SUMMER INTERNSHIP REPORT

Monitoring and Evaluation of Forest Area Diversion Including the Status of Compliance of Approval Conditionalities and Impact of Forest Diversion Cases on the Forest & Wildlife – Metal and Mineral Mining

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DECLARATION BY ORGANIZATION

This is to certify that the project report entitled "**Monitoring & Evaluation of Forest Area Diversions Including the Status of Compliance of Approval Conditionalities of Forest Diversion Cases on The Forest & Wildlife – Metal & Mineral Mining** " done by **Kapil D. Bhalerao** and **Ramamohan K.** (PFM 2009-11) for MoEF is original work. This has been carried out as Summer Internship under my guidance for partial fulfilment of Post Graduate Diploma in Forest Management at Indian Institute of Forest Management, Bhopal.

Place: Bhopal

Date: 14-06-2010

Reporting Officer

Sujoy Banerjee IFS
Deputy Conservator of Forests,
Ministry of Environment & Forests
Government of India

DECLARATION BY STUDENTS

We, Kapil Bhalerao and Ramamohan Koosanpudi, hereby declare that the project report entitled "**MONITORING AND EVALUATION OF FOREST AREA DIVERSIONS INCLUDING STATUS OF COMPLIANCE OF APPROVAL CONDITIONALITIES AND IMPACT ON FORESTS AND WILDLIFE BY METAL AND MINERAL MINING**" is an original work. The contents of the project report have not been published before and reflect the work done by us during our Summer Internship of the Post Graduate Diploma in Forest Management at Indian Institute of Forest Management, Bhopal from 05 April 2010 to 11June 2010 with MINISTRY OF ENVIRONMENT AND FORESTS.

Place: Bhopal

Date: 14.06.2010

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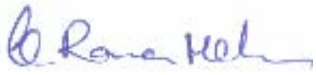

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EXECUTIVE SUMMARY

As a part of Summer Internship Project 14 mining leases were visited in five forest divisions (Satna, Balaghat, Bhandara, Kolhapur and Vadodara) spread across three states namely Madhya Pradesh, Maharashtra and Gujarat. The study included various minerals like Limestone, Bauxite, Ochre, Manganese, Fluorspar and Kyanite. (Out of 14 mining leases 3 were for underground mining and 11 were for opencast mining.)

First documents of final approvals were collected from MoEF Regional Office Bhopal, to study forest clearance conditionalities stipulated by the Ministry of Environment and Forest (MoEF) for each of the user agencies. To know the status of compliance of those conditionalities, the mining areas were visited. Local forest authorities helped to locate the mining leases. Then primary data (in the form of photographs) was collected, in which various reclamation practices followed by the user agencies were studied. Plantations within the mining lease (safety zone plantations) carried out by the user agencies were observed. Data regarding survival rate of plantations, species planted, measures taken to maintain quality of plantations was provided by the user agencies.

Overburden disposal practices carried out by the user agencies were also studied. However, since the compensatory afforestation (CA) sites were dispersed farther away from the mining area (as conveyed by concerned Forest Divisions) no visits were made to CA sites.

Key findings of study show that all the user agencies have paid for compensatory afforestation (not applicable for renewal proposals) as well as Net Present Value (approvals before 2002 are not applicable for this conditionality) of the forest land cleared in monetary terms.

Some of the user agencies were making serious efforts to grow as well as protect the plantations within core zone as well as in the buffer zone. Rainwater harvesting in the mined out area was done by Maihar Cement as well as Hindalco to reclaim the mined out land. This rainwater was further used for plantation as well as dust minimization purposes. However safety zone plantations were not demarcated in any of the mines visited.

Disposal of overburden was not done properly in some of the opencast mines like Pavri Kyanites, GMDC Kadipani etc. There was considerable dust in the air in these mines, due to which flora and fauna in the vicinity was under stress.

Mining lease boundaries were not easily identifiable as there were boundary pillars without any numerical reference. Technology can be used to make permanent demarcation of leasehold boundaries. GPS can be used for this purpose.

CA sites can also be demarcated using GPS. Also, private parties can also be involved to maintain CA plantations so as to minimize time gap between forest clearance and forest compensation.

Online portals can be developed to involve public to report directly to the authorities (An illegal mining monitoring cell can be established), so as to prevent the delay in identification of illegal mining. It will definitely help in achieving equilibrium between conservation and development.

ACKNOWLEDGEMENTS

We would like to express our deepest sense of gratitude to Mr. A. K. Rana (CCF, MoEF Regional Office, Bhopal) and Mr. Sujoy Banerjee (DCF, MoEF Regional Office, Bhopal) for providing us an opportunity to work on this project. Without their constant support and guidance, the successful completion of this work would not have been possible.

We would like to also thanks to the concerned CCFs, CFs, DFOs of the five districts (Satna, Balaghat, Bhandara, Kolhapur, Vadodara) for their constant guidance and support during the field work period. Their vast knowledge pool was a great inspiration and helps in better understanding of the work.

Thanks are also due to members of the respective organizations for making our study a fruitful one.

Of course, all the learning would have been impossible without the support provided by Dr. R. B. Lal (Director, IIFM) and Dr. CVRS Vijaya Kumar (Summer Internship Coordinator, IIFM) in making the internship possible under the Course.

Lastly, a big thank you to our families for their continuous encouragement, and our dear batch mates for their unrelenting spirit and confidence in our abilities.

