

**Study of Environmental Problems of Aravali Hills & Preparation of Action  
Plan for Restoration of Environmental Quality**

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**CHAPTER-I  
INTRODUCTION**

## 1. Historical Background

The erstwhile state of Alwar, in north-eastern Rajasthan, is possibly the oldest kingdom in kingdom-studded Rajasthan. In 1500 BC it formed part of the Matsya territories of Viratnagar (present-day Bairat), which also encompassed Bharatpur, Dholpur and Karauli. History becomes inextricably bound with mythology, as it was here in the ancient kingdom of Matsya that the Kauravas embarked on the cattle-rustling mission, which precipitated the war between them and their kinsfolk, the Pandavas. This battle forms the basis of the Mahabharata. The city of Alwar is believed to have founded by a member of the Kachh family who hailed from Amber, but control was wrested from the Kachhwahas of Nikumbhas. They, in turn, lost the city to Bada Gurjara Rajputs of Machari. It passed to the Khanzadas, under Bah Nahara of Mewat, who converted from Hinduism to Islam to win the favour of Emperor Tughlaq of Delhi.

Descendants of Bahadura Nahara defended the Alwar fort against the Mus in 1427. Alwar's fortunes were inextricably bound with those of Mewat, which was contiguous with Delhi. As Alwar was located on the strategic south-western tier of Delhi, this of course rankled with Mughals, who mounted numerous military forays into the region, only conquering after great difficulty. Alwar was later granted to Sawai Jai Singh of Jaipur by Aurangzeb only to be retaken when the emperor visited the city and noted the great strategical virtue of its fortress. The Jats of Bharatpur then threw their hat into the ring, briefly overrunning the region, and installing themselves in the Alwar fort. They were evicted by the Lalawat Narukas (descendants of the Kachhwaha prince of Amber, Naru) between 1775 and 1782 under the leadership of the Naruka Thakur (noble) Pratap Singh. His descendants were great patrons of the arts, commissioning the transcription of numerous sacred and scholarly texts and encouraging painters and artisans to visit the Alwar court. In 1803, the British invested the Alwar thakur with the title of maharaja as thanks for their support in a battle against the Marathas. This friendly alliance was short-lived, however, with the maharaja of Alwar strongly resenting British interference in governance when a British Resident was installed in the city. Following independence, Alwar was merged with the other princely states of Bharatpur, Karauli and Dholpur, forming the United State of Matsya, a name which reflected the fact that those states all comprised the ancient Matsya kingdom. In 1949, Matsya was merged with the state of Rajasthan.

### 1.1 Environmental Background

The Aravali range stretches about 615 kms from south-west Gujrat through Rajasthan, Haryana and Delhi. It covers an area of about 50,000 sq kms and acts as a barrier against advancement of desert to the east, thereby protecting the indo-gangetic plains. At the time of independence, the Aravali Hills were densely forested and rich in wildlife. Due to excessive felling of trees to meet the increasing demand for fuel, fodder and construction industry as well as extensive mining to meet the industrial demand for minerals, the eco-system of the region has come under severe stress. This has resulted in extensive soil erosion, loss of topsoil, silting up of river channels and reservoirs, reduced land fertility and lowering of the ground water table. The unprecedented deforestation has reportedly resulted in decline in monsoon rains from 101 days in 1973 to only 55 days in 1987. The entire Aravali Range has become ecologically sensitive and critically fragile.

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Aravalli Hills, hill system, North India, stretching 350 mi (560 km) through Rajasthan state is divided into the Sambhar-Sirohi and the Sambhar-Khetri ranges. The hills contain a variety of minerals, including large amounts of quartzite. Most of the hills are 1,000 to 3,000 ft (300 to 900 m) in height and from 6 to 60 mi (10 to 100 km) in width. The peak of Guru Sikhar on Mount Abu, which is 5,645 ft (1,720 m) in height, is the highest of the range.

The Aravallis, most distinctive and ancient mountain chain of peninsular India, mark the site of one of the oldest geological formations in the world. Heavily eroded and with exposed outcrops of slate rock and granite, it has summits reaching 4850 feet above sea level. It bisects the State of Rajasthan.

