SUSTAINABILITY IN COAL MINES

07
CHAPTER

SUSTAINABILITY IN COAL MINES

1. Introduction

Sustainable development has commonly been considered as an oxymoron in the setting of a natural resource that is finite. The centuries-old practices of mining have tended to priorities short-term advantages rather than considering the negative effects on the environment and communities. With the advancement of technology and growing awareness of sustainability issues, the question of how to make mining sustainable has come to the forefront. Sustainability in mining thus involves at least the following:

- The environmental dimension places a focus on the natural environment's sustainability and the availability of natural resources.
- The social dimension emphasizes the need for social and cultural sustainability, which connects to questions of benefit distribution, mining costs, and decision-making process.
- The economic dimension focuses on the costs associated with upholding standards of life and the economic sustainability of those standards.

2. Sustainable Development Policy of Coal/Lignite PSUs

The coal/lignite PSUs under the Ministry are mindful of promoting sustainability in their mining and allied activities.

(A) Coal India Limited (CIL)

A formal Sustainable Development Policy was developed by Coal India Limited in 2013 to promote sustainable development (SD) and inclusive growth. This policy encompasses mainly three components:

i. Environmental sustainability

ii. Socio-cultural sustainability

iii. Economic sustainability

The SD Policy reaffirms CIL's commitment to protecting the environment and biodiversity in order to maintain ecological balance, as well as its efforts to improve the sociocultural and economic conditions in the areas where its activities take place. For promoting sustainable development, CIL is committed to:

i. Adopt world class eco-friendly mining technologies

ii. Conserve natural resources by reducing, reusing, recycling, redefining and replacing.

iii. Neutralize the effect of mining through appropriate mitigative measures.

iv. Create income generation avenues/skill development.

v. Ensure society a better quality of life by providing basic infrastructure and management of services like water, health care, etc.

vi. Strive for conducting the business in an ethical and transparent manner.

CIL also complies with the principles of National Voluntary Guidelines as per Business Responsibility Report. It has Board level CSR & SD Committee to look after the CSR and SD efforts. Every year CIL publishes its Sustainability Report as per guidelines of sustainability reporting.

(B) NLC India Limited (NLCIL)

NLC India Limited, a Navratna Govt. of India Enterprises, a giant Public sector undertaking in southern India, incorporated in late 50s, is the prime player of open cast Lignite/ coal, Mining, Power Generation and in renewable energy on PAN India for more than six decades.

NLCIL strives hard to achieve its environmental, socio-cultural and economic sustainability goals through its Corporate Environmental Policy, Code of Conduct, Fraud Prevention Policy, Whistle Blower Policy, Internal Code of conduct for prevention of insider trading, Related Party Transaction Policy, Dividend Distribution Policy, CSR Policy, R&R Policy, Training Policy, Career Growth Policy, Occupational Health & Safety Policy, Code of Corporate fair disclosure practices for prevention of insider training.

(C) Singareni Collieries Company Limited (SCCL)

Since SCCL has been running coal mines for more than 130 years, environmental management in coal mining areas has been integrated into the development and planning of mines. To continuously evaluate how well environmental standards are being followed in coal mines and to provide appropriate channels for putting environmental protection measures into action and promoting sustainability, SCCL has formed a dedicated Environment Department.

SCCL has developed an Environmental policy, which states that "To be a role model in protection of environment for sustainable development, SCCL is committed to implement the best global practices in all its operations through prevention / mitigation of pollution, proper disposal / recycling of wastes and bringing awareness among all the stake holders for continual improvement in environmental performance".

3. Establishment of Sustainability and Just Transition (S &JT) Division SDC & JT Section at Ministry Level

The adoption of sustainable development principles in coal mining sector has been gaining ground over the years. Ministry of Coal not only envisions to secure availability of coal to meet the rising energy demand of various sectors but also prioritizes due care for local environment and host community. Coal sector envisages to promote sustainable development model in which coal production goes hand in hand with environmental protection, resource conservation, care for society and measures to protect our forests and biodiversity.

With the above goals in forefront, the Ministry of Coal has established **'Sustainable Development Cell (SDC)'** in December 2019 to promote environmentally sustainable coal mining in the country and to address concerns during mining operation and till the decommissioning or final closure of mines. Subsequently, the SDC emerged as **Sustainability & Just Transition (S & JT) Division** consisting **Sustainable Development Cell (SDC) & Just Transition (JT) Section**. Recognizing the importance of bringing sustainability in coal mining, Sustainable Development Cells (SDCs) have also been established in all Coal/Lignite PSUs with following objectives to improve the overall image of coal sector in the country:

- To advise, mentor, plan & monitor the mitigation measures taken by Coal/Lignite PSUs for maximizing resource utilization in a sustainable way.
- To minimize the adverse impact of mining and establish a sustainable environment around coal regions to improve ecosystem services.
- To share and replicate the best practices of sustainable mining
- To take up the issues of climate change on Just Transition aspects of coal sector
- To disseminate best practices of sustainability through reports, films, documentaries etc.

Role of S & JT Division

The S & JT Division advises, mentors, plans and monitors the mitigation measures taken by coal companies for maximizing the utilization of

available resources in a sustainable way, minimizing the adverse impact of mining and mitigating it for further ecosystem services. It deals the matters environmental sustainability and Just Transition aspects of the coal sector.

S & JT Division adopts a systemic approach, starting from collection of data, analysis of data, presentation of information, planning by domain experts, adoption of best practices, consultations, innovative thinking, site-specific approaches, knowledge sharing and dissemination with an aim to ease the lives of people and communities residing in and around mining areas.

SDC at CIL & its Subsidiaries

SD Cell at CIL has been constituted under the Chairmanship of Director (Technical), CIL. Similarly, SD Cell at each subsidiary consist of multi-disciplinary team under the Chairmanship of respective Director (Technical/P&P). At CMPDI, the Committee has been constituted with Director (Technical/ES) as Nodal Point for SDC. All the SDCs work in unison for achieving the objective of promoting sustainable development in Coal/ Lignite Sector.

SDC at SCCL

In compliance of the guidelines issued by Ministry of Coal (MOC), a "Sustainable Development Cell (SDC)" has been established in SCCL under the Chairmanship of Director (Planning & Projects), General Manager (Environment) as Secretary and one officer each from Project Planning, Estates, Forestry, Exploration (Hydro-Geology), Energy Management and Civil Departments.

