

# SUSTAINABLE MINING AND GEOINFORMATION

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Lecture 35: SDG 7, 8 & 9

Welcome, today we will discuss on this lecture on sustainable development goal number 7, 8 and 9. So, the concepts we are going to cover are the geo information, its utility for promoting clean energy in mining operations. The utility of geo information technology for sustainable economic growth and decent work in mining communities and the utility of geo information for infrastructure development and sustainable industrialization in mining regions. We will also have case studies that leverage the geoinformation technology for the benefit of sustainable mining and thereby realizing the sustainable development goals number 789. So, goal number 7 deals with affordable and clean energy.

**CONCEPTS COVERED**

- GeoINFO for Promoting Clean Energy in Mining Operations (SDG 7)
- GeoINFO for Sustainable Economic Growth and Decent Work in Mining Communities (SDG 8)
- GeoINFO for Infrastructure Development & Sustainable Industrialization in Mining Regions (SDG 9)
- Case Study: Leveraging GeoINFO for Sustainable Mining and Development

The slide also features icons for SDG 7 (Affordable and Clean Energy), SDG 8 (Decent Work and Economic Growth), and SDG 9 (Industry, Innovation and Infrastructure) in the top right corner. Logos for IIT Kharagpur and NPTEL are visible in the bottom left corner.

**Goal 7 Affordable and Clean Energy**

Ensure access to Affordable, Reliable, Sustainable, and Modern Energy for all

- By 2030, ensure universal access to affordable, reliable, and modern energy services
- Enhance international cooperation to advance clean energy research, technology, and investments while upgrading infrastructure for sustainable energy in developing countries
- The Global Tracking Framework, developed by the World Bank and IEA, tracks electricity access progress
- India has 58% of its land area receiving over 5 KWh/m<sup>2</sup>/day of solar energy, making solar a key clean energy source
- Renewable Energy growth relies on Investments, New Technologies, and Mining of key minerals like Lithium and Cobalt for Solar Panels and Wind Turbines
- Satellite imagery monitors power grids, solar farms, and wind turbines for maintenance and expansion. Thermal infrared sensors (e.g., on Landsat) detect heat loss from energy infrastructure to improve efficiency

Share of primary energy consumption from renewable sources, 2012  
Measured as a percentage of primary energy using the substitution method. Renewables include hydropower, solar, wind, geothermal, biomass, wave and tidal, but not traditional biomass, which can be a bio-energy source, especially in lower income settings.

Source: Energy Institute - Statistical Review of World Energy 2011  
Harnath et al., 2011

So, what does it mean? It ensures access to affordable, reliable, sustainable and modern energy for all who are directly or indirectly attached to mining sector living within and the periphery of the mining industries. So, by in this particular domain by 2030 it needs to be ensured that universal access to affordable reliable and modern energy services are ensured for all. thereby to enhance international cooperation to advance clean energy research technology and investments while upgrading infrastructure for sustainable energy in developing countries be it for this case the mining industry. So, the global tracking framework developed by the World Bank and IEA they tracked international energy agency tracks the electricity access progress.

So, as far as our nation India is concerned it has about 58 percent of its land area receiving over 5 kilowatt hours per meter square per day of solar energy making India a clean energy source as far as the solar energy is concerned. So, many of our mining industries mining areas are located with means located in India do receive a very high amount of solar energy in terms of per meter square per day that is how the areas are also well suitable as far as trapping the solar energy sources. The renewable energy growth relies on investments, new technologies and mining of key minerals like lithium and cobalt for solar panels and wind turbines per se. So, in this way what happens for this case the satellite imagery monitors the power grids, the solar pumps, wind turbines for maintenance and expansions, thermal infrared sensors such as which is available from ASTER or Landsat and many other sensors like that detect heat loss from energy infrastructure to improve the energy efficiency. So, how the target 7 can be achieved or can be benefited using geo information technologies going to subsection of target 7.1 that defines universal access to affordable reliable and modern energy services.

**Targets Achievable Using Geoinformation**

Share of electricity production from hydropower, 2022

**Target 7.1: Universal access to affordable, reliable, and modern energy services**

- Identifying suitable locations for energy infrastructure, including solar farms and electricity grids, using spatial analysis.
- Tracking progress of electrification in remote areas and to assess the availability and reliability of energy supply in mining towns and facilities.

