A *REIA* STUDY OF MARBLE MINING ACTIVITIES IN DISTRICT NAGAUR (RAJASTHAN)

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Abstract

Conventional and unscientific mining poses severe threat to life, public property and continuation of mining in the area. Incompatible land uses, huge waste dumps and large scale land transformation have resulted in land degradation, ponding, flooding, water contamination and health hazards in Makrana mining area. Segregation of dumps, compatible land use, research and development activity for use of marble slurry are suggested measures for reclamation and restoration of the degraded land. While for the purpose of development and economic upliftment of people, there is a need for establishment of industrial project, but these have to be environmentally friendly. Therefore it is essential to assess the impacts of mining on different environmental parameters, before starting the mining operations, so that abatement measures could be planned in advance for eco-friendly mining in the area. Environmental Impact Assessment (EIA) is a systematic process that examines the environmental consequences of development action like mining, cement, transport, river valley. EIA systematically examines both beneficial and adverse consequences of the proposed project and ensures that these impacts are taken into account during the project design.

Keywords: *Mining, REIA, Nagaur*

Introduction

Mining actions and waste product produces a major impact on surrounding environmental ranging from localized surface and ground water contamination to damaging effect of airborne pollutants on the regional ecosystem. The main objectives of this study were to evaluate (estimate) the possible environmental impacts that might generate from mining industries as a rapid growth industrial sector in Nagaur.

Rajasthan, a mining hub, has the second largest mineral reserves in the country. It produces 42 varieties of major minerals and 23 minor varieties. Rajasthan mines produces first in India. The minerals are mainly available in Makrana in Nagaur, Rajsamand, Uaipur, Ajmer, Sikar. Applicant will pay royalty for the marble to be produced from the mine, sales tax and other applicable taxes will be paid thereby contributing to the regional revenue. The public revenue will further be put for

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public expenditure as mentioned by the Rajasthan State Industrial Development & Investment Corporation Ltd. The Rajasthan natural stone industry alone employs about half a million workers.

Rajasthan has the largest resources of good quality marble in India. Total recoverable reserves of marble in India are estimated at 825 million tonnes by IBM, out of which 563 million tonnes alone are found in Rajasthan. As per the information from Stona-2000, Rajasthan possesses 11,000 million tonnes of mineable marble reserves. The following statement shows reserves of various marble belts/ deposits of Rajasthan

Table 1
Marble reserve in Rajasthan. Values are expressed in million tonnes

S. No.	Deposit/belt	District	Reserves
1.	Agaria- Amet- Kelwa-Morwad	Rajsamand	387
2.	Makrana	Nagaur	56
3.	Keshariaji	Udaipur	40
4.	Babarmal (Devimata)	Udaipur	60
5.	Tripura Sundari-Talai-Odabasi-Bhimkund-Vithaldeo	Banswara	230
6.	Andhi- Bhainslana	Jaipur	50
7.	Jhiri -Sariska	Alwar	20
8.	Selwara-Dhanvav- Koteswar	Sirohi	80
9.	Jahajpur- Kekri	Bhilwara	60
10.	Kalyanpura-Narwar-Saradhana	Ajmer	60
11.	Patan-Rampura	Sikar	10
12.	Umar	Bundi	25
13.	Dungarpur	Dungarpur	10
14.	Chittaurgarh	Chittaurgarh	7
15.	Pali	Pali	3
16.	Jaisalmer	Jaisalmer	2
	Total		**1100**

About 85% country's production is shared by Rajasthan. It has produced 4278.63 thousand tonnes of marble during 1999-2000 worth for Rs. 42903.15 lac rupees (Sale value). (DMG, 2000).

The study assesses through simple preliminary EIA for the major effective impacts of wastewater and solid waste disposal strategies adopted in marble manufactures along other environmental norms. Environment Impact Assessment (EIA) is a process, used to identify the environmental, social and economic impacts of a project prior to decision-making. It is a decision-making tool, which guides the decision makers in taking appropriate decisions for proposed projects. It aims predicting environmental impacts at an early stage of project planning and design, find ways and means to reduce adverse impacts, shape projects to suit the local environment and present the predictions and options to decision makers. By using EIA, both environmental and economic benefits can be achieved. The environmental damage caused by mining was accepted by society because of the economic benefits that derived from mineral extraction. (Nelson, 2007).

