



IMPACT OF MINING INDUSTRIES ON THE ENVIRONMENT (SPECIAL REFERENCE TO THE ARAVALI RANGE OF RAJASTHAN)

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ABSTRACT Under the study of the tradition of Indian knowledge, we get knowledge of India's geographical and natural resources. The history of mineral extraction in India dates back to the Harappan civilisation. The extensive availability of mineral reserves has significantly contributed to India's development. The study of geography in ancient texts reveals the Aravali structure. The formation is seen in the clear succession of pre-Cambrian rocks. Rajasthan possesses substantial mineral deposits, including copper, lead, zinc, rock phosphate, soapstone, silica sand, limestone, marble, and gypsum. The majority of the state's mineral resources are located inside the depths of the Aravali Mountain range. Mining puts pressure on the environment due to various aspects like exploration, extraction, refinement, and closure of mines. The main environmental issues related to the mine include the degradation of land surface area, spread of sand along with the wind in agricultural land, erosion of drains and water pollution. Even in Rajasthan, in the range of Aravalli hills and around it, the fauna is diverse and there is a threat of ecological systems. This research examines the remote sensing and GIS methodologies employed to discern diverse land uses and boundaries in satellite imagery, as well as to detect temporal changes in land patterns. Mining is the primary activity contributing to environmental damage. Mining activities result in alterations to the natural environment.

KEYWORDS : Degradation, Aravali Mountain Range, Environment, Pollution

Introduction

Rajasthan, a mineral-abundant state in Western India. Mining in Rajasthan has been practiced since antiquity. The Aravali range in Rajasthan contains a diverse assortment of main and minor minerals, being the oldest range in the Indian subcontinent. The Aravalli range is regarded as the oldest in the world and extends diagonally across the State of Rajasthan. It disseminated across extensive regions in the state, and mining operations are prevalent in this area. Aravali is referred to as the museum of minerals, encompassing both metallic and non-metallic varieties, including construction stones. It occupies a strategic location due to its substantial reserves of minerals, lignite, petroleum, and natural gas. Rajasthan is the most affluent state in the nation for the abundance and diversity of minerals. Rajasthan is the exclusive producer of lead and zinc ores, selenite, and wollastonite. The majority of the nation's production of calcite, natural gypsum, and silver originates from Rajasthan. The State is a significant producer of ball clay, calcite, clay, copper ore/concentrate, feldspar, fireclay, limestone, ochre, phosphorite/rock phosphate, and steatite. The mining process adversely affects the environment and neighbouring areas by degrading land and biodiversity, generating hazardous substances, dust, and chemicals that disrupt both the ecosystem and the health of nearby populations. Mining alters the ecosystem. Mineral extraction from the earth modifies the environment, affects water quality, disrupts local ecology, and transforms land usage. The extent of environmental impact is contingent upon various factors. The individuals and community associated with the mine will be affected by environmental alterations both directly and indirectly, before, during, and after the mining process. The effects on individuals will vary due to economic, cultural, and socio-economic factors.

Study Area

Rajasthan State, especially the districts adjoining and on the verge of Aravalli namely Udaipur, Dungarpur, Banswara, Rajsasamad, Bhilwara, Sirohi, Chittogarh, Pratapgarh, Kota, Ajmer, Jhalawar.



Fig.1. Representing the different districts of Rajasthan

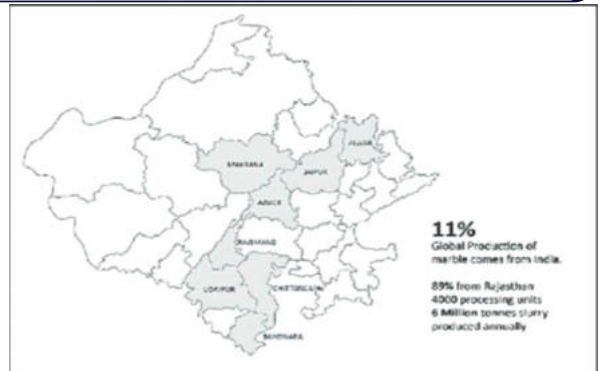


Fig.2. Representing the different selected southern districts of Rajasthan Udaipur, Dungarpur, Banswara, Rajsasamad, Bhilwara, Sirohi, Chittorgarh, Pratapgarh, Kota, Ajmer, Jhalawar.

Objective Of The Research Study

- 01. To examine the local communities' perception on how the mining activities affect the environment in terms of Flora & Fauna, Bio-Diversity
- 02. To determine the extent of Mining regions and new Mining Leases allotted causing the Land Degradation.

Hypothesis

- a) This is to significant that local communities' perceptions that mining activities impact the environment and their livelihood
- b) This is to significant that determine the extent of the mining regions' surrounding environmental effect zone in order to research land degradation.

Methodology

A) Primary Data: The primary data shall be collected through a random sampling method in the selective mining area with the help of the following tools.