**Target 7.2: Increase the share of renewable energy in the global energy mix**

- Identifying optimal locations for solar, wind, and hydropower projects considering land use, topography, and environmental constraints.
- Geospatial tools can evaluate the feasibility of renewable energy projects (solar, wind, and hydropower) to reduce reliance on fossil fuels in mining.

**Target 7.3: Double the global rate of improvement in energy efficiency**

- Integrating GIS for smart urban planning that reduces energy consumption through optimal transport networks and building designs.
- GIS tools can improve the design of haul roads and transport networks, reducing fuel consumption and emissions.

In Mining areas, GeoINFO are highly applicable for Energy Planning, Efficiency Improvements, and Infrastructure Development, aligning Mining Operations with the Targets of SDG 7

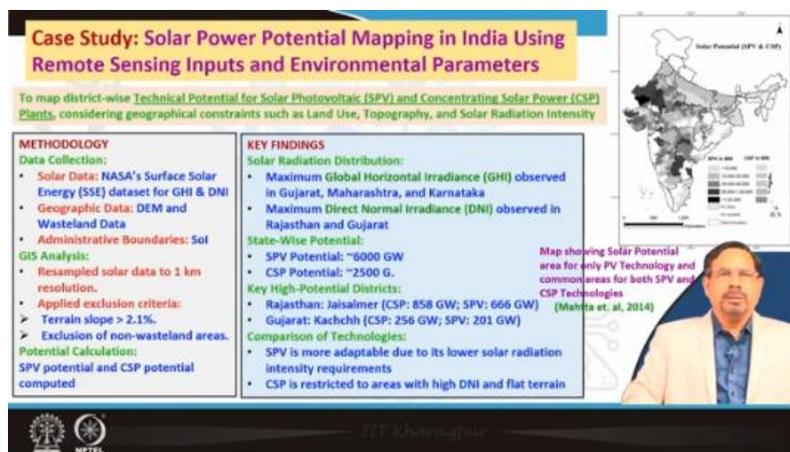



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Here, in terms of identification of the suitable locations for energy infrastructure including solar farms, solar and the electricity grids, we may need the help of the support of geoinformation tools for various spatial analysis. Tracking progress of electrification in remote areas and to access the availability and reliability of energy supply in the towns that are located around the mining areas and its facilities can be very well done using geoinformation technologies. So, target 7.2 that aims at increasing the share of reliable energy in the global energy mix. So, here remote sensing can be useful in identifying the optimal locations for solar wind and hydropower projects considering the land use distribution pattern the type of land use and land cover the topographical variations and also various environmental constraints can be taken into consideration using the geoinformation platform. So, the geospatial tools can evaluate the feasibility of renewable energy projects such as solar, wind and hydropower to reduce reliance of fossil fuels in the mining industry sectors.

Coming to target 7.3 that envisages the double means targets that the double the global rate of improvement in terms of energy efficiency that may be expanded or that may be included under the mining areas or the mining sector. Here also the geo information is useful in terms of integrating through its GIS platform for smart urban planning that reduces energy consumption through optimal transport networks and building designs. So, geoinformation can improve the design and in terms of how roads and transport networks thereby reducing the fuel consumption and emissions. So, the state of electricity production from hydropower plants for the year 2022 is shown in terms of a map for the whole globe on the right hand upper right-hand corner. So, here what we can see that yes using geo information these kind of various maps in terms of their products potential as far as hydropower production or many other renewable energy sources such as solar and wind can be brought out.

So, in mining areas that means the areas that fall under the mining sector here also remote sensing such as remote sensing and the umbrella technology the geo information is highly applicable for energy planning efficiency improvements and infrastructure development. These all can well align in mining operations with respect to targets of sustainable development goal number 7. Coming to a case study such as solar power potential mapping in India using remote sensing inputs and environmental parameters given by Mahtta et al published in 2014 over India. So, on the right-hand side we can see a map showing the solar potential area for only the photovoltaic technology and the common areas for both the the potential for solar photovoltaic photovoltaic and the CSP that is concentrating the solar power plants using the geoinformation technology. So, what they did they tried to map at district level both the SPV and CSP the technical potential for solar photovoltaic and concentrating the solar power plants by considering the geographic constraints such as land use topography and more importantly the solar radiation intensity.



