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IMPACT OF MINING ACTIVITY ON ENVIRONMENT: AN OVERVIEW

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ABSTRACT:

Mineral are crucial for any country's development and economic prosperity, so many open and underground mines have been created. On the other hand, this has an impact on our environment both directly and indirectly. Using large machines to generate more with less effort increases environmental issues. Due to mining activities, there are more environmental issues, such as land degradation, loss of biodiversity and forest, soil contamination, surface and ground water pollution, air pollution, and noise pollution. Stakeholders and the government should be informed of the laws & regulation that fall under "The Environmental Protection Act, 1986" in order to lessen the issue. This paper evaluates the effects of mining on the environment, including soil degradation, air pollution, noise pollution, water pollution, ecological disruption, health etc. and National Mineral Policy, 2019.

Therefore, a country's management of its mineral resources must be strongly connected to its entire economic development and preservation and conservation measures. Before major mining projects can be approved and carried out, the majority of countries around the world demand some sort of environmental impact assessment (EIA), and the contribution of these two acts, Environment Protection Act of 1986 and The Water (Prevention and Control of Pollution) Act of 1974, helps in reducing environmental pollution.

KEYWORDS:

MINING IMPACTS, NATIONAL MINERAL POLICY, 2019, ENVIRONMENTAL PROTECTION ACT, 1986, THE WATER (PREVENTION AND CONTROL OF POLLUTION) ACT, 1974, AND EIA

INTRODUCTION

Minerals are a crucial component of any nation's national economy. India is blessed with abundant mineral resources. The majority of the land is being mined, with a sizable amount of it being covered by forests. In India, there are up to 89 minerals and over 20,000 mineral deposits that are known 4 fuel, 11 metallic, 52 non-metallic and 22 minor minerals are generated at a cost of Rs. 73944.59 Crore (Annual Report, Ministry of Mines, 2004-05). Mines that are both open-pit and underground the ecology were impacted by both types of mines. Overburden is consolidated and unconsolidated material that is dumped on unmined areas as a result of open-pit mining operations and must be removed. One of the most pressing environment issues is control the overburden produced by these open-pit mines, which is linked to issues with soil erosion and topsoil loss, pollution of the water, air and noise, biodiversity loss, ecological disruption, social issues, health difficulties, and among other things.

MINING RELATED POLLUTANT AND EFFLUENT SOURCES

IMPACT ON WATER

- Water supply in the area is declining since mining utilizes a lot of water.
- Removing water bodies from the area to make room for dumping and quarrying.
- Interference with the drainage system.
- Hydrological regime, ground water regime, and ground water table disruption.
- Surface and ground water bodies are polluted by mine water discharge, runoff from coal stocks, and overburden dumps, particularly domestic effluents, making the water unfit for domestic use and, in some cases, even for agriculture purposes.
- Heavy/toxic metals may be produced by acid mine drainage (AMD) as a result of the presence of pyrite bands in coal seams. Among toxic water are the pollution of heavy metals like lead (many Chhattisgarh and M.P mining regions), mercury (around India but especially some of the most seriously affected places are coastal cities like Mumbai, Kolkata, Karwar (in Karnataka), and North Koel (in Bihar), and other pollutants include arsenic (Bihar, Jharkhand, and West Bengal) as well as uranium (Rajasthan, Jharkhand, and Panjab).
- Surface water bodies must be drained if the amount of subsidence movement on the surface exceeds the safe limit.
- Water from disturbed above-ground water bodies seeps into the underground caverns. It is necessary for this water to out of the mine,

pumped.

- As surface cracks grow, rainwater from the surface finds its way underground. This could include a variety of contaminants on the surface.
- When pumped out and released onto the surface, polluted underground water may also pollute surface water bodies.
- Avoid dumping overburden from mines in valleys or depressed areas adjacent to mined areas, which serve as the primary sources of surface or groundwater supplies (Nriagu, 1988). This effect may be seen in the major waste dumps constructed in the southern valley of the Jhamarkotra phosphorite mines, which contains shallow groundwater and surface water for supplying water supplies.

