

CHAPTER 6

LAND MANAGEMENT - MITIGATION OF LAND DEGRADATION AND RECLAMATION

Mining involves forest land, Government non-forest land and tenancy or private land for its developmental as well as operational activities. During exploitation, land degradation due to change in land use takes place. An external dump is created to accommodate OB removed to extract coal and is accumulated till internal dumping or backfilling commences.

The process of land management includes top soil management, technical reclamation of external OB dump, internal dump / backfilled area, management of void left after completion of extraction, technical reclamation of subsidence due to UG mining, plantation *i.e.*, biological reclamation of technically reclaimed dumps and monitoring progress of reclamation by satellite surveillance.

6.1 Topsoil management

Topsoil is the upper and outer most layer of soil, usually the top 5 cm to 20 cm. It has the highest concentration of organic matter and microorganisms wherein most of the earth's biological soil activity occurs. It takes approximately 1000 years for one inch of topsoil deposit to be formed. The topsoil also contains a range of nutrients and trace elements essential to plant growth and may also contain native seeds that are concentrated in the top 50 mm of the soil profile. In order to re-establish of native species, the thin layer of top soil needs to be removed during excavation of coal in the OCM, stacked separately and preserved carefully for beneficial soil organisms and future vegetation. However, the duration of stockpiling needs to be minimised since excessive time of storage could cause structural degradation, death of seeds and microorganisms, especially when soil moisture content is high.

Considering the time taken to generate and the importance of topsoil, MoEF&CC stipulated that topsoil be stacked at earmarked specific sites with adequate measures to preserve and be used either concurrently for backfilling or as top layer for reclamation of mined out areas. A record of topsoil indicating the area of stacking along with the date was to be maintained. The stipulations did not exempt the subsidiaries from maintaining the records related to topsoil, notwithstanding the fact that topsoil was either used concurrently for backfilling or the inventory of topsoil that existed was minimum.

6.1.1 We observed that out of 23 OC/mixed mines selected for detailed scrutiny, in 13 mines across five subsidiaries, as detailed below, though topsoil was stacked in the earmarked area and reported periodically, basic records of topsoil indicating the quantity and areas of stacking were not maintained:

Table 10: Non-maintenance of records of Top Soil in the mines of subsidiaries

Sl. No.	Subsidiary	Mines where records were not maintained.
1	BCCL	Kuya and Dahibari Basantimata
2	CCL	Piparwar OCM, Rajrappa OCM, Kathara OCM and AKK OCM
3	ECL	Dabor, Rajmahal and Sonepur Bazari
4	NCL	Nigahi (till March 2014) and Khadia
5	SECL	Gevra OCM and Kusmunda OCM.

The subsidiaries accepted (October/November 2018) the audit observation and agreed to take remedial action. Further developments are awaited (March 2019).

In the C&AG's Performance Audit Report No. 9 of 2011-12, it was recommended that proper records of topsoil storage and use should be maintained.

6.1.2 We also observed that as at the end of March 2018, in three mines of WCL although 75.30 lakh cum of topsoil was stacked at earmarked sites, it remained unutilised since 2013-14. Further leguminous plants were not planted on it to retain / improve the nitrogen content in the topsoil as recommended (August 2000) by Indian Bureau of Mines.

6.1.3 We also observed that out of 9.69 lakh cum of topsoil generated during 2013-18 by three²⁷ mines of NCL, top soil actually used was 5.79 lakh cum (60 per cent) as detailed below.

Table 11: Utilization of Top Soil in NCL

Year	Quantity in lakh cubic metre (cum)		Percentage of utilization
	removed	utilised	
2013-14	0.84	0.59	70.24
2014-15	1.55	0.71	45.81
2015-16	2.05	1.13	55.12
2016-17	2.30	0.96	41.74
2017-18	2.95	2.40	81.36
Total	9.69	5.79	59.75

We further observed that as at the end of March 2018, 4.95 lakh cum²⁸ of top soil remained accumulated which is indicative of the fact that these were not being utilised concurrently as envisaged (para 6.1), thereby exposing its quality to deteriorate.

While accepting (November 2018) the accumulation of top soil, NCL's reply was silent as regards its concurrent use.