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The Aravalli range, stretching from Palanpur in Gujarat to Delhi, divides Rajasthan into three distinct climatic regions. The Udaipur zone of the range is estimated to be around 300 million years old. It is,

therefore, not surprising that the range is a unique amphitheatre of biological diversity. But with the man-animal conflict on the increase, it is feared that the spectacular biodiversity of the Aravallis may be totally lost by the mid 21st century.

Due to its geographical location, the range harbours a mix of Saharan, Ethiopian, peninsular, oriental and even Malayan elements of flora and fauna. However, very few studies have been carried out on the ecology of this mountain system.

In the early part of this century, the Aravallis were well wooded. Today, the changes in the environment at Aravallis are severe.

The foothills of the Aravallis on the west fall in the rain shadow of the 1,721-metre-high hill Guru Shikar and a number of dry deciduous desert plants like *babool* have overgrown the land. On the eastern rain-fed foothills, the vegetation is typical of sub-humid climate: date palm and other trees. In the higher altitudes the vegetation is mesic: mostly *sagwan* and *sheesham*. The bushes are dominated by *karonda* and *thor*.



Though we find a number of tree species in the hills, timber quality trees have almost disappeared. Hillock after hillock used to be covered by bamboo. Today, bamboo clumps survive only near temples or forest outposts.

However, distribution of wildlife was not restricted to regions as in the case of vegetation. The lion, which is presently restricted to the Sason Gir sanctuary of Gujarat, was found on the southwestern foothills of Aravallis. But after the killing of two lionesses at Anadra in 1862, these majestic beasts have not been spotted in the region.

The tiger, panther, leopard and sloth bear were very common, too. Middle sized carnivores like the jungle cat, civet, carcal, wolf, jackal and mongoose were found in abundance. Herbivorous large mammals like the wild boar, *sambhar* and spotted deer were plentiful. The *chinkara*, black buck and the blue bull were found in the foothills. The jungle fowl was the pride of Abu hill.

Today the region presents a vastly different scenario. Tigers, medium sized carnivores and the herbivores have all vanished. Panthers are invading villages for food. The remaining population of sloth bears is thriving on *lantana* berries. The only species untouched is the primates, which are protected by religious sentiment.

The British had promulgated a legislation — Abu Wildlife Protection Act in 1889 — which was followed till the Raj existed. Thereafter, the common man took to indiscriminate felling of trees and

killing of wild animals, firstly for food and then for trade. Wildlife can sustain regulated *shikar* but certainly not wanton killing for trade.

The main Aravalli range has become a prime tourist centre for Gujarat and Rajasthan. As a consequence, hotels have sprung up everywhere. All the wild fruit like figs, *jamun*, mango and date, are harvested for selling to the tourists. Man has usurped the natural food of wild animals. Agriculture has reached the highest altitude of the hills. The native habitat has shrunk. Grazing by livestock is rampant and there is very little shelter for wild animals. In spite of the fact that three wildlife sanctuaries and five closed areas have been declared, there is heavy biotic pressure on the main Aravalli range.

With the human population on the increase, their demand from the forest has correspondingly gone up. Some serious thinking and implementation of laws has to be undertaken if the ecology of the Aravalli mountain system is to be saved.

Many representations were received by Ministry of Environment & Forests (MoEF), Government of India about the mounting ecological problems in the Aravali Region. It was also noted that the Forest (Conservation) Act, 1980 and the Punjab Land Preservation Act, 1900 were being violated. The matter was taken up with the states of Haryana and Rajasthan and subsequently in the year 1990, a writ petition was filed in the Supreme Court to take suitable corrective action. In order to save the threatened eco-system in the Gurgaon district of Haryana and Alwar district of Rajasthan, a draft notification under the provisions of Environment (Protection) Act, 1986 was issued with the objective of regulating certain selected activities. The notification [under section 3(1) and 3(2) of the Environment (Protection) Act, 1986 and rule 5(3) (d) of the Environment (Protection) Rules, 1986] was gazetted on 7<sup>th</sup> May, 1992. This is appended as Annexure-I in this report.