Kapil Bhalerao

Ramamohan K

LIST OF ACRONYMS

CA	**Compensatory Afforestation**
CAMPA	**Compensatory Afforestation Fund Management and Planning Agency**
CAT	**Catchment Area Treatment**
GMDC	**Gujarat Mineral Development Corporation**
ha	**Hectare**
IBM	**Indian Bureau of Mines**
ISO	**International Organization for Standardization**
ML	**Mining Lease**
MoEF	**Ministry of Environment and Forests, Government of India**
MOIL	**Manganese Ore (India) Limited**
NPV	**Net Present Value**
OB	**Over Burden**
RF	**Reserved Forests**
SI	**Summer Internship, (PFM 2009 - 11)**
UA	**User Agency**

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Chapter 1

INTRODUCTION

INTRODUCTION

1.1 About Ministry of Environment and Forests

"The Ministry of Environment & Forests (MoEF) is the nodal agency in the administrative structure of the Central Government for the planning, promotion, co-ordination and overseeing the implementation of India's environmental and forestry policies and programmes.

The primary concerns of the Ministry are implementation of policies and programmes relating to conservation of the country's natural resources including its lakes and rivers, its biodiversity, forests and wildlife, ensuring the welfare of animals, and the prevention and abatement of pollution. While implementing these policies and programmes, the Ministry is guided by the principle of sustainable development and enhancement of human well-being.

The Ministry also serves as the nodal agency in the country for the United Nations Environment Programme (UNEP), South Asia Co-operative Environment Programme (SACEP), International Centre for Integrated Mountain Development (ICIMOD) and for the follow-up of the United Nations Conference on Environment and Development (UNCED). The Ministry is also entrusted with issues relating to multi-lateral bodies such as the Commission on Sustainable Development (CSD), Global Environment Facility (GEF) and of regional bodies like Economic and Social Council for Asia and Pacific (ESCAP) and South Asian Association for Regional Co-operation (SAARC) on matters pertaining to the environment.

The broad objectives of the Ministry are:

- *Conservation and survey of flora, fauna, forests and wildlife*
- *Prevention and control of pollution*
- *Afforestation and regeneration of degraded areas*
- *Protection of the environment and*
- *Ensuring the welfare of animals*

These objectives are well supported by a set of legislative and regulatory measures, aimed at the preservation, conservation and protection of the environment. Besides the legislative measures, the National Conservation Strategy and Policy Statement on Environment and Development, 1992; National Forest Policy, 1988; Policy Statement on Abatement of Pollution, 1992; and the National Environment Policy, 2006 also guide the Ministry's work". **(About Ministry: MINISTRY OF ENVIRONMENT AND FORESTS, GOVERNMENT OF INDIA)**

1.2 About the Summer Internship Project

Summer Internship (S.I.) project was based on monitoring and evaluation, of forest land diversions. The focus was on metal and mineral mining (non-coal mining). Duration of the S. I. project was 10 weeks, out of which 7 weeks were spent in the field to visit 14 mining leases (underground as well as opencast) spread across three states, namely Madhya Pradesh, Maharashtra and Gujarat. Minerals include bauxite, limestone, ochre, manganese, kyanite and fluorspar.

The status of compliance of approved (forest clearance) conditionalities under Forest (Conservation) Act, 1980 was studied for each of the mines visited. Also, various practices followed to reclaim already mined out land, pattern of reclamation and species planted were also studied.

Mining is non-forestry operation for which forest land is diverted and thus it has certain impacts on the adjoining forests. Within the stipulated time span there were certain efforts made to study such impacts.

Chapter 2

REVIEW OF LITERATURE

REVIEW OF LITERATURE

2.1 Mining

Mining is closely associated with forestry and environment issues. A major part of the nation's known reserves of some key minerals are in areas which are under forest cover. Further, mining activity is an intervention in the environment and has the potential to disturb the ecological balance of an area. However, the requirements of economic development make the extraction of the nation's mineral resources an important priority. A framework of sustainable development is to be designed which takes care of bio diversity issues and to ensure that mining activity takes place along with suitable measures for restoration of the ecological balance. **(NATIONAL MINERAL POLICY, 2008 (For non-fuel and non - coal minerals))**. Special should be taken to protect the interest of host and indigenous (tribal) populations through developing models of stakeholder interest based on international best practice. Project affected persons must be protected through comprehensive relief and rehabilitation packages in line with the National Rehabilitation and Resettlement Policy.

2.1.1 The Metal Mining Cycle

(Metal Mining and the Environment n.d.). Discovering metal-rich deposits commonly requires extensive searching, and exploration is the first step in the mining cycle. Once exploration geologists find an area with metals, they determine whether it is of sufficient size and richness to be mined profitably. If the deposit is rich enough, activities to extract the metals from the Earth begin.

Extraction, the next part of the cycle, involves mining to remove the metal-bearing minerals from the Earth, mineral processing (beneficiation) to concentrate the metal bearing minerals, and smelting to liberate metals from the minerals that contain them. Although beneficiation and smelting are the most common processes, other processes such as chemical leaching are used for some types of metal extraction.

Mine closure is the final step in the mining cycle. Mining eventually depletes the metal-rich material that could be economically removed at a specific mine. When mining can no longer be profitably conducted, the mine and related facilities used in beneficiation or smelting will be closed. Closure involves many activities specifically conducted to prevent or mitigate undesired environmental and social impacts. These activities involve reclaiming disturbed areas, removing facilities, mitigating safety hazards, cross-training employees, and other activities that lead to environmentally benign and safe conditions where mining once took place.