²⁷ Nigahi, Jayant and Block B

²⁸ 1.05 lakh cum (opening balance) + 9.69 lakh cum (generation) - 5.79 lakh cum (utilisation)

6.2 Non-adherence to norms relating to OB dump

In open cast mining method of coal extraction, benching²⁹ is to be made for coal seam and the OB with extraction of coal, as specified in the Coal Mines Regulations, 1957 (Regulation). The Regulations prescribe the maximum height and breadth of the OB dump to be maintained in the mines. Further, the conditions for maintenance of slope of OB dump are also affirmed by MoEF&CC from time to time through the EIA-EMP of the projects.

Audit test checked the records relating to OB dumps in the sample OC mines and observed the following:

6.2.1 A fatal accident occurred (December 2016) in Dahar Nangi patch of Rajmahal OCP of ECL wherein OB slid down due to failing of the floor burying 12 tippers, 6 excavators and 23 workmen in the process. This resulted in not only loss of 23 lives but also stoppage of production in the affected patch. Director General of Mines Safety (DGMS) suspended (June 2017) operations in this patch on the plea that the benches in coal II and III seams did not conform to the norms regarding height of the bench, specified in the Regulations.

The work relating to removal of OB and extraction of coal in Sonapur Bazari mines was entrusted (October 2014) to a contractor³⁰. The scope of work awarded to the contractor included benching the OB in accordance with the prescribed norms. The Engineer-in-charge (EIC) of mines was to exercise general superintendence over the work of the contractor. We observed that DGMS suspended (January 2017) operations in Quarry 3 of Sonapur Bazari OCP also on the plea that the height of the benches of R-VIII coal seam deviated from the regulations. The findings of DGMS are indicative of defective monitoring.

Consequently, ECL had to resort to unscheduled production in other patches of Rajmahal and Sonapur Bazari OCP so as to recoup 37.92 lakh tonnes of coal (Rajmahal 26.25 lakh tonnes³¹ and Sonapur Bazari 11.67 lakh tonnes) up to March 2018.

ECL attributed (November 2018) the failure of OB dumps at Rajmahal to absence of adequate land and reluctance of villagers to handover physical possession of their land, though notified under CBA Act. However, the reply was silent as regards failure to conform to the prescribed norms of benching in Sonapur Bazari. We also observed that ECL did not resume operations relating to extraction of coal in these patches so far (November 2018), implying that the suspension of operations remained in force.

²⁹ Benching: A method of working small quarries or open pits in steps or benches.

³⁰ M/s. International Commerce Limited (ICL)

³¹ 1.25 lakh te for the period from December 2016 to March 2017 and 25.00 lakh te during the year 2017-18

6.3 Plantation for green cover

Biological reclamation by way of broadcasting of grass seeds and plantation / afforestation was to be undertaken for stabilization of OB dumps against erosion and to put the land to best use. Tree plantation was to be taken up on external OB dumps and on back filled / internal dump areas including terraced slope, vacant land and avenue plantation as a remedial measure to mitigate air and noise pollution. CIL guidelines prescribed a green cover of at least one-third of the mining area. EC accorded to the mines and the related EIA-EMP envisaged developing heterogeneous mix of forest with local species having combined properties like medicinal, timber yielding and fruit bearing, so as to ensure perennial green cover and high survival rate.

6.3.1 Audit observed that there was no uniform strategy among subsidiaries for biological reclamation of mined out area through plantation activities as detailed below.

- ECL did not set year-wise internal targets for itself. As against 491.23 hectares (ha) of land technically reclaimed during 2013-18, the extent of land biologically reclaimed during the same period was 368.43 ha, leaving an accumulated area of 122.80 ha still to be biologically reclaimed as at the end of March 2018. We observed that during 2013-18, no plantation was undertaken in three³² mines and the green cover in Rajmahal constituted less than one-third of mine area.
- Against the de-coaled area of 3922.85 ha, MCL biologically reclaimed only 2024.73 ha (51.61 *per cent*) as at the end of March 2018. No target was fixed for plantation during 2013-14 and hence no plantation was undertaken during that year. The details of consolidated internal target fixed for biological reclamation of de-coaled land by way of plantation and actual achievement there against by MCL during 2014-18 is furnished in **Annexure – I**.
- The actual achievement of plantation of saplings as compared to the internal target ranged between 47.16 *per cent* (2014-15) and 149.17 *per cent* (2015-16) during the four years ended March 2018. MCL could reflect better achievement in 2015-16 only due to reduction in target for that year, for which no reasons were found on record.
- We observed that out of 7.01 lakh saplings planted during 2014-18, 0.42 lakh saplings (6 *per cent*) were destroyed due to avoidable reasons such as fire, road widening, OB dumping and dump slide, which is indicative of the fact that these were not nurtured to their finality.

