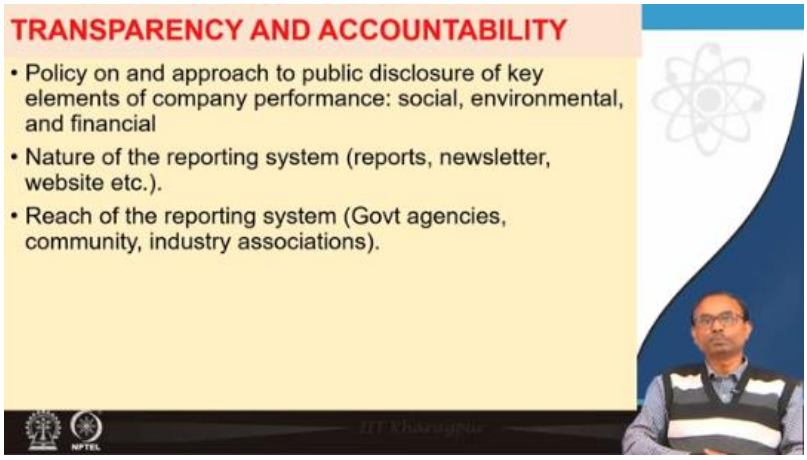
So, now we come to the different in a elaborated way the different sustainability framework parameters. So, scientific mining: what are the main salient parameters in the scientific mining? How science and technology can be used for efficient mine planning? Improved methods of mining, both technically sound and environmentally sound. Levels of mechanization, what are the different type of new advanced equipment we can use in the mining company for better productivity and safety. Technological upgradation using these scientific means how we can conserve our mineral resources, we can do better mine closure planning and implement mine closure plans. Lastly commitment to rehabilitation is very, very important.

Rehabilitation of degraded land is very important. In environmental protection, some of the main salient points are: what was the land use before the mining, what will be the land use after the mining, what is the desirable land use, water use. A lot of water we are handling in the mining and water is a scarce resource. It is going to very critical. So, we have to preserve our water, and we have to use water and energy efficiently. Energy is an essential expenditure of mining, and because of the energy, there is a lot of greenhouse gas effect, and carbon footprint. So, we have to use energy efficiently, whether from non-renewable sources or renewable sources. Waste minimization and tailing management: The mining industry is producing a lot of waste. So, how can we reduce waste, when we are producing a lot of tailings? How are we handling the tailings? In an eco-friendly, environment-friendly manner, and how we can convert our waste to resources using science and technology. Air pollution, liquid effluent and solid waste management, these are critical environmental parameters. Dust is an important environmental parameter in mines. Other important parameters are: noise and vibration control, and biodiversity loss. The mining industry, particularly when removing forest cover, may result in biodiversity loss. We must explore how to mitigate and re-establish biodiversity. Environmental compliance is essential, and there are regulations we must follow. We should also go beyond compliance through voluntary actions and adopt major environmental reporting standards like ISO 14001. Obtaining ISO 14001 certification will help in gaining environmental capital.

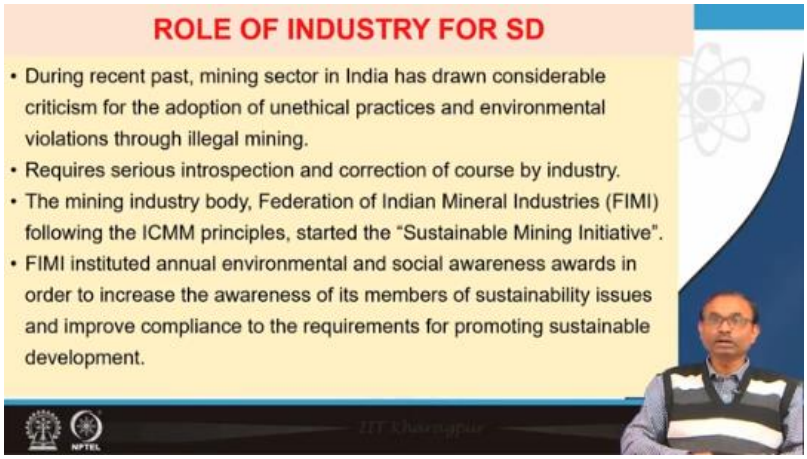
Community stakeholder engagement is critical for sustainable development. It is one of the key parameters in the SDF. Policies on stakeholder involvement in mining operations, mechanisms for participation and consultation in decision-making, and established procedures for addressing grievances are necessary. Procedures and institutions must be established, to handle stakeholder grievances and concerns. Policies and principles to

address indigenous community grievances, especially since mining often occurs in forested areas with tribal populations. Policies on business ethics, approach to corruption, equality, and gender discrimination are very important. There should be clear guidelines on conducting business regarding these issues, including approaches to bribery, competition, and resettlement of communities affected by mining projects. Open-cast mining often displaces people, so policies for their rehabilitation are crucial.

Socio-economic development in mining areas requires procedures for assessing impacts, preparing area development plans, and implementing projects to generate local income. Mechanisms for creating local employment, such as skill centers, artisan centers, or training programs, are vital. Investment in the community, mineral wealth distribution, and contributions to local employment should be prioritized. Company commitments to education, training, and skill development for locals are important. Contributions to physical infrastructure like roads, schools, hospitals, community centers, and sports facilities in mining areas should also be emphasized.

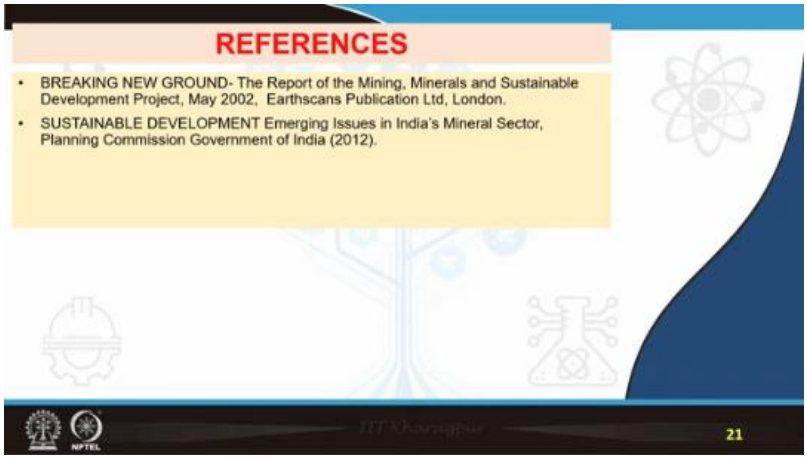


Transparency and accountability policies should include public disclosure of key performance elements like social, environmental, and financial metrics. Reporting systems should detail how social, environmental and financial performance is communicated to stakeholders via reports, newsletters, websites, and public advertisements. Sustainability reports must be accessible to stakeholders, including government offices, agencies, communities, and industry associates.



These are key parameters in the sustainable development framework for Indian mining industries. The industry plays a crucial voluntary role in sustainable development. Without genuine commitment, progress is unlikely. Recently, India's mining sector has faced criticism for unethical practices and environmental violations. Illegal mining has been a major issue, requiring industry introspection and correction. The Federation of Indian Mineral Industries (FIMI) launched the Sustainable Mining Initiative, instituting annual awards to raise awareness and improve compliance. The industry is a critical part of the sustainable development triangle. FIMI's initiatives aim to enhance awareness and compliance, promoting sustainable practices in mining.

In summary, we discussed the sustainable development framework for the Indian mining industry.



These references provide further insights. With this, we conclude the lectures on sustainable development frameworks. The next class will cover a new topic: sustainable development in Indian mining. Thank you.