The methodology they followed are they try to collect the data as far as the solar data is concerned they use the NASA's SSE surface solar energy data set for the GHI that means global horizontal irradiance and for calculating the direct normal irradiance which is abbreviated as DNI. The geographic data in terms of DEM and was collected from ASTER and SRTM particularly and the Westland data has been collected from the Westland Atlas of the country and various administrative boundaries have been picked from the Survey of India. As far as the geo information-based analysis is concerned, they resampled the solar data to 1 kilometer resolution so as to match with the resolution of other data sets used in the study. And applied exclusion criteria such as terrain slope which is more than 2.1 percent, exclusion of non-watershed areas and also the they use in terms of potential calculation the SVP potential and CSP potential were computed. So,

the key findings out of this study by Mahtta et al 2014 are solar radiation distribution particularly the maximum GHI and the DNI could be observed in Gujarat, Maharashtra, Karnataka

And for DNI it was observed in Rajasthan and Gujarat states respectively. It can be visualized with respect to the availability of solar radiation intensity which is relatively better in terms of these states. So, also the land use and topographical variations. The statewide potential in terms of SPV and CSP is approximately 6000 gigawatt and 2500 gigawatt respectively. And the key high potential districts particularly Jaisalmer was identified located in Rajasthan as the key high potential district and for Gujarat it is the catch.

So, the the various potential in terms of the CSP and SPV are mentioned in the bracket in terms of gigawatt of energy potential and that they have. Comparison of technologies SPV is more adaptable due to its lower solar radiation intensity requirements whereas the CSP is restricted to areas with high DNI and and flat terrain. So, this way it serves as an example that utilizes the geoinformation technology for the for potential mapping of the solar potential areas or the areas where particularly the solar reading intensity can be can be trapped in terms of the safe clean and the green energy. So, this may fall and applicable in various mining industries that fall within this domain. Coming to the next one the SDG goal number 8 that deals with decent work and economic growth.



It aims at creating Goal Number 8 of the SDGs, which focuses on a balanced approach to economic growth, social inclusion, and environmental sustainability by ensuring economic opportunities and decent work for everyone. So, in a sense, it enhances productivity through diversification, technological upgrades, innovation, and emphasizes high-value-added and labor-intensive sectors. Goal 8 also promotes inclusive

employment with equal pay and safe workplaces for all, including women, youth, persons with disabilities, migrants, and precarious workers. Goal 8 also promotes the growth of micro, small, and medium enterprises (MSMEs) through better access to financial services and encourages sustainable tourism, which creates jobs, promotes local culture, and contributes to economic development. Additionally, SDG 8 aims to improve global resource efficiency and decouple economic growth from environmental degradation. It is particularly useful for monitoring illegal mining activities through satellite imagery, ensuring compliance with environmental laws, contributing to sustainable practices, and reducing economic loss.

Now, let us see how the utility of geo-information tools provides benefits for SDG Target 8. So, let us examine subsection Target 8.1, which aims at sustained per capita economic growth. Here, geo-information is useful for monitoring regional economic activities, urban expansion, and infrastructure development. Geo-information also helps in mapping agricultural productivity, land-use changes, and industrial zones that affect gross domestic product (GDP) growth. As far as Target 8.2 of the SDG is concerned, it aims at achieving higher levels of economic productivity.

**Targets Achievable Using Geo-information**

- Target 8.1: Sustain per capita economic growth**
  - Monitoring regional economic activities, urban expansion, and infrastructure development.
  - Mapping agricultural productivity, land use changes, and industrial zones that affect GDP growth.
- Target 8.2: Achieve higher levels of economic productivity**
  - Assessment of resource availability and monitoring of industrial pollution, promoting efficient resource use.
  - Optimizing mining operations by identifying mineral-rich zones
  - Drones and LIDAR improves productivity through detailed topographical mapping for mine planning.
- Target 8.3: Promote development-oriented policies and support entrepreneurship**
  - Mapping business clusters, small & medium-sized enterprise (SME) distribution, & access to financial services
  - This aids policymakers in identifying areas requiring infrastructure development or financial support.
- Target 8.4: Improve Global Resource Efficiency**
  - Monitoring land use, resource extraction, and production processes to improve resource efficiency and reduce environmental degradation
  - Geoinformation can also support sustainable production and consumption frameworks