FIGURE SHOWING WATER POLLUTION BY MINING ACTIVITY

IMPACT ON LAND

- Land receives the brunt of open-pit mining's negative effects, accounting for over 85% of them.
- The use of land for large-scale excavation, dumping of overburden, construction of industrial and service buildings, roads and other infrastructure, townships, etc. cause significant land disturbance. If it affects forest land, agricultural area, or inhabited land, the effect is severe. When it comes to forest land, the impact depends on whether the area is thick of degraded, and whether it supports endangered or threatened species, endemic habitat, or both. Moving people involves inhabited land. Agriculture production is decreased when agricultural land is converted to residential and industrial use.
- Scholars and environmental activists have extensively researched and documented soil erosion and degradation brought on by a variety of environmental unorganized activities in general, and mining in particular.
- Because of siltation and runoff from overburden dumps, the alteration on top soil characteristics reduces the fertility of the land and the amount of agriculture produced in the immediate area.
- A shift in land use due to the construction of building and other infrastructure.
- Topographic and drainage changes brought on by subsidence.
- A change in the effective use of land brought on by altering the underground and surface water regimes.
- Polluted water discharge on the surface affects the topsoil's quality.

FIGURE SHOWING DEFORESTATION IN THE MINING AREAS

IMPACT ON AIR QUALITY

- Air pollution from drilling, blasting, transporting coal and overburden, crushing, and screening that releases gaseous pollutants (SO_2, NOX, CO), suspended particulate matter, as well as dust.
- Pollution caused by waste-dump fires and mine fires including those that were left unattended after mining.
- Auto-emissions.
- The emissions from coke ovens and soft coke bhattas.

FIGURE SHOWING AIR POLLUTION BY MINING ACTIVITY

IMPACT ON NOISE POLLUTION

- Pollutants like SPM, CO_2, NOX, SO_2, and others are contributed by mine exhaust air.

- Diesel generators, boilers, etc. release NOX, CO, SPM into the atmosphere.
- Equipment that is installed in shafts, incline, compressor houses, and workshops produces noise that contaminates the surrounding area.
- The use of land machinery during the handling of overburden raises noise levels in the nearby residential areas as well. However, at the planning stage, choosing the right disposal location can minimize any noise impacts on the locals. It is preferred to use "noise mapping" to visualize the spread of the noise and create noise contours, allowing for the planning and implementation of preventative actions (ABH Publishing Corporation). Although the Tenth Conference on Safety of Mines' recommendations made noise mapping necessary in Indian mines (according to the Directorate General of Mines and Safety), the mining industry is still not placing enough emphasis on creating noise maps of mines.