SDC at NLCIL

NLCIL has also established a "Sustainable Development Cell (SDC)" with Chief General Manager (Land) as Chairman and 3 officers from Civil, Horticulture and Agriculture to assist. Director (Mines) is monitoring the overall activities of SDC.

The SDC Cells are adopting a systematic approach, starting from collection of data, analysis of data, and presentation of information, planning based on information from project authorities, adoption of best environment management practices, innovative thinking and site- specific approaches.

Meetings are conducted at regular intervals by the S&JT Division of the Ministry to review the progress of various sustainable activities of coal/lignite PSUs, namely creation of eco-parks, mine tourism, mine water utilization, biological reclamation of OB dump and backfilled areas, ecological studies in mines, promoting alternative usage of OB, energy efficiency measures, air quality management in coal mining areas, publication of status report/ good practices and other sustainability related matters of coal/lignite sector etc.

4. Environmental Sustainability Management

In order to achieve environmental sustainability, the following is a brief explanation of the environmental protection measures being adopted by Coal/Lignite PSUs in coal mining areas:

4.1 Air Quality Management

Drilling, blasting, loading, unloading, and transportation of coal and OB are the main causes of dust generation. Wet drilling is used to reduce dust generation. Dust suppression systems are also included with drill machines. Surface miners and bucket-wheel excavators (BWEs) are being used more frequently, which reduces the need for drilling and blasting and, thus, the pollution load. Vehicles get routine maintenance in accordance with the manufacturer's specifications.

At locations of loading, transfer, and unloading in mines, dust suppression systems are in place. Additionally, washeries, CHPs, Feeder Breakers, Crushers, belt conveyors, haul roads, and coal stock areas have water-spraying systems installed to capture fugitive dust. To keep dust from getting airborne, all of the roads connecting mines, CHPs, workshops, and colonies have been blacktopped.

By planting grasses on slopes and plants on the dump top as soon as they form, it is possible to greatly reduce the amount of dust that is produced by the OB dump due to wind. Roadside avenue plantations are grown to reduce dust. Plantation is

done around the quarry and OB dumps, acting as a barrier to stop dust from being carried in the air.

The trucks are being covered with tarpaulin and mist spray systems have been installed. For the purpose of controlling air pollution, fog cannons, wheel washing systems, motorised road sweepers, etc. are being used. It is encouraged to dispatch coal using the rail, MGR, conveyor, and tube conveyor networks.

Fig. 7.1: Water Sprinkler for Dust Suppression in Jayant, NCL

Dust suppression systems are installed at loading, transfer and unloading points in mines. Additionally, water-spraying systems for arresting fugitive dust in washeries, CHPs, Feeder Breakers, Crushers, belt conveyors, haul roads and coal stock areas are installed.

All roads connecting mines, CHP's, workshops and colonies have been black topped to prevent dust from becoming airborne. Mist spray systems have been introduced and the trucks are being covered by tarpaulin. Fog canon, wheel washing system, mechanical road sweepers etc. are being deployed for control of air pollution. During the year 2025 (till December), Coal/Lignite PSUs have deployed/installed 260 mist sprayers/fog canons, 14-wheel washing, 17 mechanical road sweeper and 9 CAAQMS. Further, during the period January 2026 to March 2026, it is projected to deploy additional 23 mist sprayers/fog canons, 3-wheel washing, 11 mechanical road sweeper and 36 CAAQMS.