Mining in the early days took place at a time when environmental impacts were not as well understood and most importantly, not a matter of significant concern. During these times, primarily before the 1970s, the mining cycle did not necessarily include closure activities specifically designed to mitigate environmental or social impacts. As a result, historical mine sites may still have un-reclaimed areas, remnants of facilities, and untreated water. This inherited legacy of environmental damage from mining is not indicative of the mining cycle today. Now, mine closure and a number of activities to mitigate the social and environmental impacts of mining are an integral part of all metal mine planning and mineral development from the discovery phase through to closure. **(Hudson, Fox, & Plumlee, 1999)**

The mining of minerals is no doubt essential for development and industrial growth for providing better standard of living, but there are environmental concerns related to mining i.e land degradation, pollution of air, water, noise affecting biological environment as well as socio-economics. It has been experienced that the mining in the past has caused a lot of damage to mother earth due to unplanned operations. In order to maintain balance in ecosystem, legislations have been enacted, compliance of which would not only allow sustainable development of mineral resources, for current need, but also would leave options open for prosperity. With these objectives, the notifications have been enacted for environmental clearances, from Ministry of Environment and Forestry (MoEF) before starting mining operations. Similarly, the approval of mining plan is essential from Indian Bureau for Mines (IBM) or the competent authority of state government. All the mining operations have to be done as per the mining plan. **(Draft of The Mines and Minerals (Development & Regulation) Act, 2010)**

The mining process, from the surface in open pit mines or from underground, separates the ores from the surrounding rocks. Although both surface and underground mining disturb the landscape, the scale of these disturbances differs markedly.

2.1.1.1 Surface Mining

Open cast mining commonly disturbs more land surface and earth material than underground mining. The leading mines in the world are open cast mines. The open cast mining process includes blasting the ore loose, hauling it to a crusher, and breaking it into pieces small enough for milling. Technology has evolved to handle tremendous volumes of material in this highly mechanized process of open cast mining. Typically, for every ton of metal ore produced, as much as two or three tons of waste rock is also produced. As mining operations expose the ore body, the mine geologist will continue to map and describe it to ensure that the most cost-effective mining plan is developed and implemented.

Waste rock, the name for rocks and minerals that enclose the ore and need to be removed in order to recover it, contains too few valuable minerals to process. Although the metal content of waste rock is too low to be recovered profitably, the environmental issues related to its characteristics and handling are very important. Large volumes of waste rock are created during the open cast mining process. The waste rock disposal areas that develop at a surface mine sometimes cover hundreds or even thousands of acres and may be several hundred feet (one to two hundred meters) high. Waste rock disposal areas are commonly one of the most visible aspects of a surface mine. **(Hudson, Fox, & Plumlee, 1999)**

If not properly managed, erosion of mineralized waste rock into surface drainages may lead to concentrations of metals in stream sediments. This situation can be potentially harmful, particularly if the metals are in a chemical form that allows them to be easily released from the sediments into stream waters. When this occurs, the metals are considered to be "mobilized" and "bioavailable" in the environment. In some cases, bioavailable metals are absorbed by plants and animals, causing detrimental effects. Although current mining and reclamation practices guided by environmental regulations minimize or prevent waste rock erosion into streams, disposal of waste rock in places where it could erode into surface drainages has occurred historically. These conditions still exist at some old or abandoned mines.

2.1.1.2 Underground Mining

Underground mines may use vertical shafts as shown, or mine openings driven into mountainsides, known as "adits;" although the primary challenge for underground and open pit mining is the same - to remove ore economically from the enclosing rocks — underground mining differs in two important ways. First, the size of the operation is much smaller than in open pit mining, and the mining activities are not as visible at the surface. The second big difference is the volume and disposal of waste rock. It is common in underground mining for the volume of waste rock to be equal to or less than the volume of the ore produced. In optimum situations, very little waste rock is generated and the waste rock can be used to fill underground areas where access is no longer needed. **(Lyday, 1996)**

2.2 Conditionalities of Forest Clearance [Forest (Conservation) Act, 1980]

Mining Proposals in forest areas in respect of coal and other minerals should be accompanied with the following documents,

2.2.1 In respect of Underground mining in stratified deposits in forest areas:

The mining plan in stratified deposits in forest areas should include the predicted subsidence, slope and strain values and their impact on forest and surface and their mitigation. Accordingly, the mine plans

should be made to restrict the subsidence movement within these limits with the provision of mitigation measures. All mining plans in respect of coal and other major minerals should be accompanied with numerical modeling in 3-Dimension for subsidence prediction through an expert mining engineer/organization to assess long term damage on surface vegetation due to underground mining with the mitigation measures should be submitted along with the proposal. The surface layout of mining areas should be designed so as to use minimum possible land, and wherever feasible, the surface facilities should be planned over non- forest areas.

2.2.2 Open cast mining in forest areas:

In respect of open cast mining in forest areas, a comprehensive study of soil waste management and land reclamation with post mining land use plan and de-commissioning should be made and the plan should envisage the minimum possible overburden dumping outside the mine. In place where the non- forest land is available, the external dumping of the overburden should be planned on non- forest land. Special attention should be given to top-soil and sub-soil handling and management.