The EIA study is being done for the Mine Lease (core zone) and area within 10 km radius (buffer zone), both of which comprise the ‘study area. The following data, through field survey and other sources, has been collected

Materials and methods

Study area

Makrana (Lat. 27°02'25", N; Long. 74°43'44" E) is situated at eastern margin of the Thar desert and has an ancient marble mining history. The Makrana marble has made a perceptible dent in marble industry because of its block ability, whiteness, (high CaO 50-56 %, low MgO 0.90-1.77 %), good polishing character and luster. It is fine grained and exhibits stable, well distributed colours, pleasing and attractive designs and patterns.(Natani,2001). The translucent varieties of Makrana marbles are preferred over other marbles for monumental and sculptural work.

Instrument/Equipment:- Analytical balance: Sampler : RDS APM 460 BL for PM_{10} & $PM_{2.5.}$ For the sampling and analysis of SO_2 Improved West & Gaeke Method (IS 5182 Part 2 is used.NO2 Modified Jacobs & Hochheiser method (IS 5182 Part 6 method is used. Water and soil samples were collected, preserved and bought to the laboratory for the chemical analysis. Volumetric titration method is used for the hardness of wáter.

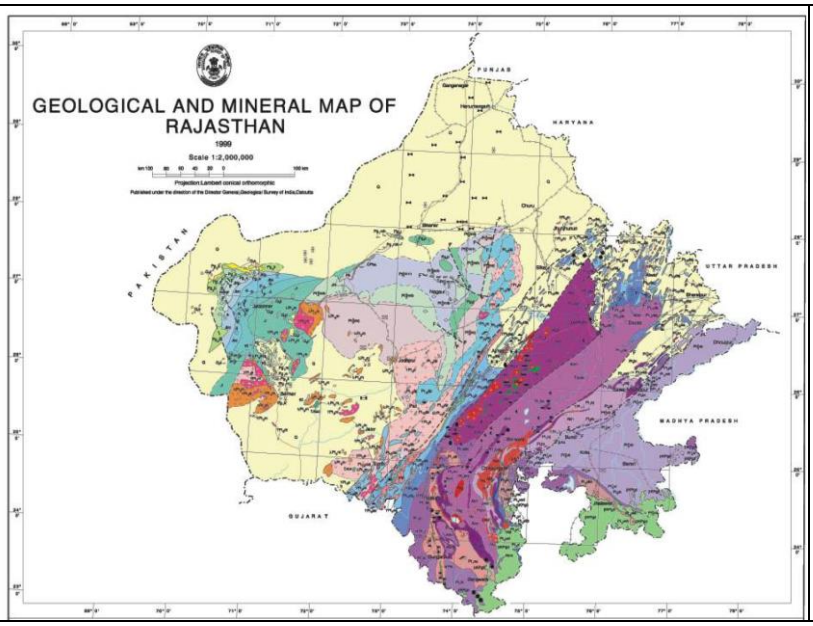

Figure 1 Rajasthan mineral map

Methodology

The environmental impacts from the proposed mining activity on different environmental parameters viz. air, water, noise, soil,conditions has been assessed through rapid Environmental Impact Assessment (REIA) studies. On the basis of a quick assessment of the environment condition at all the mine site and the nature of the adjoining area, it has been found that the area lying within mining lease areas forming cluster as its centre was considered to be the core zone of 500 meter where

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fugitive emission of the mining activity can have an impact on physical and biological environment. Area within 3 to 5 Km from mine boundary was considered to be the intermediate zone, where some impact may be observed. Area within 5 to 10 Km was considered as buffer zone, where only sight impact may be observed occasionally.

The detailed survey by random sampling methods was conducted in Nagaur district different location during study period.

Environment baseline study have been conducted during the winter season December 2015 to February 2016 in respect of micrometeorology, air quality, ambient noise levels, biological environment (flora & fauna), water quality, soil quality & socio-economics in the core and buffer zone of 10 km radius.

Data has been obtained by analysis of wáter, soil and monitoring of air quality.

Results and discussion

Baseline environmental data (Table 2).