## 1.2 Supreme Court Directives

Acting on a writ petition filed by Tarun Bharat Sangh (Alwar) in 1991, the Hon'ble Supreme Court delivered a judgment on April 8, 1993, ordering:

- That mining activities within the protected forests of Sariska Tiger Reserve should be stopped forthwith.
- That mining activities in the mines situated outside the protected forest area but within the boundaries of the Tiger Reserve may continue for a period of four months. The concerned mine owners should approach Ministry of Environment & Forests, Government of India for permission and if no permission is obtained within the said period, the mining activities in the entire area declared as Tiger Reserve will stop on the expiry of four months granted by the Supreme Court.
- Hon'ble Supreme Court had also directed the Ministry of environment & Forests to consider the petitions submitted by Rajasthan Government to the Justice M.L. Jain Committee for utilisation of the forest land for continuance of the mining operations and submit a report to the Supreme Court within three months.

Subsequently, the Hon'ble Supreme Court extended the time limit prescribed earlier to 31<sup>st</sup> October, 1993, making it clear that the Union of India shall pass orders within a period of three months *i.e.* by 5<sup>th</sup> November, 1993.

Pursuant to the orders of the Hon'ble Supreme Court, the Ministry of Environment & Forests decided that cases covered by this order would also be considered by the Appraisal Committee of Experts already constituted by the Ministry.

As a result of the Hon'ble Supreme Court's decision, the Department of Mines, Government of Rajasthan, submitted a proposal to the Union Ministry of Environment and forests in respect of 180 marble leases in six clusters located outside the protected forests but within the tiger Reserve on 1<sup>st</sup> June, 1993. The Rajasthan authorities also clarified that as the individual leasees may not have access to the detailed data required under the Gazette Notification dated 7<sup>th</sup> May, 1992, detailed maps and applications have been compiled by the State Government itself.

The Ministry of Environment and Forests examined the data furnished by the state of Rajasthan for the above proposal. No Environmental Impact Assessment (EIA) report was prepared by the State, which could lead to the formulation of Environmental Management Plan (EMP). Subsequently, the State Government was requested to furnish the requisite EIA report along with an EMP and other missing data as specified in the Notification dated 7<sup>th</sup> May, 1992.

An EIA report was prepared by the Zila Khanij Udyog Sangh (Alwar) for 115 of the leases, out of which 30 mines are within the protected forests, 70 are outside the protected forest and 15 are partially within the protected forest of Sariska Tiger Reserve. This was submitted to the Ministry in the third week of July, 1993. A few individual applications were also received.

### **1.3 Consideration of the Proposals and Evaluation of the EIA**

The EIA alongwith the data furnished by the leasees and the State authorities, was first considered by the Appraisal Committee on 29<sup>th</sup> July, 1993. Both the Rajasthan Government and Zila Khanij Udyog Sangh (Alwar) made presentations. The Committee felt it necessary to make a field visit to the mining areas in Sariska in order to gain a better understanding of the situation. A sub-Committee comprising of experts on mining, conservation and socio-economic issues was constituted.

#### **1.3.1 Field Visits**

The Sub-Committee made an intensive site inspection on the 17<sup>th</sup> and 18<sup>th</sup> August, 1993. The Committee not only visited the mine sites but also had discussions with the mine owners, workers and local villagers. Discussions were also held with Tarun Bharat Sangh (Alwar). The following observations were made during the field visits:

- The mining areas were found be severely degraded and unplanned mining has left the areas covered with deep pits and overburden dumps.
- The blasting resorted to by the miners renders more than 60-70% of the marble reserve of little value.
- The majority of mine leases in this area are 100mx100m. The small size of the leases has inevitably led to outdated pick and shovel technology, which is wasteful and devoid of safety considerations.
- Dumping of waste material is unplanned. Cases were found of waste being dumped much beyond the lease boundaries and some times on common land as well as on other persons land.
- The mining activity has provided some employment to the local villagers. Minimum wages, however, to women workers were more often not paid. Also, no attention was paid to safety, accident compensation and other welfare for the workers.
- Mining activities including blasting, operation of machinery, movement of trucks and labour was found to be detrimental to the flora and fauna of this ecologically sensitive area.
- The full cost of mining does not seem to have been taken into account, namely the cost of disappearing forests, degraded grazing and agricultural lands and the health and well being of the people.
- The Sub-Committee felt it was imperative to arrest and reverse the ecological damage caused.