FIGURE SHOWING NOISE POLLUTION BY USE OF BLASTING TECHNICS & HEAVY MACHINES IN MINING AREAS

IMPACT ON ECOLOGY

- Clearing vegetation from land used for quarrying, detonating overburden, and building infrastructure.
- Deforestation if the mine is located near a forest.
- Wild life and other fauna disturbance brought on by clearing of vegetation on deforestation.
- Animals and birds flee the area due to noise and vibrations from machine operations and blasting.
- Decrease in water table, disruption of the waste regime, and air and water pollution all cause vegetation to grow more slowly.
- Aquatic flora and fauna decline as a result of polluted water discharge.
- The clearing of the region required for the development of the shaft/incline complex, infrastructure, settlement, etc. drive the wildlife out.
- Because of the aquifer fissures caused by underground mining, the adjacent area's water table is reduced. The growth of vegetation and agricultural products are negatively impacted by this.
- The top soil's ability to support vegetation in the subsiding area's tensile zone may be compromised.
- Aquatic ecosystem is impacted when toxic water from underground mines is discharged into surface water bodies.
- Environmental disorder and mining always go hand in hand, but open cast mining especially so. In addition to having an impact on river flow, siltation, water pollution, deforestation, and other factors, opencast mining also leads to soil degradation, vegetation degradation, and the destruction of productive land. Many times, important ore deposits occur near or close to a forest. This is specifically true of Karnataka, where open cast mining significantly contributes to deforestation in Bellary, Sandur, and Chikkanayakanahalli (Tumkur). Trees and vegetation are destroyed when infrastructure for any sort of mining is developed.
- In the end, the nallas become a river or reservoir. The increase in total solids, other minerals like fluorite, mercury, etc., and leachates from mine dumps, which are detrimental to aquatic life and human health, are the main causes of water pollution. As a result, the water's dissolved oxygen content decreases. The aquatic life is impacted by this action. High levels of particle matter in the water column in surface waters can have harmful effects on fish and other aquatic life that are both chronic and acute.
- The biodiversity of birds, animals, medicinal plants, insects, flies, reptiles, sponges, etc. was harmed by gas mining. A total of 194 plant species were identified in Tumkur, Ballary, Hospet, and Sandur (TBHS) region, of which 90 are tree species, 36 are shrub species, and 68 are herb species, according to a study on the National Environmental Engineering Research Institute (NEERI) Report. In this area, 61 plant species with therapeutic characteristics can be discovered, including 28 trees, 23 herbs, and 10 shrubs. This accounts for 30% of all plant species. In forest areas, conservation and preservation of species in a state of balance are particularly crucial because each species has a specific ecological niche and connected to other species in some way via the food chain. The impact of mining on the forest, agriculture, aquaculture, and human life has increased in line with the more than fourfold growth in ore production since 1999-2000. In place with a higher concentration of mining activity, it has been seen that SDI is decreasing. Continuous serial mine stretches on its hilltops in

the Ramdurga block, NEB block, and other blocks have fundamentally altered the environment in the area. It has been noted that the majority of lessees are utilizing exotic species for planting to restore the landfills and other leased areas, which results in monoculture and will soon change the environment. The NEERI reported a substantial number of wild creatures during its investigation in 2001-2002, including 16 species of mammal, 145 species of bird, and 9 species of reptile. Due to mining related noise, air, water, and soil pollution as well as associated human disturbances, all of these species are currently endangered (Pullaiah. T, 2006). The night time mining operations have further fueled and exodus of wild animals from surrounding forest. The loss of biodiversity in the area would be caused by the fine dust produced by mining activities, such as transportation, which settles on flowers, fruits, leaves, etc. and prevents seed germination (Environmental Geology-ecosystem protection in mining zones).

- Opencast mining activities alter the earth's surface. Overburden dumps are man-made habitats that contribute to a number of environmental issues, such as habitat fragmentation, dust pollution, erosion, and an overall disruption of ecology in the surrounding area.
- Sediments that have been deposited in layers in terrestrial ecosystem can have a variety of effects on groundwater, surface waters, and terrestrial ecosystems. Heavy metals may be mobilized by minerals linked to deposited sediments and transported to nearby surface waters or subsurface aquifers by lowering the pH of surface discharge. Additionally, contaminated sediments may reduce the pH of soils to the point that suitable habitat and plants are lost. (Journals and daily news publications)

IMPACT ON SOCIETY

- The eviction of landowners' neighbours. The stress and anguish of moving deteriorated the PAPs' already precarious health conditions.
- Loss of income for those who are directly or indirectly dependent on the land.
- Outsider immigration (officers, skilled workers, contractors, small business owners, and government officials), which rapidly declines after the mine is shut down. Local ethnic culture has been diluted.
- Noise from crushing and blasting, as well as disturbance and health effects on the local population.
- The sanitation has been severely compromised. As a result of the widespread accumulation of feed dust, several ailments affect humans. Heart disease, cancer, and lung infections are very common in the mining region. According to environment officers with the Karnataka State Pollution Control Board, the problem of dust during transportation is not resolved because there are no basic criteria that have been defined and where action may be taken. Due to mining activity, people are suffering from pandemic diseases. Pure food, pure air, and pure drinking water are now uncommon. The equilibrium of the surroundings is absent.
- Urbanization (well-organized townships, markets) while mining is active and the abandonment of remnants after mining is complete.
- Threats to property and human life after mining. Society's aspirations are rising.
- In the event of a mine area slope failure, communities close to overburden dump sits run the risk of having mud slide from the dumps. The settlement is affected in numerous ways when the entire muck etc. enters there. This incident took place in the adjoining Khadia overburden dumps of Chilkad and Basti. In the interim, a tunnel through the Basti has been built of efficiently drain run-off water.
- Impact on the mining industry's high labour intensity in India which, despite attempts at mechanization, is continuing to intensify and calls for serious and honest efforts in this crucial area of environmental challenge. In this sense, significant variables that have a bearing on worker health include:
    1. The production of dust, especially irrespirable dust.
    2. The surrounding and conditions at work.
    3. Vibration and noise, with the latter being particularly hand-transmitted.