2.2.3 Use of Fly ash in reclamation of open cast mines:

Wherever feasible, depending upon the characteristic of fly ash and its availability nearby, use of fly ash in reclamation of open pits should be looked into and planned. Fly ash for purpose should be characterized from the point of view of leaching potential with special reference to heavy metals. While forwarding the proposals, the State Government may also bear in mind the Para 7.13 of The National Minerals Policy, 1993 (For non-fuel & non-atomic minerals) wherein it states that *"---Mining operation shall not ordinarily be taken up in identified ecologically fragile and biologically rich area….."*

2.2.4 Mining Plan:

Ministry of Environment and Forest is receiving a large number of proposals for grant of /renewal of mining lease, in order to take a holistic view, it is essential that a copy of the mining plan duly approved by the IBM, Nagpur should be enclosed with the proposal along with map of forest area on printed original copy of Survey of India topo-sheet 1:50,000 scale showing boundaries of forest areas and other mining leases of forest block within that sheet.

2.2.5 Plan for Rehabilitation of Oustees:

If the project involves displacement of people, a detailed rehabilitation plan shall be submitted along with the proposal for diversion of forest land. The Scheduled Tribe and Scheduled Caste population should be

separately considered, and a plan for their rehabilitation should be in consonance with the socio-economic, cultural and emotional lifestyle.

2.2.6 Details of compensatory afforestation scheme:

i. Details of non forest area/degraded forest area identified for compensatory afforestation, its distance from adjoining forest, number of patches, size of each patch
ii. Map showing non-forest/degraded forest area identified for compensatory afforestation and adjoining forest boundaries
iii. Detailed compensatory afforestation scheme including species to be planted, implementing agency, time schedule, cost structure, etc
iv. Total financial outlay for compensatory afforestation scheme
v. Certificates from competent authority regarding suitability of area identified for compensatory afforestation and from management point of view. (To be signed by the concerned Deputy Conservator of Forests)

2.2.7 Net Present Value (NPV):

The Hon'ble Supreme Court of India, vide its order dated 30th October, 2002 and 1st August, 2003 in the I.A No. 566 of Writ Petition (C) No. 202 of 1995, has directed that the Net Present Value (NPV) shall be realized in respect of forest land diverted for non -forestry purposes from all User Agencies.

Ministry of Environment and Forests, Govt. of India has further issued guidelines vide letter No. 5-1/98-FC (Pt-II) dated 18.9.2003 for realization of Net Present Value @ Rs. 5.80 lakhs/ha being the minimum and Rs. 9.20 lakhs/ha being the maximum limit depending upon the quality and density of the forest land diverted.

2.2.8 Lease Period for Mining Lease:

The approval under the Forest (Conservation) Act, 1980 for diversion of forest land for grant/renewal of mining leases shall normally be granted for a period co-terminus with the period of mining lease proposed to be granted/renewed under MMRD Act, 1957 or Rules framed thereunder, but not exceeding 30 years. While recommending cases for approval under the FC Act, the user Agency/State Government shall indicate the period for which the mining lease is proposed to be granted/ renewed under non compliance of stipulations to the satisfaction of MOEF, the clearance accorded may be summarily withdrawn.

2.3 Mineral Conservation and Development Rules 1988, Rule – 33

i. *"Every holder of prospecting license or a mining lease shall take steps so that the overburden, waste rock, reject and fines generated during prospecting and mining operations or tailings, slimes and fines produced during sizing, sorting and beneficiation or metallurgical operations shall be stored in separate dumps.*

ii. *The dumps shall be properly secured to prevent escape of material there from in harmful quantities which may cause degradation of environment and to prevent causation of floods*

iii. *The site for dumps, tailings, slimes shall be selected as far as possible on impervious grounds to ensure minimum leaching effects due to precipitation*

iv. *Wherever possible the waste rock, overburden etc shall be backfilled into the mine excavations with a view to restoring the land to its original use as far as possible*

v. *Wherever backfilling of the waste rock in the area excavated during mining operations is not feasible, the waste sumps shall be suitably terraced and established through vegetation or otherwise*

vi. *Fines, Rejects or tailings from mine, beneficiation or metallurgical plants shall be deposited and disposed in especially prepared tailing disposable area as such they are not allowed to flow away and cause land degradation or damage to agricultural field, pollution of surface water bodies and ground water or causes flood."*

2.4 CAMPA

CAMPA was constituted by the Central Government vide notification dated 23.04.2004. It acts as a custodian of CA Fund–including all funds (CA, NPV, CAT Plan, Penal CA Etc) received from User Agencies. The funds are meant to be disbursed to the State/ UT governments after receiving their proposals as per an Annual Plan of Operation (AOP).

The funds are mainly meant to compensate the loss of forests and ecological services and to facilitate regeneration of the services provided by the forests. **(Forest (Conservation) Act, 1980, (with amendments made in 1988))**

Chapter 3

METHODOLOGY

3.1 METHODOLOGY

The SI Project was divided into three major segments

First Part:

Collection of information regarding forest clearance conditionalities stipulated by the Ministry of Environment and Forest (MoEF) for each of the user agencies, through the documents of final approvals, available at MoEF Regional Office, Bhopal

Second Part:

Visit to the mining areas to know the status of compliance of forest clearance conditionalities

Field staff of the Forest Department helped to locate the mining leases

Primary data was generated in the form of photographs at mining sites

Secondary data was obtained from User Agencies (Mining practices followed, Data regarding reclamation practices, Waste disposal, Survival Rate of Plantations, Species Planted, measures taken to maintain quality of plantations), concerned Forest Division (Data regarding CA sites, NPV paid by the UA etc.) and MoEF Regional Office, Bhopal

Third Part:

Third part included analysis of data i.e. consolidation and interpretation, so as to understand current approach of user agencies regarding forestry conservation and suggest certain recommendations to governing authorities to implement Forest Conservation Act, 1980 with more efficiency, in case of metal and mineral mining.