Logos: IIT Bombay, NPTEL

Here, geo-information is useful for assessing resource availability and monitoring industrial pollution, thereby promoting efficient resource use. Geo-information is also useful for optimizing mining operations by identifying mineral-rich zones, as discussed earlier, due to variations in satellite signatures and indirect links to mineral-rich areas. Drones and LiDAR improve productivity through detailed topographical mapping for mine planning. In terms of SDG Target 8.3, which aims at promoting development-oriented policies and supporting entrepreneurship. Geo-information helps in mapping

business clusters, particularly small and medium-sized enterprise (SMSE) distribution, and access to financial services.

If the locations of different this SMEs and clusters can be found out then that can be very well integrated and analyze as far as the access to financial services is concerned. These together aids in policy making by identifying the areas that are required or could be required for infrastructure development or financial support. As far as target 8.4 is concerned that deals with improving the global resource efficiency. So, geoinformation is useful in monitoring land use, resource extraction and production processes to improve resource efficiency and thereby reducing the environmental degradation. Here the role of geoinformation is already known to all of us.

It can help in terms of supporting sustainable production and coming out with a kind of consumption framework in the mining industry sector. Target 8.5 that deals are the targets in terms of achieving full and productive employment and decent work. So, geo information is useful or are used in terms of identification of the regions with high unemployment, gender inequality and workforce participation gaps. Once we have the survey data or the attribute data we can link it to their locations and the extent areal extent as far as that particular region, village or gram panchayat or block is concerned and thereby the workforce participation gap areas can also be identified. So, the information helps in designing the location-based employment programs and the infrastructure development.

**Targets Achievable Using Geo-information**

**Target 8.5: Achieve full and productive employment and decent work**

- Identification of regions with high unemployment, gender inequality, and workforce participation gaps.
- Geoinformation helps design location-based employment programs and infrastructure development.

**Target 8.6: Substantially reduce youth not in employment, education, or training**

- Mapping educational institutions, training centers, and job markets, enabling targeted initiatives to improve access for youth to employment and education.

**Target 8.7: Eradicate forced labor and child labor**

- Tracking locations of illegal mining, logging, and agricultural practices where child labor and forced labor are prevalent.
- Mapping tools assist in law enforcement by providing spatial evidence of unauthorized activities.

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Coming to target 8.6 that deals with substantial reduction of youth in employment education and training. So, mapping educational institutions training centers and job markets enable targeted initiatives to improve access for youth to to employment and education. So, if we can map the various educational institutions the training centers, the

job markets. So, linking these three together can help the youth to understand where is the education and the employment potential linkage. So, if we know that yes in this sector there is employment opportunity that can be very well linked and mapped with respect to the opportunity as far as education and training is concerned.

So, that may connect the youth in terms of their employment generation potential. Target 8.7 deals with the eradication of forced labor and child labor. Yes, tracking the location of illegal mining, logging, and agricultural practices where child labor and forced labor are prevalent is what we can do in terms of the mining sector, where it is expected or probable that child labor and forced labor are more prevalent. So, if we can identify illegal mining locations, logging, and other agricultural practices, then we can perhaps help in creating a database that may move toward the eradication of forced labor and child labor using geoinformation. So, geoinformation-based mapping tools assist in law enforcement by providing spatial evidence of unauthorized activities such as illegal mining, logging, and agricultural practices, as mentioned before.

Target 8.8 deals with protecting labor rights and promoting safe working environments. Here, geoinformation data or data available on a geospatial platform can assist in identifying risk zones for better regulation enforcement. Geoinformation technology is useful in enhancing mining safety by mapping hazards, monitoring air quality, and reducing disaster risks through terrain analysis. Target 8.9, which aims at promoting sustainable tourism, is useful in mapping tourist destinations, cultural heritage sites, and natural reserves using geospatial tools that may help in developing sustainable tourism strategies. So, in mining areas where different kinds of tourist destinations, cultural heritage sites, or nature reserves exist, geoinformation tools can be well utilized and promoted in terms of sustainable tourism.

