



Wasteland management in mining areas of the Thar Desert

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Abstract

Rajasthan is India's fifth-largest mineral income state, significantly contributing to national mineral production with a record revenue of Rs 9,202.5 crore for the Financial Year 2024-25, a growth of 23.4%. The state is rich in lignite, gypsum, and various clays, with 82% of the country's gypsum resources located there. Mining activities, particularly opencast methods, cause environmental degradation, including loss of land, reduced fertility and pollution of groundwater. This leads to threats to local ecosystems and public health. The paper highlights the necessity of wasteland management and afforestation in fragile ecosystem of Thar Desert.

Keywords: Minerals, desert ecosystem, afforestation

Introduction

Rajasthan is the fifth-largest mineral income state of India. It is a significant producer of metallic and non-metallic minerals, contributing a huge amount to mineral production of nation. The state also holds the second-highest rank in terms of mineral storage and production in India. In Financial Year 2024-25, Rajasthan's Department of Mines earned a record revenue of Rs 9,202.5 crore. This represents a 23.4% growth and a Rs 1,742 crore increase compared to the previous financial year.

An estimated 5720 million tonnes of lignite are found in 78 locations in the western and northwestern districts of the state of Rajasthan, including Barmer, Bikaner, Nagaur, Jaisalmer, and Jalore. The power stations in Giral (distt. Barmer), Kapurdi-Jalipa (distt. Barmer), Palana-Barsinghsar (distt. Bikaner), and Gurha (distt. Bikaner) are lignite-based power plants which are used for captive purposes. Rajasthan alone contains 82% of the country's 1055.55 million tonnes of gypsum deposits.

Degradation of Environment by Mining Activity

In Bikaner district, the mining activity is carried out by opencast mining method of the non-metallic minerals like gypsum, fuller's earth and white clay. Out of these gypsum mining covers the largest part and this activity inflict damaged the large area of land surface. In these opencast mining the environmental degradation is evidently unavoidable. In this process the lands have been altered and turned upside down, the vegetation cover completely destroyed, fertility status of the area decreases which results in complete loss of biomass. Mining activities often involve the extraction of water from aquifers, leading to a decline in groundwater levels and the pollution of existing water sources with heavy metals and other contaminants. This poses a significant threat to the local ecosystem and human populations that rely on groundwater for drinking and irrigation purposes.

Furthermore, mining activities in the Thar Desert often involve the clearing of large tracts of land, leading to soil erosion and loss of biodiversity. The removal of vegetation cover and topsoil disrupts the natural ecosystem and increases the risk of desertification, making it crucial to implement proper wasteland management practices to

restore and rehabilitate degraded lands. Afforestation and reforestation programs can help mitigate soil erosion, improve soil fertility, and enhance biodiversity in mining areas of the Thar Desert.

In addition to soil and water degradation in the Thar Desert, mining operations can endanger population health and air quality. These operations can release dust, particulate matter, and other pollutants that can cause cardiovascular disease and pulmonary issues among local communities. Effective dust control measures, such as covering stockpiles and using water sprays, can help minimize the impact of mining activities on air quality and protect the health of surrounding populations. Furthermore, the disposal of mine waste and tailings in mining areas of the Thar Desert poses a significant challenge for wasteland management. Mine waste contains high levels of heavy metals and other contaminants that can leach into the soil and groundwater, leading to long-term environmental damage. Proper disposal and management of mine waste are essential to prevent soil and water contamination, as well as the spread of pollutants to adjacent ecosystems.

Wasteland Management

To address these environmental challenges, comprehensive wasteland management plans are needed in mining areas of the Thar Desert. These plans should focus on sustainable land use practices, integrated water management strategies, and environmental impact assessments to prioritize conservation and restoration efforts. Reclaiming degraded lands through revegetation, soil conservation, and water harvesting techniques can help restore ecosystem services and biodiversity while supporting local communities' livelihoods. The revegetating material for mined wastelands in arid regions should consist of plant species that are well-suited to the specific terrain and climatic conditions. To identify appropriate vegetation, a survey of the neighboring areas adjacent to the mined site should be conducted. Recommended species for such revegetation efforts include various trees, shrubs, and grasses that can thrive in these environments with proper soil and water conservation measures. The suggested tree species include *Acacia tortilis*, *Acacia Senegal*, *Prosopis juliflora*, *Albizzia amara*, *Prosopis cineraria*, *Salvadora persica* and *Tamarix aphylla*.

Recommended shrubs consist of *Parkinsonia aculeata*, *Dichrostachys nutans*, *Cercidium floridum*, *Colophospermum mopane*, and *Capparis decidua*. For grasses, suitable options are *Desmostachys bipinnata*, *Cenchrus ciliaris* and *Cymbopogon jwarancusa*. Community participation and stakeholder engagement are essential for successful implementation of wasteland management initiatives in mining areas of the Thar Desert. Local communities, indigenous peoples, and other stakeholders should be involved in decision-making processes, land-use planning, and resource management to ensure the sustainable development of mining regions. Empowering communities through capacity-building, awareness-raising, and skill development programs can help build resilience and enhance the adaptive capacity of people living in mining-affected areas.

Conclusion

Wasteland management in mining areas of the Thar Desert is essential for protecting the environment, conserving natural resources, and promoting sustainable development. By implementing integrated and participatory approaches to land rehabilitation, water conservation, and pollution control, mining companies, government agencies, and local communities can work together to mitigate the adverse impacts of mining activities on the environment and create a more sustainable future for the Thar Desert. It is imperative to prioritize the restoration and rehabilitation of degraded lands, as well as the protection of water resources, air quality, and public health, to ensure the long-term viability of mining operations in the region.

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