Fig. 7.2: Wind Barrier System in Pipwarwar Railway siding, CCL

Fig.7.3: Automatic Truck Washing System in Amlohri Area, NCL

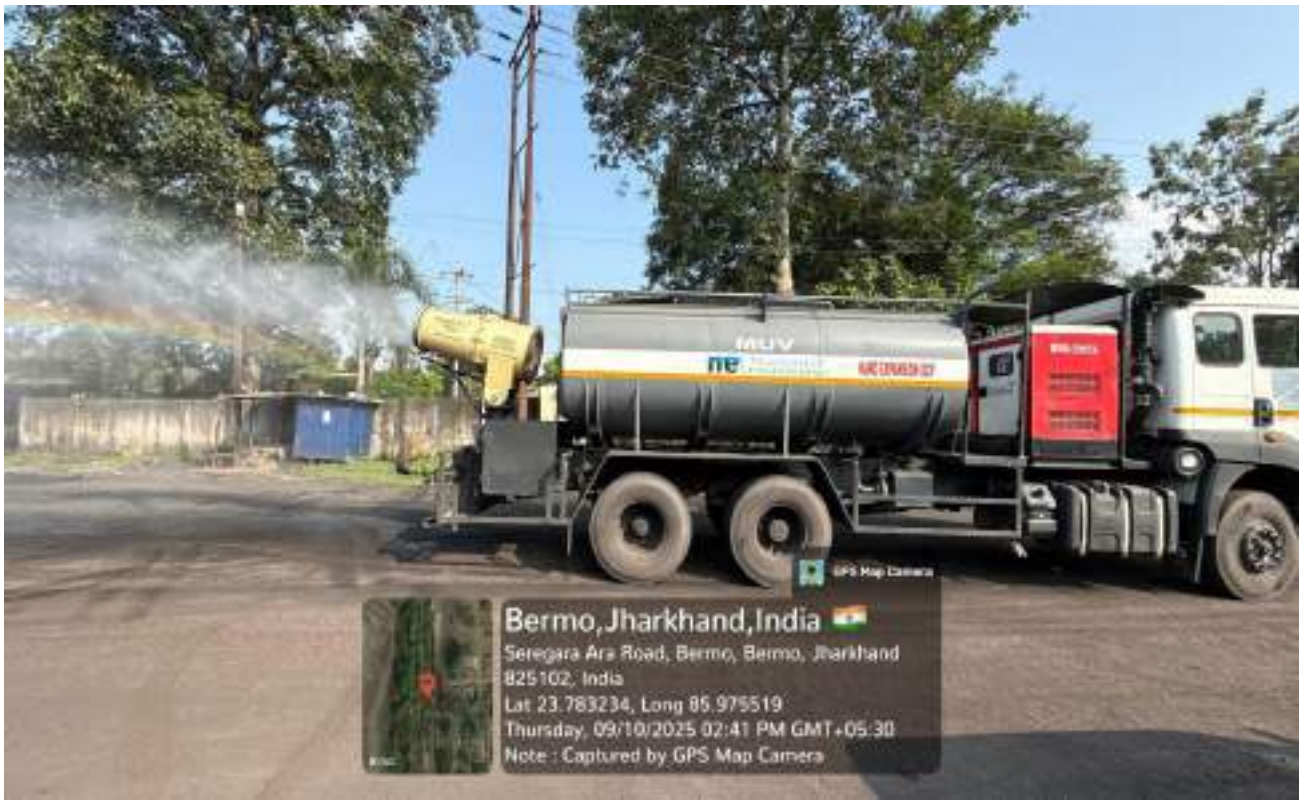

Fig. 7.4: Truck mounted fog cannon at Karo, B&K, CCL

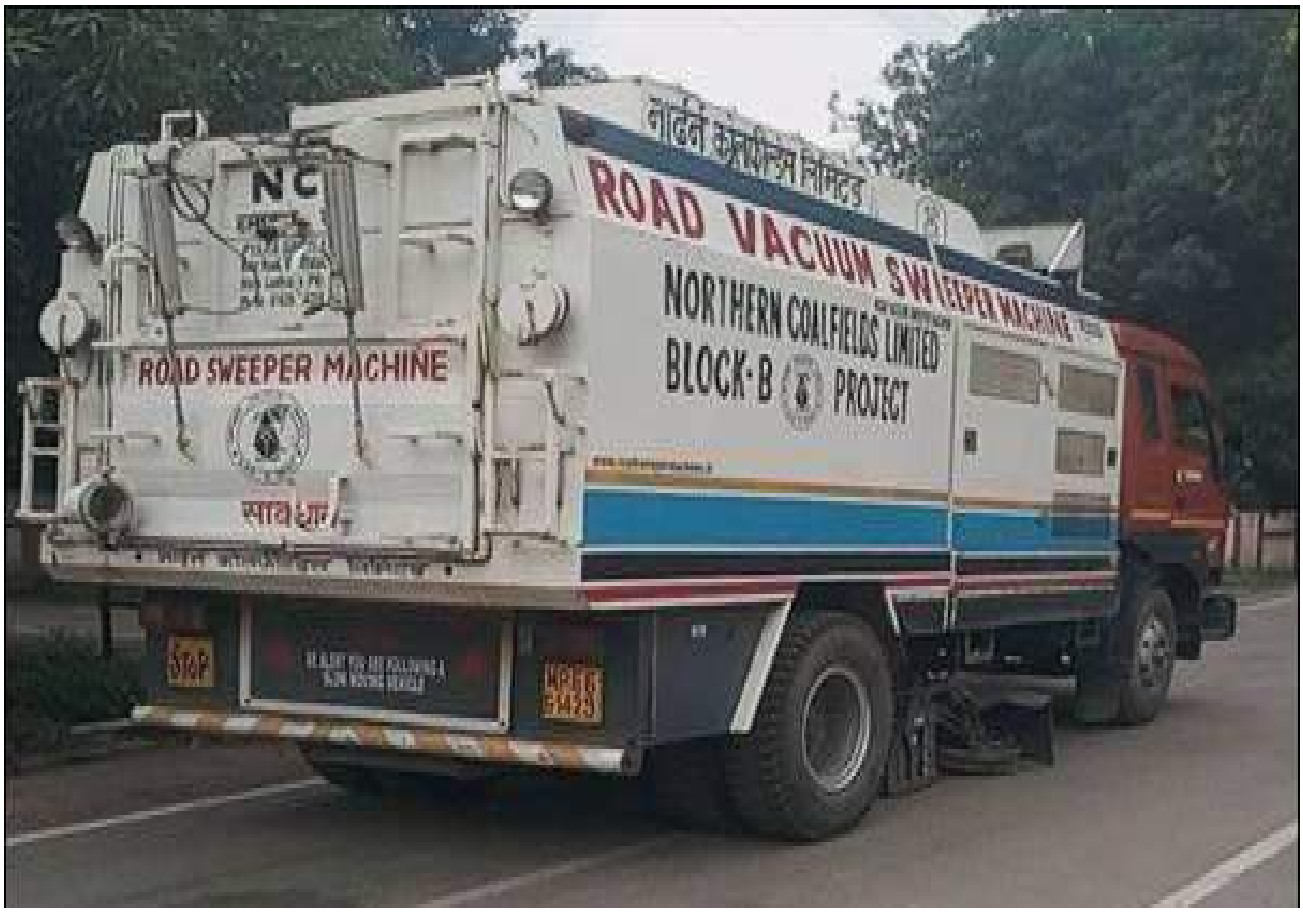

Fig.7.5: Road sweeping Machine in NCL

Fig. 7.6: High efficiency Water Sprinkler

Coal companies are commissioning First Mile Connectivity (FMC) Projects aimed to replace the system of convention loading & road transport with rapid mechanized loading system with transport through Rail/MGR/Conveyors/tube conveyor network. Some of the projects have already been completed and others are in pipeline. These projects are not only minimizing air pollution but also results in substantial reduction in carbon footprint.

Dust generation from the OB dump due to wind is controlled significantly by planting grasses on slopes and plants on dump top soon after their formation. Avenue plantation is raised along roads for dust control. Plantation is done around the quarry and OB dumps, which serves as a barrier to prevent the dispersion of air borne dust. Wind screens have been created to restrict the movement of dust within a limited area.