1. Field survey in the various mining areas viz, Udaipur - Dakankotra, Babarmal, Umarda, Risabhdeo, Daroli Lime Stone Mines Rajsamand – Kelawa, Agariya, Nizarna, Morwad, Sapol, Nathdwara

B) Secondary Data: Data are available in the form of Articles, Annual Reports, and Previous research papers related to similar and related topics.

Results On The Impact Of Mining Industries On The Environment

Sr. No.	Types of Impact
	Impact on Environment

01.	Impact on Land (Degradation of Aravali)
02.	Waste Dumping & Marble Slurry
03.	Water level & Pollution
04.	Flora & Fauna



Fig.4. Representing the impact of mining industry on environment

Impacts On The Versatile Lands Of Rajasthan

The primary environmental impacts of mining include land degradation, deforestation and biodiversity loss, soil contamination, air pollution, surface and groundwater pollution, noise and vibrations, and the deterioration of natural drainage systems. In the Aravali Mountain range, due to mining land degradation is one of the major issues. It has been at many places due to closed mining or abandoned area after mining the absorption power of rainwater and resulting in low rainfall or wastage of rain water.

1. Impact on Land (Degradation of Aravali)

Alteration in Forest Area: Between 1999 and 2019, the forest area diminished by 0.9% of the total area, equating to 75,572.8 sq.km. This decline resulted in the loss of 705 sq.km of forest.

- The forest area in the central range of the Aravali diminished by 32%, coinciding with a notable expansion of cultivated land from 1975 to 2019.
- Illegal Quarrying: More than 25% of the Aravalis in Rajasthan and 31 hill ranges have been obliterated due to unlawful quarrying activities.
- Bhilwara (Iron Ore – Jindal Saw Limited & Shopstone mining in Jahajpur Tehsil) , Chittorgarh (Lime Stone mines in Chittorgarh & Nimbahera tehsils) , and Rajsamand (Marble Mining) districts have intense mining activities of major and Minor minerals resulting in Land degradation of a huge area.

The mining activity in Rajasthan is a big source of revenue generation for the Government. As per the Mining Department records, approx. 711 lease is being allotted for the mining of major & Minor minerals in the Aravali Hills regions. The approximate area allotted for a mining lease in Udaipur District is approx. 7400 acres of land in Aravali which contains major minerals and minor minerals. This shows that either in this area Mining activity is under process or closed or the area is abandoned due to unavoidable circumstances. This causes Land degradation in the Aravali Hills area in Udaipur.

Further, more leases have been allotted to the new areas in the last couple of years.



Fig.5. Photograph Showing The Land Degradation During Mining

Area Approx. 350 Acres Agariya, Rajsamand 2023 Photo Curtsey – (Rubi Kumari)



Fig.6. Photograph showing after the closure of mines-land Degradation Devgarh Kakrod, 2022 photo Curtsey- (Rubi Kumari).

2. Waste Dumping & Marble Slurry – Impact on Livelihood

This is biggest challenges for the mine Operators to dump their waste and Marble Slurry. Kishangarh is an example of Waste Dump area. In Rajsamand, an area is also used in Mokhampura, Kelwa in District Rajsamand, Rajasthan for waste dumping and Marble slurry, which harms the Land which might use for Agriculture and other purposes. It also harming the Local residents causing lung diseases Silicosis.

Silicosis, formerly referred to as Patthar ki bimari (disease of the stone) among stone quarry workers, results from prolonged exposure to silica dust affecting the lungs. An untreatable occupational illness, predominantly impacting mining workers. Rajasthan recorded 48,448 instances of silicosis, of which 31,869 were officially certified.



Source : <https://nhrc.nic.in/sites/default/files/2023-1-20.pdf>

Fig.7. Photograph showing the marbel slurry Dumpyards Kishanagar, 2023 photo Custsey- Deepak Chandra, LEO(C)



Fig.9. Photograph showing Abandoned Mines and Overburden Dumped Devgarh, malkot, 2023 Photo Curtsey – Deepak Chandra, LEO(C)

3. Water Level & Pollution

a) The greatest phosphate reserve in India poses a threat to Udaipur's water supply. Situated in the Aravali mountain in southern Rajasthan, around 26 km from Udaipur.

b) phosphate is essential for the operation of fertiliser factories; nevertheless, its availability is confined to depths between 380 and 600 meters below ground level, necessitating considerable excavation for access.

c) High-pressure blasting for mining significantly impacts the water level.

d) The overexploitation and excessive use of groundwater have caused a significant fall in water levels, perhaps leading to the depletion of aquifers in numerous regions next to the Aravalis.



Photograph - Rock Phosphate Mines at RSMM Jhamarkotra, 2023, Curtsey - Rubi Kumari

Illegal Mining

Illegal mining of masonry stone also causes the dryness of many rivers in Udaipur and other areas in Rajasthan. Recently, news came for areas like Bhilwara, Jhalawar, and Kota, where the illegal mining of masonry Stone affects rivers like Banas, Bhimsagr in Jhalawar, Harigarh Lake in Jhalawar, etc.