Chapter 4

FIELD OBSERVATIONS AND FINDINGS

4.1 FIELD OBSERVATIONS

4.1.1 M/S Maihar Cement

Location - Bhadanpur, Dist. Satna, Madhya Pradesh
Mineral - Limestone,
Mining Type - Opencast,
Area of Forest Diversion – 163.398 ha,
Year of Final Approval – 1997

- Introduction

The deposit was being worked by opencast mechanized mining. Ground water and rainwater collected in the quarry was pumped out and utilized for Mines Township, Plant, and Plantation. All environmental aspects were regularly controlled and periodically monitored.

Dust control measures, Water management, Noise & Vibration control system, Dump management & Afforestation Programme as already being adopted in Bhadanpur mines were meeting the IS/ISO – 14001 norms.

Figure 4.1.1 - I: Bhadanpur Limestone Mine

- Plantations carried out by the User Agency

Table I: Details of afforestation (As on 31.12.2009) within Mining Lease (M.L.) area

Location	Area (ha)	Trees Planted (No.)	Number of trees survived (No.)
O.B. Dump	11.94	23880	23800
Around office area	0.23	460	460
Backfill area	12.69	25800	25800
Around township & other area	3.5	7000	7000
Total	**28.36**	**57220**	**57220**

(Secondary Data, obtained from User Agency: M/s Maihar Cements,Bhadanpur,M. P.)

Figure 4.1.1 - II: Plantations in the Core Area

- Overburden Management

Figure 4.1.1 - III: Plantations on OB Dumps

All the dumps were matured and had been effectively stabilized. There was no instance or even an indication of any slope instability, washouts or rolling down of stone. The angle of the slope is kept 35^{o}-36^{o} for stabilizing the dumped material. To provide a further stability the overburden dumps were benched with height not exceeding 10 meters.

Fertile topsoil was transported and spread over the surface and slopes of the dump. Suitable species of trees were planted for further stabilization. Properly spaced plantation provided close root binding and close canopy of vegetation, preventing soil erosion from rain splash.

- Top Soil Management

The M. L. and surrounding areas had thin soil cover (0.6 to 1.0 mtrs.) Mostly it was composed of unfertile murrum and lateritic soil. Therefore, wherever fertile topsoil was available, it was separately handled and stacked. It is immensely valuable for plantation, and hence was 100% conserved for useful purposes like

afforestation, dump plantation, plantation, gardening or landscaping & beautification and for supplying to colony residents for kitchen gardening etc.

- Reclamation and Rehabilitation

A total of 12.69 ha area had been reclaimed and entire 12.69 ha area had been rehabilitated by planting trees of difference species.

Figure 4.1.1 - IV: Rainwater Harvesting

4.1.2 M/S Gopal Sharan Singh

Location – Naro Hill, Dist. Satna, Madhya Pradesh,
Mineral - Bauxite,
Mining Type - Opencast,
Area of Forest Diversion – 9.036 ha,
Year of Final Approval – 1999

- Introduction

Figure 4.1.2 - I: Abandoned Mining Site

The mining lease was over in September 2009. Hence the mining site was no more in use. However, it was absolutely untreated with very less scope of natural revegetation.

- Plantations carried out by the User Agency

Natural plantation was taking place at the site. As the site was abandoned no information regarding plantations carried out by user agency was generated.

- Overburden Management

As it was a bauxite mine there were no issues of overburden dumping.

- Top Soil Management

No Information obtained as the mining lease was over.

- Reclamation and Rehabilitation

Figure 4.1.2 - II: Soil containing Bauxite

The mining site was left untreated i.e. without reclamation, by the user agency. There were very few chances that this soil would support natural vegetation. Certain amount of supplements was required to make the conditions amenable.

4.1.3 M/S Sharadkumar Bansal

Location - Pipritola, Dist. Satna, Madhya Pradesh,
Mineral - Ochre,
Mining Type - Opencast,
Area of Forest Diversion – 4.6 ha,
Year of Final Approval – 2009

- Introduction

The mining operations were manual except for blasting. There were no measures taken to minimize dust during the operations. Also, the mining operations had hampered aesthetic beauty of the area.

Figure 4.1.3 - I: Pipritola Ochre Mine

- Plantations carried out by the User Agency

There were no plantations carried out by the user agency on the mined out area, claiming that the ore was not exhausted then. Safety zone plantations were without any protection. Also soil was not that much fertile to grow plantation without any serious commitment.

- Overburden Management

Not much problem of overburden was observed, as excavated material was utilized almost completely for further processing.

- Top Soil Management

Figure 4.1.3 - II: Soil Erosion at Mining Site

Top soil was not managed and was lying within the lease forming dust. There was a road within the mining lease, which was covered with a layer of almost 2-3 inches of dust.

- Reclamation and Rehabilitation

Mining activities were going on and reclamation of site was not yet started. However, as shown in above figure it was causing considerable soil erosion.

4.1.4 M/S Ramchandra Bansal

Location – Sarbhanga, Dist. Satna, Madhya Pradesh,
Mineral - Bauxite,
Mining Type - Opencast,
Area of Forest Diversion – 10.92 ha,
Year of Final Approval – 1999

- Introduction

Mining lease was over in 2009. No mining activity was going on when the mine was visited.