Fig.7.7: Wind screen at Phulbasia Siding, Magadh Area, CCL

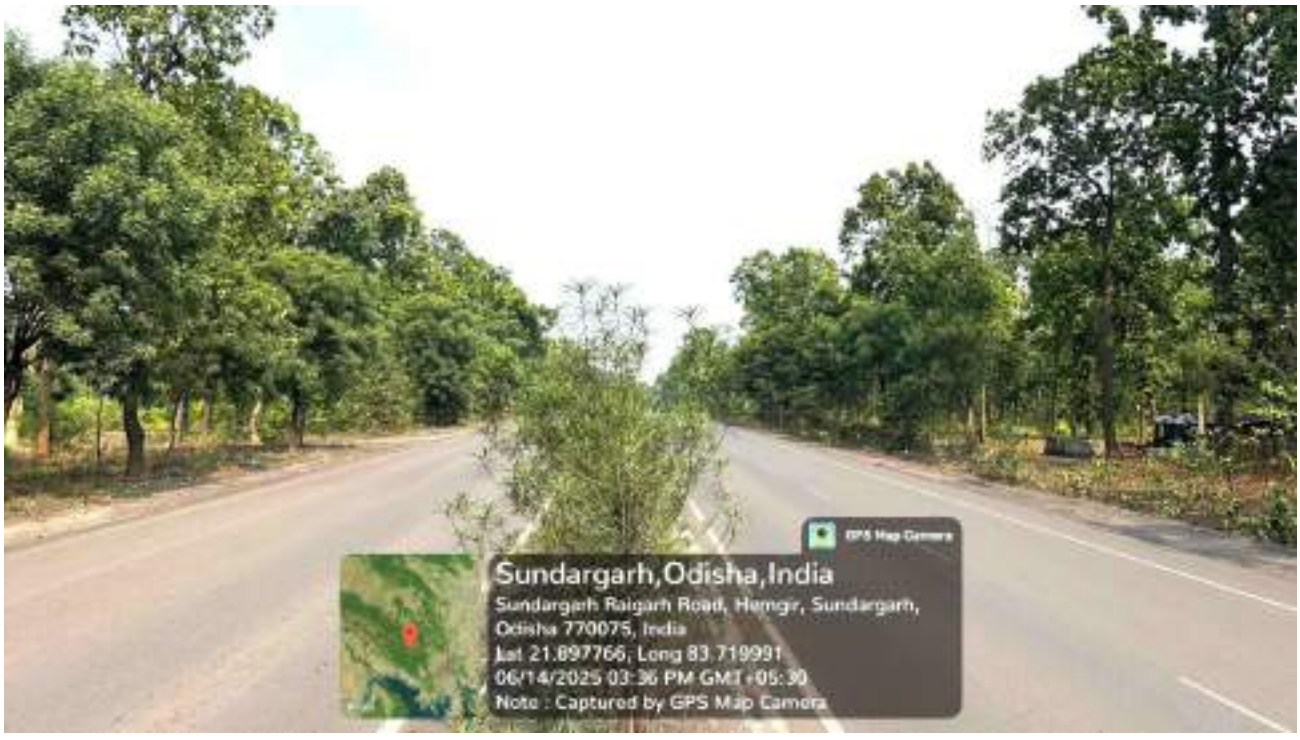

Fig.7.8: Green Belt along roads, MCL

The ambient air quality in and around coal mines is routinely monitored as per statutory stipulations and their results are shared with regulatory agencies. Continuous Ambient Air Quality Monitoring Systems (CAAQMS) have also been installed in opencast mines which are connected to SPCB websites for real time monitoring of Ambient Air Quality Parameters. Additional pollution control measures are undertaken, if required, to bring the air quality level within permissible limits.

With various emission control and mitigative measures in place, the standards of ambient air quality in and around mining areas are maintained within the prescribed limits. NLCIL has an in-house lab (CARD) accredited by NABL with a sufficient number of pollution monitoring devices, and it regularly monitors the air quality on alternate days in accordance with the Consent to Operate (CTO).

4.2 Water Quality Management

In Indian coal mines, the mine water is often of good quality. The only criterion for which sedimentation, a physical process, is used to treat, is suspended solids. The suspended solids are settled in the mine sump before being discharged. High suspended particles and oil & grease concentrations are characteristic of effluents from workshops and CHPs. Effluent treatment plants and/or oil and grease traps have been installed for workshops and CHPs. STP facilities are being installed for treatment of domestic effluent.

Controlling and removing water pollutants and contaminants in order to make the water safe for reuse is the goal of water quality management. Reusing treated water for home and industrial purposes reduces or eliminates the need for freshwater from other sources. Coal/Lignite PSUs strive to leave the smallest possible water footprint on the surface water regime. Only a small number of CIL mines have experienced the issue of acidic mine water, for which appropriate pollution control systems have been built and put into place. Before releasing the run-off water into the natural water regime, steps are taken to prevent soil erosion and arrest suspended solids, such as the building of toe walls, garland drains, settling ponds, gabions, cribs, check dams, and rock fill dams.

The zone of influence caused by mining

operations on ground water level is only evident up to 1,000 metres from the mine's boundary, according to scientific research based on routine groundwater level monitoring. The project's domestic and industrial water requirements are sustainably satisfied by using mine water or an old, abandoned quarry. Additionally, following adequate treatment, mine water is also provided to a local town for domestic use.

Additionally, mine wastewater that complies with prescribed statutory norms is released into nearby drainage systems, ponds, and agricultural fields, acting as a continuous source of recharge and raising the water level in the mining area. In mines and colonies, water saving techniques are being used. In every mining area, buildings for collecting rainwater are being built. To ensure compliance with applicable requirements, the quality of surface water, ground water, and mining effluents are periodically monitored. Both open wells and piezometers built in mining areas are used to measure ground water level

4.3 Mine Closure, Bio-reclamation & Land Use Management

Before mine operations even begin, planning for mine closure must be completed. Throughout the course of the planning process, it must be periodically reviewed and modified as necessary to be compliant with social and environmental challenges. The planning for the mine closure has several goals, including:

- To construct a self-sustaining ecosystem and to restore the physical, chemical, and biological quality that was damaged by mining to an acceptable level.
- To enable effective and sustainable after-use of the site
- In order to safeguard public health and safety.
- To stop environmental degradation and promote environmental sustainability as an outcome.
- To reduce negative socioeconomic effects.
- To safeguard the local flora and fauna.
- Making good use of the resources.

Plans for mine closure include both final and progressive elements. While the Final Mine Closure Plan aims to leave the site as safe, sustainable, and as close to its pre-mining status as is reasonably possible, the Progressive Mine Closure Designed to address to repair damages as soon as possible to limit their long-term impact. All operating coal and lignite mines currently have mine closure plans that have been approved, and mine closure activities are being carried out in accordance with the approved plan.