3. Flora & Fauna

- The state's various ecosystems range from the parched Thar desert to the lush green Aravali Mountain range and a unique wetland.
- Habitat of wildlife including species like Indian Leopard, Bengal Tigers, a variety of birds, deer, Chimpanzees, and a variety of moneys and other animals and birds.
- A rich biodiversity with over more than 2000 plant species, 80 + mammals more than 500 varieties of bird species, and numerous reptiles.
- In Chittorgarh, a crocodile century area has been saved for the large numbers of crocodiles in the Chambal River. In Udaipur, Bagidara is also a reserved area for the crocodiles.



Photograph - Crocodile Century in Chambal at Rawatbhata, Chittorgarh

Due to mining activities in the Aravali Range, animals like Leopard and Beers are transiting themselves to the residential areas for their survival. Recently many cases happened near Gogunda village in Udaipur District and nearby areas where leopards were found roaming in the villages and harming almost 12 livelihoods as per the local news available. Especially, the animals like leopard, beer, chimpanzees and others are the most sufferers.

4. Supreme Court Orders

- In 1992, authorisation from the Central government became necessary for all mining and industrial operations in the Aravalli region.
- In 1996, the renewal of mining leases within a 2 to 5-kilometer radius of Badkhal Lake required authorisation from both the central and state pollution control boards.
- In 2002, mining activities were prohibited in Haryana due to extensive deterioration in Faridabad and adjacent regions.
- In 2009, mining was prohibited once more across the Aravalli range.
- In 2017, a complete destruction of the Kant enclave, a residential complex spanning around 424.84 acres within the Aravalli forest range, was ordered, and the firm was instructed to properly reimburse all investors in the property.

5. Initiative To Save The Flora & Fauna In Aravali Mountain Range In Rajasthan

- One of them is Environment Development Institute which has been doing plantation work for 12 years. In the last 12 years, 1 lakh 32

thousand trees and plants have been planted so far. Saplings including 25 thousand Neem, 5 thousand Shisham, 5 thousand Banyan, 20 thousand Peepal, 20 thousand Gulmohar, 10 thousand Jamun, 5 thousand Aritha, 10 thousand Ashoka, 5 thousand Kajaliya were planted.

- In Udaipur also, Mining Engineers Association runs a drive for the plantation of trees to save the earth near the mining area with the collaboration of different Marble and Soapstone mines, Department of Geology and Mines and Others. During this drive approx 1800 different types of saplings planted near the dumping yard area.

.Source : Udaipur news, 06.09.2024

- One lakh 9 thousand 200 saplings have been planted by about 18 mining lease holders. Since the Mines Department is associated with mining activities, it also has more responsibility for environmental protection.

.Source : <https://www.khaskhabar.com/local/rajasthan/jaipur-news/news-more-than-3-lakh-75-thousand-saplings-planted-in-mining-department-offices-and-mining-areas-news-hindi-1-660070-KKN.html>

6. FINDINGS & CONCLUSION

Singh, Manmohan (2022), *Ecological Change Due to Mining in Aravali Region* ; Singh, R.B. Environment Monitoring: Development Styles and Research Strategy in India Desert Region. Academic Press; Lodha, R.M., Water Pollution and Environment Strategy: A Case Study of Udaipur Region; Shah, Bhomik. Marble Mining and Processing in Southern Rajasthan: Impact on Environment, Leading to Degradation of the Aravalis While going through the said articles also found that mining affects the Land degradation, Decline in Underground water level, affects on the bio diversity and reduction in the Flora & fauna. Rajasthan, a mineral-rich state. Mining is the second largest source of employment after agriculture. While doing this study as on the topic "Impact of Mining Industries on the Environment", I would like to conclude as Mining gives a lot of revenue to the Government and employment directly and indirectly to the residents near the mining lease areas. But it affects the land degradation, a major area of concerns i.e. dumping of Over burden and Marble slurries. During the study, it was also found that due to mining, there is an impact of decrease in underground water level drastically. It also found that the areas that became abandoned for whatever reasons, there is the remedy to the abandoned land and also the water logged in the mines is of no use to the local residents nearby the mining lease areas. It also affects the flora and fauna of the Aravali Mountain range.

7. Suggestions

Mining, an area that gives a lot of revenue to the Government, produces many employment opportunities directly and indirectly, a pillar to the growth of economy, increasing the social standards of livelihood, changing the demography of the cities and nearby localities and many more to add to the positive impact on the society. But, a question always in mind that at what cost we are getting all these things and what we are leaving for the next generations...is it a barren and unused lands, low underground water levels, degraded land, and lack of flora and fauna. Government emphasis is more on collecting the revenue from the exploration of major and minor minerals from the womb of the Aravali Mountain Range, but in context to increasing number of lease of mining areas of different minerals, Government should also make a strict regulation regarding the tree plantation, Rain Water harvesting near the mining lease area and villages, all government Offices campuses and schools so that it will help to increase the underground water level and keep healthy environment for the next generations.

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