#### **1.3.2 Issues for addressal**

After the field visit, the Committee decided that the continuation or otherwise of mining in Sariska should be viewed against the following criteria:

- Whether these mining activities are in conformity with existing mining policies and long-term environmental conservation.
- Whether mining activities is compatible within Sariska Tiger Reserve.
- Whether mining activities contributes to the welfare of the local community or further impoverishes them due to environmental degradation.

### 1.3.3 Options

Several options were considered by the Committee including the following:

- Continuation of mining but with emphasis on comprehensive rehabilitation of mining areas including improved management plans and improved technology.
- Mining activities to be continued until lease expiry. No renewal of lease and no new mining lease to be given to safeguard the integrity and future of Tiger Reserve.
- Mining blocks on the periphery of core boundary to be closed except the one which is away from the core area.
- Mining activity to be stopped in the Sariska Tiger Reserve.

The Committee was of opinion that the EIA and EMP submitted by the mine owners did not deal adequately with management plans, including waste disposal, overburden dumping, mine working, green belt development and rehabilitation of mined areas. Additional facts and figures were requested from the mine owners.

On 11<sup>th</sup> October, 1993, the Government of Rajasthan along-with Zila Khanij Udyog Sangh and their consultant presented the additional information to the Committee.

After detailed discussion between Expert Members, the State Pollution Control Board and other agencies, the Committee came to the conclusion that the data in EIA and EMP as furnished by the mine owners is still inadequate in the following areas:

- ⇒ Critical gaps in the data on mining reserves, delineation of mineral deposits, methodology of determining the mineable reserves.
- ⇒ Evaluation of ambient air quality in the area along-with the noise level.
- ⇒ Inadequacy of methodology in sampling and prediction models to determine the quality of air.
- ⇒ Inadequate data with respect to impact of mining on water environment.
- ⇒ Absence of details regarding management of overburdens and reject dumps: Lack of action plans for restoration of mined areas with reference to top soil management, creation of green belt etc.
- ⇒ Socio-economic issues pertaining to the mine workers and local community were not adequately addressed.

Discussions with the consultant and the mine owners also brought out the fact that their proposed EMP was not supported by realistic data and time phased action plans for reclamation and rehabilitation of the area. The proposed solutions for waste management were not considered viable.

The Committee unanimously concluded that the mining operations in Sariska Tiger Reserve have resulted in excessive environmental degradation and the proposed EMP was unlikely to remedy the situation. The Committee further concluded that mining activity is not compatible within Sariska Tiger Reserve and does not adequately contribute to the welfare of the people.

### 1.3.4 Alternative Sustainable Employment

The Committee considered the following suggestions for providing employment to the local mine workers rendered jobless due to the closure of mines:

- ⇒ Employment of workers in afforestation and rehabilitation of degraded land and involvement of eco-development programmes in and around Sariska Tiger Reserve.
- ⇒ Involvement of workers in rehabilitation of the closed mines through projects formulated to restore the area.
- ⇒ NGO scheme such as water harvesting systems, dairy projects etc. should be supported and encouraged in the area. This will be another source of employment.
- ⇒ Mine owners may be considered for granting alternative leases.

### 1.3.5 Recommendations

The Committee noted the serious environmental degradation arising out of mining operations in Sariska Tiger Reserve. Its affects go much beyond the boundaries of the leaseholds not merely on the adjoining forests but also on agricultural lands beyond the mine areas. The Committee also noted that the present Policy of the Government of Rajasthan in not conducive to the mining operations being conducted in an environmentally compatible manner. The Committee unanimously made the following recommendations:

- ⇒ All mining activities outside the protected forest are but within the Tiger Reserve should be stopped with immediate effect.
- ⇒ Although mining activities within the protected forest are in under consideration of the Forest Advisory Committee for diversion of Forest Land, this Committee recommends that mining should not be allowed in this area.
- ⇒ Mine owners affected by closure of mines in the Sariska Tiger Reserve may be considered for grant of leases outside ecologically sensitive area.
- ⇒ A corpus fund should be created with contributions from the Union and the State Governments as well as the lessees to provide relief in the interim period to the local mine workers made jobless.
- ⇒ Sustainable employment should be provided for those rendered jobless because of closure of mines through:
  - The eco-development schemes of the government,
  - Voluntary agencies should be provided funds through schemes such as wasteland development.
- ⇒ A monitoring Committee with involvement of NGOs and participation of village communities be constituted to oversee the relief and rehabilitation work.
- ⇒ The Rajasthan Government needs to review its policies regarding mining leases so that with better technology and better managed mining can be carried out without seriously damaging the supportive resources of the rural communities. The Rajasthan Government should also assess the real environmental costs of mining and take more seriously its monitoring role.