The improvement of the landscape affected by mining activities is one of the biggest objectives of the mine closure plans. Since there is no usable mine void during the initial phase of mining, the overburden (OB) produced by the mine is stored outside the excavated area. As the mine voids become available the OB generated is backfilled in the quarry. This continues throughout the life of the mine. Progressively, the non-active external dumps and backfilled sites are subjected to biological reclamation. After 1-2 years of technological reclamation, when the soil has stabilized, biological reclamation is typically started.

The mined-out land's rehabilitation process primarily focuses on the following:

- Restoring the land to its pre-mining land use or that consistent with the surrounding land.
- Maintaining the long-term stability of the affected land to match with the community and commercial needs.
- Besides plantation, the reclaimed areas are also being developed in parks, flora & fauna sanctuaries, grazing land, ponds and playgrounds with ecological, tourist and commercial values are planned.
- Solar Panels on reclaimed areas are also being planned.
- Hi-tech cultivation has also been taken

up on the mined out / reclaimed areas. Bamboo plantation and grassing of OB dumps/back-filled areas are also being done

- Plantation has also been taken up in degraded forest lands of surrounding area with concurrence of State Forest department and also in private lands in the mine surroundings in the form of Social Forestry /CSR.
- Extensive Avenue plantation has been taken up along the approach roads/routes leading to the connecting surrounding villages.
- Some of the coal companies have developed their own nurseries for developing saplings of native species of plants. Seedlings are also distributed to local population to sensitize plantation by local people.

During the year 2025 (till December), Coal/Lignite PSUs have planted 60.87 lakh saplings covering an area of about 3172 Ha. Further, during the period of January 2026 to March 2026, it is projected to bring an additional area of 56.72 Ha under green cover.

Thus, Coal/lignite PSUs have not only enhanced their production level over the years to meet the rising energy demand but also shown their sensitivity and care towards native environment by adopting various mitigation measures including reclamation of mined out areas and extensive plantation in and around coal bearing areas. Additionally, over the past six years, up to March 2025, Coal/Lignite PSUs achieved a cumulative plantation area of 13,401 Ha with 290+ lakh saplings.

Fig. 7.9: Miyawaki Plantation at Rajarappa, Area CCL

In addition to bio-reclamation of mined out areas, green belt is also created around the source of air pollution like mine, infrastructure and roads to reduce air pollution. Green belt is also provided around the mine and residential colony for noise attenuation.

Reclamation of mined out areas is important for sustainable development. Emphasis is being laid on proper reclamation which includes both technical and biological reclamation as well as mine closure. Satellite surveillance for land reclamation is being given the requisite thrust in order to assess the progressive status of reclamation and to take up remedial measures, if any, required for environmental protection.

Satellite data-based Image Analysis and satellite surveillance of progressive reclamation activities is being regularly carried out by Coal/Lignite PSU.

The plantation carried out on non-forest

backfilled as well as external overburden dumps is best suitable for Accredited Compensatory Afforestation (ACA). The Ministry of Coal has guided Coal/Lignite PSUs to extensively cover non-forest land for compensatory afforestation in future to promote ACA and expedite the Forest Clearance process. In line with the Accredited Compensatory Afforestation (ACA) guidelines, Coal/Lignite PSUs have so far identified 6,385 hectares of land to establish an ACA land bank for upcoming coal mining projects.

4.4 Vriksharopan Abhiyan 2025

The "Ek Ped Maa Ke Naam" campaign, launched by Prime Minister Shri Narendra Modi on World Environment Day, encourages citizens to support a greener planet through tree plantation. As a major feature of the World Environment Day 2025 celebrations, Coal/Lignite PSUs undertook large-scale plantation drives aligned with this environmentally impactful initiative. During FY 2025–26 (up to December 2025), approximately 3005 Ha land were brought under green cover by planting about 58.18 lakh saplings in and around coal mining regions. Additionally, nearly 6 lakh saplings were distributed to local communities. The campaign witnessed active participation from around 35,000 individuals, including PSU employees, local residents, school children, self-help groups (SHGs), and community Organisations.

4.5 Mission GREEN (Grow, Restore, Enrich and Empower Nature) Coal Regions

Mission GREEN Coal Regions booklet launched by the Hon'ble Minister of Coal on 4 July 2025 in Hyderabad. The Mission aligns with the Hon'ble Prime Minister's Panchamrit commitments and Mission LiFE by prioritizing sustainability and climate resilience. It focuses on minimizing environmental impacts while improving socio-economic outcomes in coal-dependent areas. A five-year vision has been prepared for CIL, NLCIL, and SCCL to develop post-mining and other suitable lands into vibrant, sustainable ecosystems.

Five-year vision for Coal/Lignite PSUs include:

Large-scale afforestation and greening.

- Promotion of mine tourism for livelihood generation.
- Use of treated mine water for agriculture and community needs.
- Implementation of renewable energy and energy efficiency measures.
- Skill development & livelihood training for local communities.
- Restoration of traditional water bodies.

Ministry of Coal has constituted a monitoring committee and Mission GREEN activities are being regularly monitored.

Fig 7.10: Mission GREEN Coal Regions booklet launched by the Hon'ble Minister of Coal

6. Best practices:

In the areas of reclamation, mining water utilization, promotion of renewables, alternate uses for OB, energy efficiency measures, etc., coal/lignite PSUs have done a number of praiseworthy initiatives. The purpose of showcasing these works and practices is to encourage others to replicate them. Some of the best practices have been compiled hereunder:

6.1 Development of Eco Parks/ Mine Tourism Sites/Recreational Parks

Development of eco-parks/tourism sites to promote mine tourism is one of the key thrust areas of S & JT Division of MoC and coal companies. Over the past six years, up to March 2025, a total of 17 Eco-Parks/Mine Tourism Sites/Recreational Parks have been created (CIL-14, NLCIL-2, & SCCL-1), with 5 of them already linked to local tourism circuits—showcasing the commitment to sustainable and visitor-friendly mine tourism.