**Targets Achievable Using Geo-information**

- Target 8.8: Protect labor rights and promote safe working environments**
  - Geospatial data assists in identifying risk zones for better regulation enforcement.
  - Geospatial technology enhances mining safety by mapping hazards, monitoring air quality, and reducing disaster risks through terrain analysis.
- Target 8.9: Promote sustainable tourism**
  - Mapping tourist destinations, cultural heritage sites, and natural reserves using geospatial tools helps develop sustainable tourism strategies.
  - It also supports monitoring the impact of tourism on local economies and ecosystems.
- Target 8.10: Strengthen financial institutions**
  - Geospatial analysis can identify underserved regions and populations lacking access to banking and financial services.
  - It helps in planning the expansion of financial infrastructure and services.

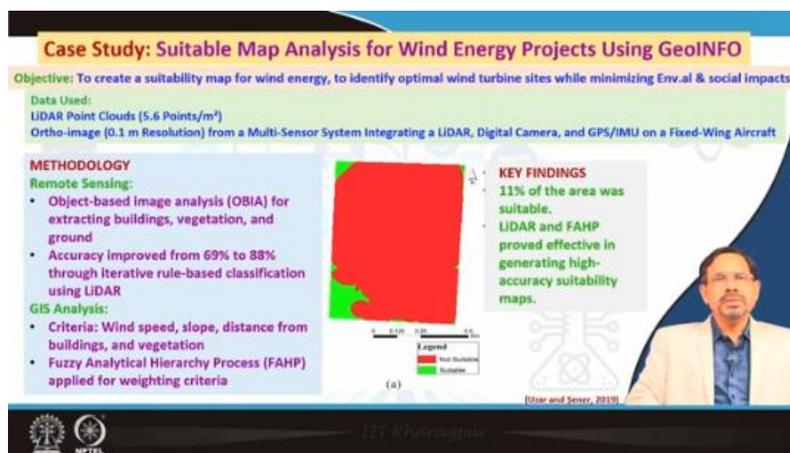
**GeoINFO enhance decision-making, safety, and sustainability in mining, making them vital tools for achieving multiple targets under SDG 8 in mining contexts.**

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**NPTEL**

Thereby, geoinformation helps in supporting the monitoring of tourism and can contribute to the local economy and ecosystem conservation. Let us move to Target 8.10, which aims at strengthening financial institutions. Geoinformation tools can identify underserved regions and populations lacking access to banking and financial services. So, all this we discuss in terms of GIS-enabled platforms or GIS-enabled databases. This way, the information helps in planning the expansion of financial infrastructure and services.

So, what we understood is that all these subsections in terms of SDG goal 8 have different elements. Particularly, the database in terms of location and their attributes are kept or generated and put in a GIS platform or geoinformation-based platform. Then, they can be used for different kinds of analysis in a more holistic way, thereby ensuring sustainable mining practices. So, geoinformation helps in terms of enhancing decision-making, safety, and sustainability in mining, making them vital tools for achieving multiple targets under SDG goal number 8 in a mining context. So, a case study is also linked to our SDG goal number 7 as well. So, let us see in terms of employment generation and a suitable map analysis for a wind energy project using geoinformation technology. Here, this study given by Uzar and Sener in 2019 aims at creating a suitable map for wind energy generation.



So, thereby, to identify the optimal wind turbine sites while minimizing the environmental and social impacts. So, the data used are LiDAR point clouds, which are about 5.6 points per square meter, and the orthoimage of 0.1 meter resolution from multi-sensor systems integrating the LiDAR, the digital camera, and the GNSS platform on a fixed-wing aircraft. So, it is a combined technology where the orthoimages are developed, and the LiDAR points are also utilized. The methodology followed remote

sensing and object-based image analysis-based methodologies, as practiced by these authors, to extract the building, vegetation, and ground. The accuracy was improved from 69% to 88% through iterative rule-based classification using LiDAR. So, in terms of GIS analysis, a criteria has been framed that considers the wind speed, slope, distance from buildings and vegetation, and they all have been taken care of using a

weighting criteria assigned using fuzzy analytical hierarchical process, sometimes called AHP (analytical hierarchical process) or fuzzy-based analytical hierarchical process, that gives you a criteria in terms of assigning the weights. So, the map shows a kind of suitable and non-suitable areas: non-suitable are red, and suitable areas are shown in green in part. So, the key finding is that 11% of the area was suitable. So, LiDAR and the fuzzy analytical hierarchical process proved effective in terms of generating high-accuracy suitable maps that have utility in terms of economic generation and potential as far as the wind energy project is concerned. Let us go to SDG goal number 9, which talks about industry, innovation, and infrastructure.