### 1.4 Genesis

Protection of Environment from the degradation caused by industrial development is the present watchword for the survival of the human civilization. The World environment Conference of June, 1992 at Rio-de-Janeiro underlined the commitment of the Governments throughout the world and reinforced the need of immediate action plan to protect the environment for future generation. It is also recognized that mineral mining and processing certainly contribute to the national and global environmental problems and there is need to protect the biodiversity of the world.

Broadly speaking, Berlin Guidelines (Mining & Environment) suggested (as adopted in Harare Conference):

.....sustainable mining activities require good environmental stewardship in all activities, from exploration and processing to decommissioning and reclamation. It acknowledges the importance of integrating environmental and economic considerations in the decision making process and the fact that the mineral deposits are unique in their occurrence. It recognizes the importance of mining to the social, economic and material needs of society, in particular for the developing countries.

“Sustainable mining under appropriate environmental guidelines is based on interaction between industry, governments, non-governmental organizations and the public, directed towards optimizing economic development while minimizing environmental degradation. The need for such guidelines is recognised by industry, governments and international agencies. It is also recognized that the political will of the governments, together with commitment of industry management and of the community, are the essential conditions needed to enforce environmental legislation and more importantly to ensure compliance with all the applicable laws for the protection of the environment, employees and the public”.

The United Nations organized “Inter-regional Seminar on Guidelines for the Development of small and medium scale mining” held in February, 1993 at Harare, Zimbabwe recommended the following under the Environmental Section.

IX. Government and their agencies should take into account the “Berlin Guidelines” and have a responsibility to:

- d. Make the small and medium scale mining sector aware of their potential to cause environmental damage and their responsibility to minimize it;
- e. Ensure effective local monitoring and control systems;
- f. Encourage the development and use of Environmental Friendly Technologies.

### **Activities in Aravali Ranges**

In the Aravali Hills, a large number of mining activities, operation of stone crushers and pulverizers, deforestation and unplanned construction activities are causing environmental degradation. These mines are usually located in clusters in remote mineral rich districts / areas where living standards are lower and understanding of people towards environmental impacts is also poor. In the past, mine operators took no note of environmental damage. In fact they were not even conscious about it. The attitude of mining community is to ignore the environmental concerns. In majority of the cases, the environmental concerns are ignored for making quick profits. The small mines (< 5 hectares) and the mining of ‘minor minerals’ which are no doubt small individually but have damaging characteristics when in clusters *e.g.* the mines of granite, marble, slates, quartzite etc. (falling under minor minerals) are no less damaging than the others, especially when the processing is taken into consideration. The mining activities in the region results in disturbance of land surface, altering drainage pattern and land use besides the pollution problems. This may lead to the following environmental problems:

#### **1.5.1 Air Pollution**

The air pollution is generated in the mines mainly by the mining operations like drilling, blasting, moving of heavy earth moving machineries (HEMMs) on haul roads, collection, transportation and handling of minerals, screening, sizing and segregation units etc. The main air pollutants in the mining areas is particulate matter especially Respirable Particulate Matter (RPM). However, SO<sub>2</sub>, NO<sub>x</sub> are also existing due to vehicular emissions, DG sets exhaust, domestic use of fuels etc. High level of suspended particulate matter is attributed to increase in respiratory diseases such as chronic bronchitis and asthma cases.

#### **1.5.2 Water Pollution**

The major sources of water pollution in the mines area are the carryover of the suspended solids (overburden dumps) in the drainage system to the mine sump water and storm water drainage.

#### **1.5.3 Noise Pollution**

The main sources of noise pollution are blasting, movement of HEMMs, drilling and mineral processing plant.

#### **1.5.4 Solid Waste**

The main sources of solid waste in the mining area is the overburden.