  Research on this topic conducted by CMRs (Central Mineral Resources) in a few coal mines and industrial districts of the Jharia and Raniganj coal fields has shown that 19-20% of the population suffers from respiratory ailments (silicosis), and 23-24% from gastrointestinal issues. Another 16% is accounted for by illnesses including malaria, pneumonia, tuberculosis, fever, etc. (R.N.Trivedi-2001)
- Loss of common property resources, in general, common property resources (CPRs) are resources that are available to the entire community of a village and over which no one person has exclusive ownership rights. They include village pastures, community woodlands, wastelands, shared threshing areas, trash disposal sites, watershed drainages, village ponds, tanks, rivers/rivulets, and river beds in India's dry regions. Many people's resources and property

have been damaged by the mine owners and middleman. Tanks and community land have been obtained. The public has been greatly inconvenienced by this. These days, water is not collected in tanks, and the water that is, is polluted by the accumulation of dust on the surface. Desserts are created by destroying forests. (Campaigs)

CPR decline might manifest in one of three ways:

1. Physical loss of resources, like the surrender of grazing land to a recently built irrigation dam or CPR area covered with buildings and highways.
2. Degradation of pastures of forest land, which reveals a decline in the physical productivity of resources.
3. A change in ownership and usage rights as evidenced by the sale of CPR lands to private parties. (2006) Benny Joseph

WATER POLLUTION RULES AND REGULATION

In order to prevent and manage water pollution and to maintain or restore the country's water's wholesomeness, the Water (Prevention and Control of Pollution) Act was passed in 1974. In 1988, the Act was modified. In order to provide for recovery and collection of a cess on water consumed by people operating and carrying out specific types of industrial operations, the Water (Prevention and Control of Pollution) Act was passed in 1977. The purpose of this cess is to augment the financial resources available to the Central Board and State Boards for the prevention and control of water pollution, which were established in accordance with the 1974 Water (Prevention and Control of Pollution) Act. The Act last underwent revision in 2003.

NATIONAL MINERAL POLICY 2019

The National Mineral Policy 2019 contains provisions that will help the mining industry, such as:

- Granting RP/PL holders the right to first refusal.
- Encouraging the private sector to engage in exploration.
- Transferring mining leases and establishing specific mineral corridors to expand mining operations in the private sector.
- The 2019 Policy suggests giving mining activity the status of an industry to encourage private sector financing of mining.
- It also states that a long-term import-export mineral policy will aid the private sector in more stable planning.
- The Policy also urges efforts to align taxes, levies, and royalties with international standards in order to support the private sector.

THE ENVIRONMENT PROTECTION ACT, 1986

Under Article 253 of the Constitution, the Environment Protection Act of 1986 (the "Environment Act") addresses subjects related to the protection and enhancement of the environment. The United Nations Conference on Human Environment, which took place in Stockholm in June 1972, is when the act was founded. India took part in this initiative to improve environment conditions and take the necessary precautions to protect the environment. The ability of the central government to act, the protection and improvement of environment, the appointment of officers and their duties, the ability to issue directives, and the creation of regulations to control environmental pollution. The Environment Protection Act lays out a framework for researching, organizing, and putting into practice long-term environmental safety requirements. It also establishes a system for prompt and adequate response to environmental threats. It is an overarching piece of legislation created to offer a framework for coordination of federal and state agencies that were established in accordance with the 1974 Water Act and the Air Act. Under section 2(a) of the Environment Act, the term "Environment" has a fairly broad definition. It covers land, water, and the relationships that occur between those elements and people, other living things, plants, animals, micro-organisms, and property. Be regulating the location of industries, the management of hazardous wastes, and the protection of public health and welfare, the Central Government is given the authority to take the necessary actions to protect and improve the quality of the environment. These actions include setting standards for emissions and discharges of pollution into the atmosphere by anyone conducting and industry or activity. The Central Government occasionally issues notifications pursuant to the Environment Act for the protection of ecologically sensitive areas or issues guidelines for matters pursuant to the Environment Act for the protection of ecologically sensitive areas or guidelines for matters pursuant to the Environment Act.