The left-hand figure is showing the building resilient infrastructure that promote inclusive and sustainable industrialization and foster innovation. So, the points are infrastructure development is critical for achieving sustainable development goals and that thereby helps in poverty reduction. The distance to access these services indicates the level of backwardness. Thematic information on infrastructure is vital for planning and addressing regional disparities. Remote sensing aids in infrastructure planning, thereby tracking the industrial pollution such as NO<sub>2</sub>, SO<sub>2</sub> and other things which are coming from the Sentinel-5, the TROPOMI dataset, which helps in monitoring the land degradation and thereby enhance the mining in terms of free season and technology coming from the INSAR or SAR interferometry and the drones.

So, what we mean to say the AI artificial intelligence helps in terms of integration and integrating the nighttime data and support the sustainable urbanization and industrial land use planning. So, as far as the mining industry is concerned, we can we can use geo information in terms of building resilient infrastructure that helps in promoting and promoting inclusive and sustainable industrialization. The various targets, particular target 9.1 subsection aims at developing quality, reliable, sustainable and resilient infrastructure. Here the geo-information can be useful for identifying the optical locations of transport network, energy grids and water distribution systems. Thereby helps in assessment of infrastructure vulnerability to natural disasters and climate impacts.

**Targets Achievable Using Geo-information**

**Target 9.1: Develop quality, reliable, sustainable, and resilient infrastructure**

- Identification of optimal locations for transportation networks, energy grids, and water distribution systems
- Assessment of infrastructure vulnerability to natural disasters and climate impacts

**Target 9.2: Promote inclusive and sustainable industrialization**

- Land suitability analysis to locate industries while minimizing environmental impacts
- Time-series analysis to track industrial development and its impacts on land use and resources

**Target 9.3: Increase access to financial services and market integration for small enterprises**

- Improvement of supply chain efficiency by optimizing routes and market access for small enterprises
- Identification of underserved areas and populations to enhance financial services penetration

**Target 9.4: Upgrade infrastructure and retrofit industries for sustainability**

- Monitoring of energy use, emissions, and resource consumption patterns for industrial facilities
- Document and visualize progress in industrial retrofitting and infrastructure upgrades for sustainability

**Target 9.5: Enhance scientific research and technological capabilities**

- Advancing GIS, RS & Drone technologies aligns with technological enhancement goals, while open geospatial databases foster innovation through accessible datasets
- Training programs in geoinformatics help develop a skilled workforce

**GeoINFO support sustainable infrastructure, industrialization, and innovation while minimizing environmental impact. Their role is pivotal in achieving SDG 9 targets by enhancing operational efficiency, sustainability, and innovation**

**Dr. [Name]**

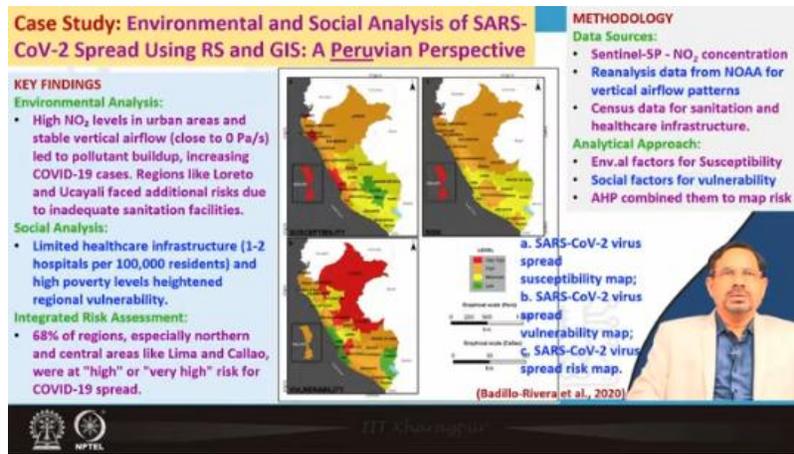
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So, as far as SDG goal number 9.2 is concerned it helps in promoting inclusive and sustainable industrialization, land suitability analysis to locate industries while minimizing the environmental impact is benefited from geoinformation tools. And we can also utilize the time series analysis to track the development as far as mining industry is concerned and its impact on land use and resources can be well analyzed. As far as target 9.3 is concerned that aims at increasing access to financial services and market integration for small enterprises. So, a geo information here is useful in improving the supply chain efficiency by optimizing routes and market access for small enterprises. So, thereby it helps in identification of underserved areas and populations to enhance the financial services penetration.