The other environmental problems associated with the mining activities are:

- Overburden management
- Air pollution caused by pulverisers
- Land degradation during mining activity and its reclamation
- Deforestation during mining activity and compensatory afforestation

The other activities causing environmental degradation in the Aravali Hills in the state of Haryana and Rajasthan are stone crushers, unplanned construction activities, unattended excavated mine pits, disturbance in the underground aquifers, disturbance of flora and fauna, social environment, topography etc.

This project is initiated with a quest to meet the objectives as given in the next section in this chapter to protect the environmental degradation of the Aravali Hills. Central Mine Planning & Design Institute (CMPDI) Limited, a subsidiary of Coal India Limited (a Government of India Enterprise) was appointed as consultant for this project by Central Pollution Control Board, vide letter No. B-31011/68/2000/PCI-II/20054 dated 15<sup>th</sup> November, 2000.

### **1.5.5 Objectives**

This project has been undertaken with the following objectives:

- ❑ To prepare status report of the pollution problems in the Aravali Hills
- ❑ To prepare environmental management plan to abate various environmental problems
- ❑ To prepare action plan for restoration of environmental quality

### **1.6 Scope of Work**

Aravali ranges in the Gurgaon district in Haryana alongwith Alwar district of Rajasthan have been notified (may 1992) as ecologically sensitive areas, therefore in-depth study of the area is essential. This document will be prepared by collecting information through questionnaire, State Boards, industrial units and field studies. Data from other governmental agencies will also be obtained. Following is the scope of work of this project:

#### **1.6.1 Base Line Data Generation**

- Preparation of land cover map which include physiography, geology, drainage pattern, water bodies, soil and vegetation cover
- The information on land use pattern would be collected from published data, state official s and by actual field studies
- Micro-meteorological data would be collected from the nearest IMD station for impact assessment on environment due to mining and other industrial activities as this is a regional studies covering Alwar district of Rajasthan and Gurgaon district in Haryana in the Aravali region.
- Data on present ambient air quality, water quality from wells, flowing streams (if any) and ponds etc. Soil quality and noise level would be collected through monitoring stations on an area network in the study area. Demographic and socio-economic details would be collected through studies by scrutiny of the published documents and field survey. Terrestrial ecological data including meteorological data of the area would be collected from government departments.

#### **1.6.2 In-depth Study**

This includes the following:

- In-depth study into the process, technology used and other environmental aspects have to be conducted for mining and other industrial activities.
- Assessment of pollution generation by mining and other industrial activities.
- Study of reuse and recovery of the wastes.

#### **1.6.3 Literature Survey**

The literature survey includes the following:

- Related literature on the field from India and other developed countries will be compiled

- The best feasible technology for mining and other industrial activities in the area will be identified
- The pollution prevention and control technology prevalent in the area and the clean technology to be identified.

#### **1.6.4 Environmental Impact Assessment**

Based on the data generated, the impact on environment due to the industrial activities and mining will be assessed. The environmental impacts of the cluster of the proposed mines and processing units, under the present environmental scenario will be addressed separately.

#### **1.6.5 Environmental Management Plan**

Based on the findings, the environmental management plan will be prepared.

#### **1.6.6 Guidelines for Pollution Prevention**

The guidelines for pollution prevention comprises of the following:

- Guidelines for pollution prevention for the mine operations and the allied activities will be prepared.
- These guidelines will include long term and short-term afforestation guidelines and programmes.

#### **1.6.7 Preparation of Action Plan**

- Short term and long term action plan for the restoration of environmental quality of the area to be prepared separately.
- The action plan will be prepared in such a way that it should be a guiding tool also in the hands of the state pollution control boards and government agencies for enforcement of the environmental laws for the restoration of environmental quality of the area.

#### **1.6.8 Laboratory Facilities and Monitoring Frequency Required by the Mines and Other Industries**

- Details of the laboratory facilities required by the mines and other industries to conduct monitoring to assess the environmental quality
- Monitoring programme including frequency of monitoring for air quality, water quality, ground water, solid wastes, noise level etc.

With the above scope of work, CMPDI has studied the environmental problems existing in the Aravali Range and suggested remedial measures for ecological restoration of hill chain system in the district.