- Plantations carried out by the User Agency

Figure 4.1.4 - I: Old Eucalyptus Plantation

Mined out area was left without any plantation. There were old Eucalyptus plants, which were part of very old plantation, on some part of the lease.

- Overburden Management

As it was a bauxite mine, there were no or very less problems regarding overburden management.

- Top Soil Management

No top soil management was observed.

- Reclamation and Rehabilitation

Figure 4.1.4 - II: No Reclamation of Mined Out Area

No reclamation of land was seen, all the pits were unfilled. No leveling of ground was done by the user agency. This would increase rate of soil erosion with running water. Also, as it was bauxite mine, certain supplementary actions for growing plantation was required.

4.1.5 M/S J. K. Minerals

Location – Sonewadi, Dist. Balaghat, Madhya Pradesh,

Mineral – Manganese Ore,

Mining Type - Underground,

Area of Forest Diversion – 33.0 ha,

Year of Final Approval – 2000

- Introduction

The mine was situated in Varasivni tahsil of Balaghat district. Mining lease of 33.0 ha was divided into 2 blocks, namely Block I and Block II. Opencast mining was done in initial stages.

Figure 4.1.5 - I: Sonewadi Underground Mine

- Plantations carried out by the User Agency

User Agency had developed a small nursery. Also, around 6.0 ha of the leasehold area was planted. Groundwater was conserved and was used as a source of water.

Figure 4.1.5 - II: Plantations in the Mining Lease

- Overburden Management

Overburden was dumped outside the mining lease. It was not used for backfilling purpose.

- Top Soil Management

Not Applicable

- Reclamation and Rehabilitation

The mining activities were taking place underground; hence there was no need of surface land reclamation.

4.1.6 M/S Manganese Ore (India) Limited, Bharveli Mine

Location – Bharveli, Dist. Balaghat, Madhya Pradesh,
Mineral – Manganese Ore,
Mining Type - Underground,
Area of Forest Diversion – 29.0 ha,
Year of Final Approval – 2007

- Introduction

It is deepest underground manganese mine in Asia. Total mining lease was 182.3 ha, out of which 29.0 ha area was a forest land. Water sprinkling was a regular practice to minimize dust within the mining lease.

Figure 4.1.6 - I: Water Sprinkling for Dust Minimization

- Plantations carried out by the User Agency

Plantations were carried out by the user agency on the surface of leasehold land. Indigenous species were planted. Safety zone plantation was well protected with barbed wire.

Figure 4.1.6 - II: Safety Zone Plantations

- Overburden Management

No information provided by the user agency.

- Top Soil Management

Not Applicable

- Reclamation and Rehabilitation

No information provided by the user agency.

4.1.7 M/S Manganese Ore (India) Limited, Dongri Buzurg Mine (2 leases)

Location – Dongri Buzurg, Dist. Bhandara, Maharashtra,
Mineral – Manganese Ore,
Mining Type - Opencast,
Area of Forest Diversion – i. 34.43 ha, ii. 59.21 ha,
Year of Final Approval – i. 2002, ii. 2003

- Introduction

It was an opencast mine, with mechanization of activities. Manganese ore was present under cover of top soil. Top soil was used for plantation purposes however the information regarding storage and further utilization of top soil was not provided.

- Plantations carried out by the User Agency

Figure 4.1.7 - I: Plantations at Dumping Site

Plantations were carried out by user agency with good survival rates, within the lease as well as in the buffer zone. Mostly indigenous species were planted with proper protection measures. Plantations were observed on dumps also.

- Overburden Management

Not clear, however overburden dumps were stabilized and were having plantations.

Figure 4.1.7 - II: Plantations in the Core Zone

- Top Soil Management

No information provided

- Reclamation and Rehabilitation

No information provided

4.1.8 M/S Manganese Ore (India) Limited, Chikla Mine

Location – Chikla, Dist. Bhandara, Maharashtra,
Mineral – Manganese Ore,
Mining Type - Underground,
Area of Forest Diversion – 70.07 ha,
Year of Final Approval – 2000

- Introduction

It was another MOIL mine. It was mechanized underground mine. This particular mine had very healthy plantations on the dumps, afforestation was done on almost 37 % of the mining lease.

- Plantations carried out by the User Agency

User agency was very much serious regarding plantations ie. Survival rate as well as number of species planted. UA had also carried out plantations in degraded forest land in the vicinity as a part of penal compensatory afforestation.

Figure 4.1.8 - I: Plantation with Reference Board

- Overburden Management

Overburdens were taken to the ground level and then were properly dumped. Proper stabilization of overburdens was also observed.

Figure 4.1.8 - II: Plantation on Stabilized OB

- Top Soil Management

Not Applicable

- Reclamation and Rehabilitation

No information was provided regarding underground reclamation of mined out tunnels.

4.1.9 M/S Pavri Kyanites

Location - Shirola, Dist. Bhandara, Maharashtra
Mineral - Kyanite,
Mining Type - Opencast,
Area of Forest Diversion – 6.5589 ha,
Year of Final Approval – 2000

- Introduction

The mine was opencast, with manual mining practices. There was considerable existence of dust. As per the secondary data provided by the user agency, it was following all the standard practices to comply with forestry as well as environmental norms, however there were hardly any efforts made as observed.

- Plantations carried out by the User Agency

Plantations were having very poor survival rate as well as quality, no protective measures were taken to grow plants.