³² Dabor, Rajmahal and Kunustoria

- No target for biological reclamation was fixed for Jayant OCP of NCL during 2013-18. The mine-wise targets fixed for biological reclamation for Nigahi, Block-B and Khadia mines of NCL for the period from 2013-18 is also furnished in **Annexure – I**. We observed that in these mines, the actual achievement of biological reclamation both in terms of area and in terms of number of plants fell short of targets and ranged from 29 per cent to 75 per cent (area) and from 22 per cent to 65 per cent (plants) respectively.

NCL stated (October 2018) that targets were fixed based on projected technical reclamation, which could not be achieved due to frequent dragline³³ failure, less utilization of existing dumpers on account of shortage of tyres and inadequate logistics capacity to handle the excavated muck. The reply is not tenable as these were avoidable and no action was initiated to overcome these constraints. We also observed that NCL did not take up three tier avenue plantation as stipulated in the EC due to space constraint, which is pointer to defective planning.

6.3.2 We further observed the following deviations from the stipulations in EIA-EMP as regards plantations in the mines of three subsidiaries:

Table 12: Details of deviations regarding plantation in the mines of subsidiaries

Sl. No.	As prescribed in EIA-EMPE/EC	Deviation observed	Subsidiary	Mines
1	Plantation to be done on OB dumps	No plantation cover on the OB dumps.	CCL	Kathara OCP & Khansmahal mines of AKK OCP
2	Three tier green belt plantation cover with combination of fast and slow growing species was to be developed along both sides of the roads and railway siding	No three tier green belt plantation was observed.	CCL	AKK OCM, platform 1 and 2 of Jarangdih Railway Siding (Kathara OCM) and Kargali washery (AKK OCM) respectively
			WCL	Gokul OC, Majri II A OC and Penganga OC
3	Plantation of varieties of native species including herb, shrubs and climbers under social forestry and natural vegetation in core and buffer zones.	Plantation confined only to two varieties of species Records maintained indicated that plantation did not include herbs, shrubs and climbers	CCL	Piparwar OCM, Rajrappa OCM, Kathara OCM and AKK OCM
			ECL	Sonepur Bazari and Jhanjra
			WCL	New Majri IIA OC and New Majri UG to OC.
4	Plantation along the river banks to be done to avoid soil erosion.	No plantation cover along river banks.	CCL	Piparwar OCM and Kathara OCM

³³ Dragline is a Heavy Earth Moving Machinery used for removal of OB in the OC mine.

There was also no mechanism to monitor and ensure survival of the existing plantations in mines of CCL.

While shifting the onus of survival of the plantations on the State Forest department, CCL stated (November 2018) that further improvements would be made in its plantation activities. Further developments are awaited (November 2018).

WCL stated (November 2018) that three tier plantation was in the process and further plantation would be done gradually.

ECL stated (November 2018) that plantation was being carried out by State Forest Department and they plant native species as per their norms. However, the fact remains that these did not conform to the stipulations of EIA-EMP.



Pic. 11: Para No. 6.3.2, Table No. 14, Sl. No. 01: OB dumps without Plantation at Kathara OCP of CCL



Pic. 12: Plantation on OB dump at Jayant OCP of NCL

Audit Summation

In 13 mines across five subsidiaries, though topsoil was stacked in the earmarked area and reported periodically, basic records of topsoil indicating the quantity and areas of stacking were not maintained. As at the end of March 2018, in three mines of WCL, although 75.30 lakh cum of topsoil was stacked at earmarked sites, it remained unutilised since 2013-14. Audit also observed that Director General of Mines Safety suspended (June 2017) operations in a patch of Rajmahal OCP of ECL as the Overburden (OB) benches in coal II and III seams did not conform to the norms specified in the Regulations. DGMS suspended (January 2017) operations in Quarry 3 of Sonapur Bazari OCP also as the height of the benches of R-VIII coal seam deviated from the Regulation. Further, ECL did not set year-wise internal targets for biological reclamation of mined out area through plantation activities. Against the de-coaled area of 3922.85 ha, MCL biologically reclaimed only 2024.73 ha (51.61 per cent) as at the end of March 2018.