Further, during the year 2025 (till December), Coal/Lignite PSUs have developed 3 new Eco-park/Mine Tourism Site/Recreational Park, namely:

- Amlohri Eco-park, NCL (Madhya Pradesh),
- Jayant Eco-park, NCL (Madhya Pradesh) and
- Netaji Subhash Chandra Bose Eco-park, BCCL (Jharkhand).

CIL

Over the past 6 years till March 2025, CIL has developed around 14 Eco-parks/Mine Tourism Site/Recreational Parks. Further, during the year 2025 (till December), CIL have developed 3 new Eco-park/Mine Tourism Site/Recreational Park namely, Amlohri Eco-park, NCL (Madhya Pradesh), Jayant Eco-park, NCL (Madhya Pradesh) and Netaji Subhash Chandra Bose Eco-park, BCCL (Jharkhand).

Fig 7.11: Amlohri Eco-park, Amlohri Project, NCL

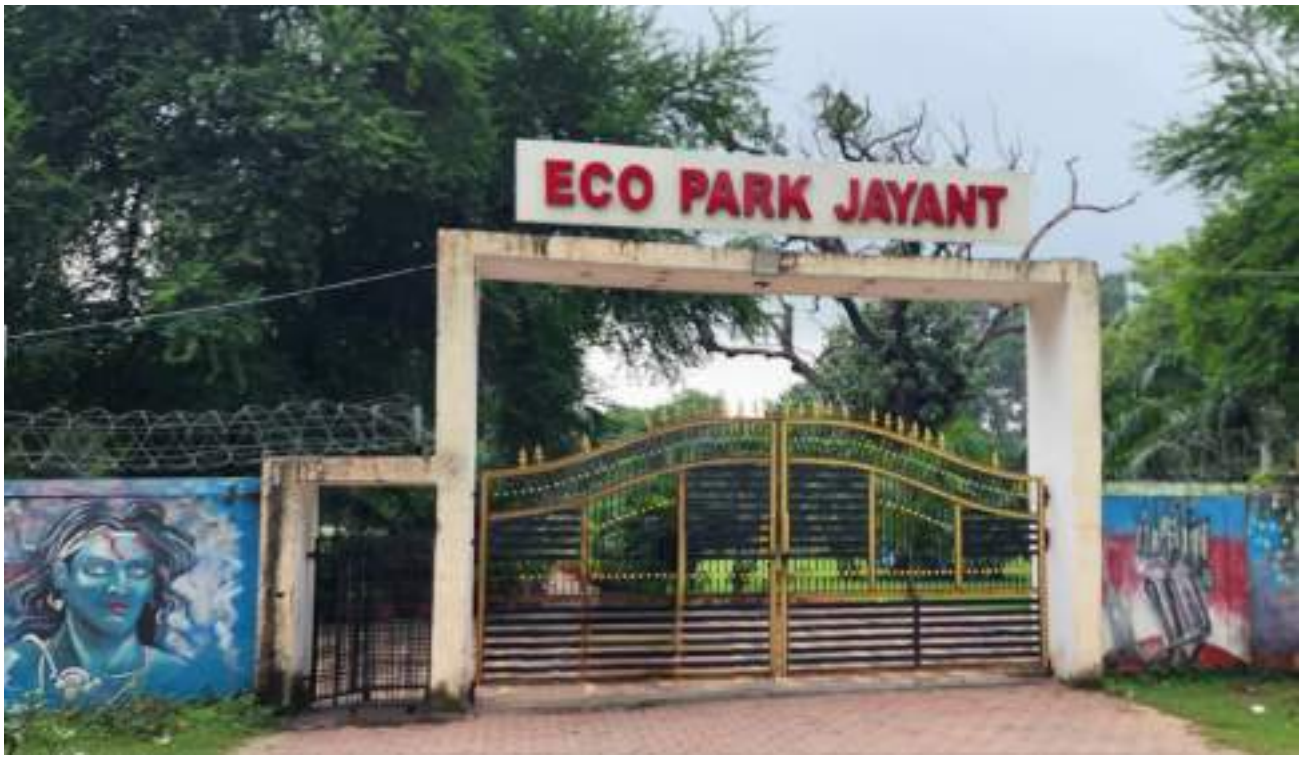

Fig 7.12: Jayant Eco Park, Sector-2, Jayant, NCL

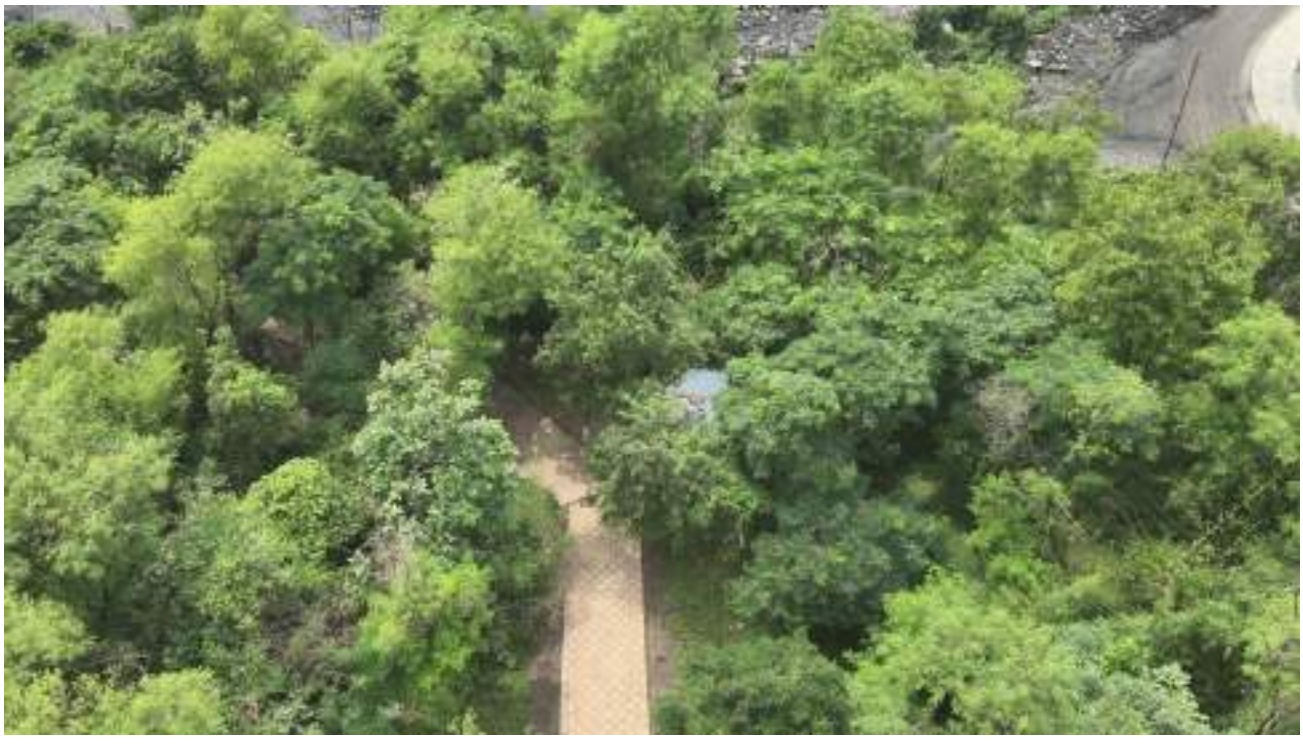

Fig 7.13: Netaji Subhash Chandra Bose Eco-park, BCCL

SCCL

SCCL has developed an eco-park/tourism site in the reclaimed mining area of the Gautham Khani Opencast Project for recreation activities and tourism purposes in order to change the public's perception of coal mining as a polluting industry. The key highlights of eco-parks are lawns and gardens along with theme plantation, cacti and succulent garden, butterfly garden, water fountains, boating facility, bird watching facility, children park, Vinayaka Vanam, canteen and restrooms.

The Eco-Park is situated adjacent to Gouthampur village in Kothagudem mandal of Bhadradri Kothagudem district, Telangana State. The nearest railhead to the project is Bhadrachalam Road Railway Station which is at a distance of 12 Km. Railway Station is connected to the South-Central Railway Dornakal junction on Chennai-New Delhi grand trunk line by a 55 Km long track which is also meant for coal transport. The park is well connected with State Capital, Hyderabad (280 Km) and the district headquarters, Bhadradri Kothagudem (10 Km) by road.

NLCIL

NLCIL Eco Tourism Park at Mine-I & Mine-II, Neyveli, Tamil Nadu was inaugurated on the day of Vriksharopan Abhiyan held on 23.07.2020 & 19.08.2021 by the Hon'ble Union Home Minister and the Hon'ble Union Minister of Coal, Mine and Parliamentary affairs, Government of India respectively. Eco Tourism Parks are located 200 km south of Chennai, 65 km from Puducherry and 45 km from Chidambaram. The key highlights of the eco-parks are as under boating facility in artificial lake, birds watching, divine tree park having tree plants for all Stars and Raasi, children play area, cafeteria, medicinal garden, vehicle rides, rearing of livestock. The eco-park is open for public.

On the auspicious occasion of Vijaya Dashami i.e. 05.10.22, an MoU was signed between NLCIL and Pondicherry Tourism Development Corporation Ltd (PTDC) in the august presence of Chief Minister and Minister of Tourism, Puducherry and Director/ Mines, NLCIL for promoting Mine Eco Tourism.

7.2 Mine water utilization

Mines, when viewed objectively, whether opencast or underground are water harvesting structures. During initial stages, the mines can temporarily effect the water table but once mining operations stabilize, they also act as water storage bodies. Post mining, all mines get filled up with natural precipitation, whether they are carved out areas of underground mines or backfilled area & voids in opencast mines. The drilling and blasting activities carried out by mining operations contribute to the secondary porosity and permeability by which ground water movement is facilitated to surrounding areas. It has been seen in many cases that once mining operations have been stopped, the water table in areas near to the mine increases.