Figure 4.1.9 - I: Poor Quality of Plantation

- Overburden Management

Overburden was stacked just aside the road and thus was causing dust into the vicinity.

Figure 4.1.9 - II: Overburden Lying Roadside

- Top Soil Management

Top soil was mixed with the overburden and thus was of no use for any plantations.

- Reclamation and Rehabilitation

As conveyed by the user agency, the mining site was yet functional and hence no reclamation was started.

Figure 4.1.9 - III: Shirola Kyanite Mine

4.1.10 M/S Hindalco

Location – Kasarsada, Dist. Kolhapur, Maharashtra,
Mineral – Aluminous Laterite (Bauxite),
Mining Type - Opencast,
Area of Forest Diversion – 106.76 ha,
Year of Final Approval – 2001

- Introduction

Kasarsada mine was an opencast, conventional drilling-blasting mine. The entire area was a reserved forest (RF). Mining lease was first granted in 1968 for 30 years. All the extracted ore was utilized by the user agency only, as a feed to its alumina plant situated 40 km away.

- Plantations carried out by the User Agency

Figure 4.1.10 - I: Plantation on Mined out Area

User agency had carried out plantations in the mined out area. Mostly indigenous species were used for plantations. Some exotic species were also planted as nurse plants. Local fruit bearing species were also planted.

As it was a barren land due to existence of bauxite into the soil, hence special care was taken to successfully grow plants with a good survival rate. Top soil as well as farmyard manure and bagasse were imported to the mining lease for plantations into the mined out areas.

Figure 4.1.10 - II: Scientific Methods Followed to Achieve Good Survival Rate of Plantation

- Overburden Management

As it was a bauxite mine, there was not much issue of overburden. However, availability of bauxite was in patches.

- Top Soil Management

Top soil was conserved separately. As the ore was available in patches, top soil was available at certain places, it was utilized for plantation as well as reclamation purposes. However, it was not sufficient hence top soil was imported from nearby fields.

- Reclamation and Rehabilitation

Mining area was situated on a plateau hence there were vessels made to accumulate the rain water into reservoir. The reservoir was made in a mined out area, it sufficed water requirements of plantation as well as dust minimization purposes.

Figure 4.1.10 - III: Rainwater Harvesting in Mined out Area

4.1.11 M/S G. M. D. C. (2 Leases)

Location – i. Ambaji, ii. Kadipani, Dist. Vadodara, Gujarat,
Mineral - Fluorspar,
Mining Type - Opencast,
Area of Forest Diversion – i. 31.2 ha, ii. 32.0 ha,
Year of Final Approval – i. 1998, ii. 2009

- Introduction

Gujarat Mineral Development Corporation is a Govt of Gujarat enterprise engaged in the field of mining, beneficiation, value addition of minerals and power generation. The GMDC has been mining fluorspar since 1961. Fluorspar ore obtained from 31.2 ha lease area was beneficiated in a plant located at Kadipani outside the forest area. The second lease of 32.0 ha area would also be used in the beneficiation plant.

Figure 4.1.11 - I: Kadipani Fluorspar Mine

The buffer zone included three states and was dominated by tribal habitation in all the three states. The lease area was surrounded by reserved forest (RF).

- Plantations carried out by the User Agency

GMDC had planted about 73.5 ha area within old 619.0 ha leasehold area. Plantations were yet to be done in overburden dumps of the opencast mine. Virgin areas had vegetation cover therefore plantation was possible only on the top of dump. And as the mineral was not exhausted in the area backfilling was not started. Plantations were dominated by babool plants.

Figure 4.1.11 - II: Old Plantations in the Buffer Zone

- Overburden Management

Figure 4.1.11 - III: Dumps not stabilized

Overburden was lying in the leasehold area without any proper stabilization process. It was causing serious problems to plants present on the hill slope

- Top Soil Management

Top soil was not separately stored; therefore its putative utilization in future was lost.

Figure 4.1.11 - IV: Overburden lying on the hill slope

- Reclamation and Rehabilitation

Mining was going in about 8 ha out of 31.2 ha of leasehold, and as conveyed by the user agency there was availability of mineral in the mined out area. Hence, no reclamation process had been started.

4.2 KEY FINDINGS

Major Approval Conditionalities for Forest Land Diversion as per FCA 1980

i. Compensatory Afforestation
ii. NPV of the Environmental Losses
iii. Demarcation of the Mining Lease Area
iv. Restoration and Reclamation
v. Maintenance of Safety Zone
vi. Afforestation in Blank Areas
vii. Managing Subsidence (For Underground Mines)
viii. Rehabilitation of families (If any)

Status of compliance of approved conditionalities was as follows for the user agencies visited:

Table II. 1: Status of Compliance of CA and NPV

User Agency	Location	Compensatory Afforestation Payment Status	NPV
Maihar Cement	Bhadanpur	YES	NA
M/S S Bansal	Pipritola	YES	YES
MOIL	Bharveli	YES	YES
	Chikla	NA	NA
	Dongri Buzurg (i)	NA	NA
	Dongri Buzurg (ii)	YES	YES
M/S J. K. Minerals	Sonewadi	NA	NA
M/S Pavri Kyanite	Shirola	NA	NA
HINDALCO	Kasarsada	NA	YES
GMDC	Ambadungar	NA	YES
	Kadipani	YES	YES