As far as SDG goal number 9.4 subsection is concerned, it aims at upgrading the infrastructure and retrofit industries for sustainability. So, here also geo information is useful in terms of monitoring the energy use, emission and resource consumption patterns for industrial facilities. And it also helps in terms of visualizing the progress in industrial retrofitting and infrastructure upgrades for sustainable towards achieving the SDGs.

Coming to target 9.5 that aims at enhancing the scientific resource and technological capabilities. As far as geoinformation is concerned, the advanced technologies such as GIS, remote sensing, drone, all these align with these technologies to enhance in terms of the geospatial database, thereby fostering innovation.

So, training programs in geoinformation also helps in terms of developing skilled workforce that are useful in terms of achieving the target SDG target 9. So, to some geoinformation support the sustainable infrastructure, industrialization and innovation while minimizing environmental impacts. Their role is pivotal in achieving the SDG 9 targets by enhancing operational efficiency, sustainability and innovation. So, a case study that deals with environmental and social analysis of SARS-CoV-2 spread using remote sensing and GIS in the Peru region. So, the environmental analysis was done high nitrogen nitrous oxide level in urban areas and that was that was found in terms of the environmental analysis.



As far as the social analysis is concerned limited healthcare infrastructure that means 1 to 2 hospital per 1 lakh residents were found which is which is under a high poverty level and in terms of integrated risk assessment 68 percent of the regions were found especially in the northern and central areas that are that are under very high or high risk as far as the COVID-19 spread is concerned. So, this could be achieved using Sentinel-5P data from TROPOMI sensor that gives you the nitrous oxide concentration the re-analysis data from NOAA that gives the airflow pattern vertical airflow pattern sensor data in terms of sanitation and healthcare came from the survey-based activities. And, the tools that is analytical hierarchical approach, analytical approach was followed in terms of environmental factors for susceptibility analysis, social factors for vulnerability and AHP used in terms of combining them to map the risk level. So, the three maps here talks

about different what you say environmental and and social risks over a region. This is well valid for a for mining industry sector where the environmental social analysis can also be similarly taken up using the geo information tools.

Now, our nation particularly the Government of India have various schemes that align to SDG 7, 8 and 9 goals. The Ujala scheme in terms of goal number 7, the skill India and start-up India that very well aligns to goal number 8 and making India digital India and smart city they all align to goal number 9. So, these are the 7, 8 references that have been used for this study. To conclude, we discussed about geoinformation technology that provide precise tools for monitoring, planning and mapping and optimizing the renewable energy projects. Thereby, enhance the energy efficiency promoting the use of clean energy.

**Gov Schemes aligned with SDG 7, 8 & 9**

Goal 7      Goal 8      Goal 9

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It has a high potential to have implications in the industrial sector. So, geo information tools they leverage significantly, they leverage in terms of contributing to achieving the economic growth, decent work and economic enhanced industrial productivity. Industry and infrastructure development aligned with geo information gives us or helps in sustainable industrialization. The integration of advanced tools like AI drones and LiDAR using geo information platform helps in providing information for decision making processes. So collaborative efforts among the stakeholders and investments in geo information are essential for addressing challenges that are there in the mining industry sector in terms of resource management, thereby helps in terms of attaining sustainable development.

So, the continued advancement of geophone system strengthens the alignment of mining operations so as to realize the sustainable development goal targets and for this it is sustainable development goal number 7, 8 and 9. Thank you very much.