Table 2
Environmental baseline data (December 2015 to February 2016)

S. No	Parameters	Measure unit	Details	SPCB Limit
A.	**Ambient Air Quality**			
1	SPM	µg/m^3	496-515	360
2	PM $_{10}$	µg/m^3	130-142	100
3	$PM_{2.5}$	µg/m^3	80-83.5	60
4	Sulphur dioxide (SO_2)	µg/m^3	85-98.3	80
5	Oxides of Nitrogen(NO_x)	µg/m^3	78-97.5	80
B.	**Noise Level in dB**			
6	At day time	Led dB(A)	54.2-78.9	75
7	At night time	Led dB(A)	45.9-69.3	70
C.	**Water Quality**			
8	Total hardness ($CaCO_3$)	mg/l	662-728	600
9	TDS	mg/l	2690-2796	2000
10	Mg	mg/l	94-110	100
11	Cl	mg/l	1078-1159	1000
12	SO_4	mg/l	73-86	400
13	Ca	mg/l	125-250	200
D.	**Soil Quality**			
12	pH	--	7.38-8.95	------
13	Potassium	---	0.725-0.886%	------
14	Nitrogen	---	1.022-1.025%	------
15	Phosphorus	--	0.088-0.093%	------
16	Soil temperature	°C	22	----
17	Organic Carbon	--	0.78%	----

Ambient Air Quality

To know the ambient air quality in the buffer zone of 10 Km. radius, air quality survey has been conducted at different location. Suspended particulate matter (SPM) found in the range of 496-515 μg/m^3. PM_{10} was found in the range of 130-142 μg/m^3. $PM_{2.5}$ 80-83.5. All parameter was found beyond the permisible limit. The main reason of byeond permisible limit was mining activity and transportation of vehicle.

Noise environment

Noise often defines as unwanted sound, interferes with speech communication, and causes annoyance (irritate), distracts from work, disturb sleep, thus deteriorating quality of human environment. Noise monitoring in the study area at different location shows that the noise level is very high at mine site and very less in location of surrounding area. The highest noise level recorded at mining site i.e. 78.9 dB(A), while the lowest level was recordéd at surrounding village**.**

Water Quality

The quality of water was studied by collecting water sample from different location. The total hardness as $CaCO_3$ was found in the range of 662-728 mg/L, TDS was found in the range of 2690-2796 mg/L. Chlorides was found in the range of 1078-1159 mg/L, sulphate was in the range of 73-86 mg/L, calcium was in the range of 125-250, magnesium values of water sample are crossed the permissible limit. It is due to extremely suspended mineral matter. The above values of different characteristics of water produce cathartic effect, Allergy, stomach related diseases, stone diseases etc.

Soil environment

The, pH, temperature, nitrogen, phosphorus, potassium content are not suitable for permissible fertile limit. Due to above value and unbalancing of nutrients, resulting in to loss of soil cover, loss of vegetation and deterioration of the land quality in study area and hence soil degradation is directly related to crop production. By proper mitigation measures, the impact on the soil environment of the study area due to the mining activities can be controlled / minimized. pH found in the range of 7.38 to 8.95, potassium was 0.725 to 0.886%, Nitrogen in the range 1.022-1.025% & Phosphorus in the range of 0.088-0.093%.Soil temperature was 22°C and organic carbón was 0.78% refers to the high organic carbón content which restrict the agricultural productivity.

Conclusions

The baseline of air, water, soil and noise levels are found across the permissible limits. Results of the study show that mining activities have significant effects on the environment. Although mining activities should be organized by terms of sustainable development, mining activities have been executed illegally. Marble

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mining at Makrana is a classic example of unscientific mining and improper waste disposal in total disregard to aesthetics, proper land use practices etc. Mining and waste disposal practices prevalent in the area need to be reviewed. Processing waste can be disposed of in abandoned pits and gully erosion areas. Segregation of overburden, mine muck, marble slurry and municipal waste dumps is suggested to prevent contamination of groundwater and land reclamation and restoration. These mining activities have led to the severe degradation of the fragile local environment on the Plateau due to the lack of adequate management and planning, as well as poor operating experience and waste management (Lin et al., 2007).

Even the land use pattern of the area will change due to mining in form of voids and dumps. Absence of scientific approach for waste recycling through land application may result in degradation of surrounding land.

The huge excavation around Makrana has resulted in large anthropogenic mounds and deep trenches. The entire landscape has been degraded and turned into derelict land, as there is no planned reclamation and restoration of quarried landscape. Natural ground slope has been obliterated causing ponding and flooding of water. Unscientific mining, improper waste disposal, high waste generation, lack of vegetation, suspended particulate matter from blasting, dried marble slurry, overburden material and unsegregated waste dumps also cause aesthetic nuisance.

Land reclamation is also easier and cheaper if mining waste is segregated. Value of marble depends on its size, whiteness, fine texture and absence or presence of cracks, fractures, etc. It is, therefore, suggested that as far as possible blasting should be avoided and deployment of wire saw machines be encouraged for mining In addition to these remedial measures, vegetation screens all around mining belt.

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