The mine voids left at the terminal years of mining is converted into water reservoir and water is being utilized. At present, there is greater emphasis on mine water treatment and its utilization by Ministry of Coal. Action plan is being chalked out and implemented by coal/lignite PSUs for mine water utilization for the community.

Mines have been providing treated mine water to the neighboring communities both for domestic and irrigation use since past. Institutional arrangements under MoC for sustainable development activities are now being undertaken to fulfil societal aspirations. This endeavor is in line with the Jal Shakti Abhiyan for water conservation campaign initiated by the Government of India.

The mine water is being treated in filter beds, settling tanks before being supplied to employees and colonies. The mine water is being utilized for industrial & domestic purposes such as dust suppression, stowing, washing of machinery, firefighting, drinking, and plantation. The excess mine water is treated through settling tanks before being stored in nearby ponds for community use, such as drinking and irrigation. The surplus water after the above usages is stored into nearby ponds/lakes for groundwater recharge and for further use of pisciculture.

Over the last 6 years till March, 2025, the volume of mine water supplied for community purposes has been around 22,800 LKL, which is anticipated to benefit around 18.63 lakh population in 1,055 villages of coal-bearing States. Out of which 8374 LKL has been supplied for domestic/drinking purposes and 14,426 LKL has been supplied for irrigation purposes.

During the year 2025 (till December), Coal/Lignite PSUs have offered about 4,759 LKL mine water for community use. Volume of mine water offered for irrigation purposes has been 2,919 LKL & for domestic/ drinking purposes has been 1,840 LKL.

Further, during the period of January 2026 to March 2026, it is projected to offer additionally 731.40 LKL of mine-water for community use.

Subsidiaries of CIL have signed MoU's with the State Governments for achieving the common goal of providing surplus water from suitable mines for use by habitations, located in the command areas of subsidiaries of CIL in the respective states. The details are as under:

- **MoU between Jharkhand Govt & CIL-** Utilization of mine water by villages situated in the command area of CCL, BCCL and ECL
- **MoU between West Bengal Govt & ECL -** utilization of mine water by communities for irrigation purposes
- **MoU between WCL & MAHAGENCO -** To provide mine water to MAHAGENCO power plants located near mines of WCL
- **MoU between WCL & Vidarbha Irrigation Development Corporation –** Providing surplus mine water to VIDC from mines of WCL
- **MoU between Chhattisgarh Govt. & SECL –** Supply of Mine Water to PHED, Water Resource Department & other Govt. agencies

Fig.7.14: Pisciculture at Kerketta C Block, N K Area of CCL

In addition, NLCIL supplies mine water to Chennai Metro Water Supply Scheme through Veeranam lake and SCCL is supplying excess mine water to community for drinking and irrigation purposes. Apart from MoU's, subsidiaries of CIL, for beneficial use of mine water by the nearby community, continuously endeavored departmentally in planning, designing, implementation and execution of various schemes successfully.