Source: Divisional Forest Offices of respective places

Table II. 2 Status of Compliance of Approved Conditionalities

User Agency	Safety Zone Plantations	Disposal of Overburden	Subsidence Management	Phased Reclamation	Demarcation of Lease
Maihar Cement	Yes	Yes	-	Yes	Yes
M/S S Bansal	Yes	Yes	-	No	Pillars not having numerical reference
MOIL Bharveli	Yes	Yes	Yes	Yes	Yes
MOIL Chikla	Yes	Yes	Yes	Yes	Yes
MOIL Dongri Buzurg	Yes	Yes	-	Yes	Yes
M/S J. K. Minerals	Yes	Yes	Yes	Yes	Pillars not having numerical reference
M/S Pavri Kyanite	Yes	No	-	No	Pillars not having numerical reference
HINDALCO	Yes	Yes	-	Yes	Yes
GMDC Ambadungar	Yes	No	-	No	Pillars not having numerical reference

Source: Primary Data collected during the Project in the form of Photographs

Table III: Plantations carried out by the User Agencies with Survival Rates

Company	Plantations Area (ha)	Survival Rate (up to 2009-10)	Protection Measures
Maihar Cement	10.47	80 %	Yes
MOIL Chikla	85.25	75 %	Yes
GMDC	142 (Up to 1998)	80 %	Yes
J. K. Minerals	6.0	70 %	Yes
HINDALCO	19.53	85 %	Yes
MOIL Dongri Buzurg	64.03	65 %	Yes

Source: From the respective User Agencies

4.3 OTHER FINDINGS

- Other reclamation practices like rain water harvesting were followed by Maihar Cement and Hindalco where rainwater harvesting was done. This rain water was then utilized for plantation, dust minimization purposes as well as various mining purposes.

- In case of Maihar Cement, there was a recycling of harvested water so as to get rid of dissolved pollutants.
- In case of underground mines, ground water harvesting was done. Reservoirs were made on the surface, and were filled with the ground water that pours inside the underground mine.
- All the opencast mines had provided land as well as monetary compensation for compensatory afforestation, however the CA sites were fragmented, situated farther away from the mining leases and were not easily identifiable. At some sites the afforestation was not yet started (as conveyed by the concerned forest authorities) due to unavailability of CAMPA funds.
- There was no rehabilitation of families in any of the sites visited.
- At some sites, there was good quality plantation raised by the user agencies (eg. MOIL Dongri Buzurg), however there was hardly any protection to prevent grazing or forest fire.
- Organizations like MOIL, HINDALCO, GMDC were running various programmes for education, health care, public awareness efficiently, as a part of their Corporate Social Responsibility.
- There were regular pollution surveys at each of the sites to comply with the pollution standards set by Central Pollution Control Board, as conveyed by the user agencies.
- At Maihar Cement, wet drilling was adapted to minimize dust at the mining site, at Hindalco each worker was provided with protective mask and ear plugs to avoid health issues related to air and noise pollution.
- All the mines, except for Pavri Kyanites had provided gumboots and helmets to workers as well as field staff.
- Proper facilities were present at mining sites for storage of explosives, where ever it was required for blasting.
- There were no clear demarcations of the safety zones.
- In Maihar Cement (Bhadanpur Mine), wildlife awareness boards were placed at various locations.

Chapter 5

CONCLUSION AND RECOMMENDATIONS

5.1 CONCLUSION

As the concrete pillars can be easily removed, there are chances that user agencies can shift the lease boundary pillars, so as to encroach on the forest land outside lease boundary. To avoid this The pillars should be properly numbered with compartment numbers and the distance between the pillars should be clearly indicated to be readily identifiable

Dumps were not properly managed in all the mine areas visited. It can result in Soil erosion, land slide especially during heavy rains.

Most of the field workers at each site were from the nearby villages thus there was employment generation for the villagers.

5.2 RECOMMENDATIONS

1. Revegetation should be done in a scientific manner so that survival rate will be more, as mining activities usually degrade structure and water carrying capacity of soil, it should first be made amenable for plantations by supplements like farmyard manure. Fertile top soil can also be imported from areas in the vicinity to support growth of local species so that micro ecology will not get disturbed in the mining area.

2. Boundaries of the lease area should be made readily identifiable, as there is always a threat of encroachment from the user agency.

Proper demarcation of mining lease is very important. It can be assisted with use of technology like GPS, so that it will become easily identifiable.

Figure 5.2 - I: Lease Boundary, Proper Demarcation required

3. Proper demarcation of CA Site by GPS referenced boundaries with proper signage is necessary to spot the site whenever needed. Data regarding CA plantations should be uploaded to a separately developed database. It will help to track status and quality of compensation that has occurred in response to forest land that has been cleared for mining purposes.

4. Creation of an online reporting portal for public to report illegal mining will also help in reducing encroachments in the forest land. Awareness programme regarding such online applications must be run with the help of forest department so as to make it work with its full potential.

5. Use of Private Partnership for raising CA plantations in non forest lands will also be desirable to reduce the gap between forest clearance and forest compensation. Also as far as possible lands used for compensatory purposes should be in nearby areas of the mining site to equilibrate the micro-climatic conditions.

6. There should be regular inspection of the mining sites; also very high penalties should be accrued in case of any violation like improper disposal of waste, which can cause serious damage to flora and fauna in the vicinity.

7. Plantations should be carried out on degraded hill slopes in the vicinity of mines like GMDC Kadipani, Gujarat.

Figure 5.2 - II: Bald Hill Slopes should be planted

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