MITIGATION MEASURE FOR CONTROL THE IMPACT OF MINING ON ENVIRONMENT

Water consumption in mining regions is quite dangerous. Surface water or groundwater will inevitably be directly or indirectly contacted by mining operations, having an effect on the aquatic environment. Therefore, businesses must make investments to prevent water contamination or, in the event that it does, to cleanse the water or keep it contained in the proper reservoirs, pipelines, canals, or other storage facilities. Environmentally friendly methods and technology must be encouraged in the mining industry.

The rule that businesses must adhere to is as follows:

- Finding substitutes for the mineral that is currently widely used while conserving resources and managing waste as little as possible.
- Correct metal recycling.
- The use of eco-friendly technologies.
- Energy conservation.

- Mining activities have a negative impact on the locals, lowering their standard of living and endangering their homes and livelihoods, particularly farming. The operation of the operator and others in this area should be looked into by the government at all levels, and adequate compensation should be given out in a suitable manner after reviewing and reevaluating the EIA.
- Before requesting a government-issued quarrying licence, it is advised that a thorough Environmental Impact Assessment be conducted. The government should establish a task force to look into companies that violate the code of practice for Quarrying Activities and bring legal action against offenders.
- The people who live there, the government, and quarry Operator Corporation should all agree on a method. Settlers should be relocated and well rewarded. During the issuing of licences and government monitoring activities, the interests of the residents should be objectively taken into account. Geologists, engineers, conservationists, and surveyors should be on the government task force team.
- Environmental management techniques.
- Waste is used as a raw resource.
- Reducing waste production by re-engineering the processes (Recycling of Industrial Effluents).
- Minimizing the need for land by careful planning of mining and related activities.
- Systematic collection, storage, and reuse of top soil as quickly as feasible on reclaimed territory.
- Using crushing and screening plants, dust extractors, and drills.
- Regulating mine fire.
- Design the mine layout to minimize disruption of the drainage pattern and surface water bodies.
- Facilities such as roads, link roads, street lighting, wells, tube wells, hand pumps, schools, community halls, health centers, veterinary centers, shopping centers, panchayat bhawan, children's parks/play areas, and tree planting are to be provided at rehabitation sites.
- By treating resettlement and rehabilitation as an essential aspect of mining and allocating sufficient manpower and financial resources, you can restore or even improve the social and economic well-being of the displaced population.
- Opt for equipment with a low noise level.
- Surface miners' mining of coal results in a significant reduction of noise and ground vibration.
- Use of controlled blasting and proper blasting design to reduce ground vibrations.

CONCLUSION

Surface and groundwater pollution is one of the significant effects of mining activity. Mining practices have serious environmental impacts related to water pollution, land degradation, loss of biodiversity, air pollution, increase in health related problems, noise pollution, vibration, and subsidence and landslides. The government should strive to offer technical assistance to local mine stakeholders, such as instruction in task facilitation and management. Mine waste needs to be regulated and transformed into a non-harmful form before it is released into waste ponds. New technology needs to be developed that uses fewer chemicals during extraction and processing. All mining operations, large and small, must be required to produce an accurate environmental impact assessment report in order to obtain a mine license. The Environmental Protection Act of 1986 should be strictly applied by the government to the whole mining industry, and an inspection officer should be appointed to ensure that the act is being followed by the mine owner. All of the society's stakeholders must initially actively follow the National Mineral Policy, 2019.

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