CMPDI has also carried out a comprehensive assessment of mine water potential in accordance with the direction of PM sector review meeting. The exercise aimed to develop a holistic understanding of:

- Water availability
- Surplus water
- Financial implications of utilizing the surplus for various purposes.

7.3 Alternative usage of OB

Even as the mandate is to produce and dispatch coal to its consumers, Coal/Lignite PSUs has taken up an out of box initiative to produce sand from overburden at a much cheaper price and usages of processed OB for stowing purpose. This will not only help in minimizing environmental pollution due to sand siltation from overburden, but will be also an option for getting cheaper sand

for construction purpose. Production of sand has already started.

During opencast mining of coal, the strata lying above coal seam is known as overburden comprising of clay alluvial sand and sandstone with rich silica content. The overburden is removed to expose and extract coal from beneath. After completion of coal extraction, the overburden is used for back filling to reclaim the land in its original shape. While extracting overburden from top, swell factor of the volume accounts for 20-25%. Initiative has been taken to utilize at least 25% of overburden in converting to sand by crushing, sieving and cleaning.

The very first initiative of such conversion has been taken by Western Coalfields Ltd. (WCL), a subsidiary of CIL in its mines. Initially a Pilot Project was launched where sand was extracted through machines erected departmentally. This sand has been offered to Nagpur Improvement Trust at a much cheaper price for constructing low-cost houses under Pradhan Mantri Awaas Yojana (PMAY). The price of sand is almost 10% of the market price with better quality. On huge success of the project and with growing demand of cheaper sand, WCL launched commercial production by commissioning the largest sand production plant of the country near Nagpur. This unit produces 2500 cubic meter of sand per day at about half the market price. Major chunk of the sand produced from this plant is being given to Govt. units such as NHAI, MOIL, Mahagenco and other smaller units at one third of the market price. Rest of the sand is being sold through open auction in the market which is helping locals to get sand at a much cheaper price. The use of overburden has minimized the volume of land required for overburden dump. This initiative also lowers the adverse footprint of river bed mining of sand. WCL is also selling overburden for road construction at a cheaper price to NHAI & others.

In this effort to Promote Circular Economy (Waste to Wealth), a total of 7 OB Processing Plants / OB to M-sand Plants have been commissioned so far by Coal/Lignite PSUs.

7.4 Energy Efficiency Measures

Efficient use of energy resources and their conservation assume tremendous significance as one unit of energy saved at the consumption level reduces the need for fresh capacity by 2 times to 2.5 times. Further, such saving through efficient use of energy can be achieved at less than one-fifth the cost of fresh capacity creation. Most importantly, energy conservation also translates into reduction of carbon footprint. Coal companies also have several areas for implementing energy efficiency measures:

- Colonies, buildings, offices, industrial establishments, rest houses etc.
- Various mining activities – HEMM, Transport, Ventilation, Pumping etc.
- Efficient Power Supply Management and many other avenues

Coal companies have been taking of various energy conservation and efficiency measures over the years and have envisaged various efficiency measures to be taken in coming years:

- Reducing electricity /diesel consumption by taking appropriate measures after comprehensive energy audit
- Replacing conventional lights by LED lights
- Replacing conventional ACs and other appliances by energy efficient Star rated appliances
- Installation of capacitor banks and other measures to improve power factor
- Use of auto-timers in street lights
- Use of Energy efficient pumps (EESL)
- Deploying E-Vehicles (EESL)

By implementing various energy efficiency measures, Coal/lignite PSUs have envisaged to create additional carbon offset potential of 1 Lakh Ton/annum.

CIL has signed MOU with EESL to implement

Energy Efficiency Programs at CIL and Subsidiaries. This shall cover Building Energy Efficiency Projects (BEEP), Replacement of old fans, ACs and conventional light fittings, motors, adoption of e-vehicle, and installation of distributed and rooftop solar projects.

During the year 2025 (till December), Coal/Lignite PSUs have replaced 94,197 conventional lights with LED lights, 1,011 energy efficient ACs, 9,192 Super Fans, deployed 117 E- vehicles, 374 Efficient Water Heaters, 381 Energy Efficient Motors for Pumps, 720 Auto-timer in street lights and installation of 20,813 of Capacitor Banks.

Further, during the period of January 2026 to March 2026, it is projected to additionally install 7,918 Super Fans, 244 E-vehicles and 290 Energy Efficient Motors for Pumps.

Fig. 7.15: E vehicle deployed in SECL HQs.

7.5 First Mile Connectivity Projects

Ministry of Coal has formulated an integrated approach to eliminate road transportation of coal from mines and has initiated steps to upgrade mechanized coal transportation and loading systems under the 'First Mile Connectivity' projects.

Coal Handling Plants (CHPs) and SILOs with Rapid Loading Systems offer benefits such as coal crushing, sizing, and speedy computer-aided loading. With reduced manual intervention, precise pre-weighed quantity and better quality of coal can be loaded. Improved loading time will bring down the wagon idling increasing their availability. Easing the load on road networks promotes cleaner environment and savings on diesel. It will be an all-round win-win situation for the company, railways and the consumers.

In view of this, coal movement for all mine having capacity >2 MTPA is addressed and 139 FMC projects costing nearly Rs. 45000cr, with 92- CIL, 12- SCCL, 5 – NLCIL and 27 for captive commercial, with a total capacity of 1319 MTPA are planned. Currently, 65 projects (43-CIL, 12-SCCL and 10 for captive commercial) with a capacity of 552 MTPA have been commissioned. The remaining projects, are scheduled to be commissioned by FY 2030.

It leads to a cleaner & healthier environment, cost (diesel) savings, and reduced loading time thereby reducing turnaround time and increased wagon availability, Precision in quantity and enhanced conformity to quality. Present diesel savings of ₹3,300 Cr. per year with 65 FMC projects when operated at full capacity.