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Our Land. Our Future
We are
#GenerationRestoration

पर्यावरण दर्पण

पर्यावरणीय समाचार पत्रिका

बीसीसीएल
BCCL
Bharat Coking Coal Limited

भारत कोकिंग कोल लिमिटेड
धनबाद

SUCCESSFUL TRANSFORMATION JOURNEY OF DEGRADED LAND THROUGH ECO-RESTORATION PROCESS

Message

In this 21st Edition of Newsletter “Paryavaran Darpan” being released on the auspicious occasion of World Environment Day 2024, it gives me immense pleasure to extend my heartfelt greetings to each one of you. This day is a reminder of our collective responsibility to protect and nurture the environment for ourselves and future generations. As the Chairman and Managing Director of Bharat Coking Coal Limited, I am proud of our ongoing commitment to environmental stewardship and sustainability.

This year's theme, "Land restoration, desertification and drought resilience," resonates deeply with our mission at BCCL. We are dedicated to restoring our mined-out areas, improving biodiversity, and ensuring that our mining operations are conducted in an environmentally responsible manner. Our efforts are geared towards not only minimizing the impact of our activities but also contributing positively to the regions we operate in.

At BCCL, we are deeply committed to environmental sustainability through initiatives such as extensive afforestation and green belt development, where millions of trees have been planted to enhance biodiversity and sequester carbon especially on OB dumps and degraded mined out land. Our water management techniques include rainwater harvesting and recycling mine water, ensuring the sustainable use of this vital resource. We prioritize pollution control by installing state-of-the-art equipment like Fog Canons, Mist Sprinklers, Mechanical Sweeper etc. and adhering to strict environmental standards to reduce air and water pollution. Additionally, we engage with local communities through various CSR activities to improve quality of life and raise environmental awareness.

As we look to the future, BCCL is committed to integrating sustainable practices into every aspect of our business. Our upcoming projects will incorporate cutting-edge technologies aimed at reducing our carbon footprint and promoting renewable energy sources.

On this World Environment Day, I urge each one of you to reflect on the importance of our environment and take proactive steps in your daily lives to protect and preserve it. Small actions, when multiplied across communities, can lead to significant positive changes. Let us continue to work together towards a greener, cleaner, and more sustainable future. Our dedication and efforts today will pave the way for a thriving planet for generations to come.

Happy World Environment Day!

Samiran Dutta
Chairman-cum-Managing Director
Bharat Coking Coal Limited

Message

बहुत हर्ष का विषय है कि कंपनी का पर्यावरण विभाग आगामी विश्व पर्यावरण दिवस के अवसर पर दिनांक 05 जून, 2024 को परंपरानुसार इस वर्ष भी पर्यावरण विषयक पत्रिका 'पर्यावरण दर्पण' के 21वें अंक का प्रकाशन करने जा रहा है। पर्यावरण सामूहिक जागरूकता का विषय है। संपूर्ण विश्व को पर्यावरणीय चुनौतियों से निपटने के लिए सामूहिक रूप से जागरूक करने के उद्देश्य से विश्व पर्यावरण दिवस का आयोजन दुनिया भर में किया जाता है। बीसीसीएल के लिए भी पर्यावरण बहुत महत्वपूर्ण विषय है।

वर्ष 2024 के विश्व पर्यावरण दिवस की थीम- **भूमि पुनर्स्थापन, मरुस्थलीकरण और सूखे से पुनर्बहाली *(Land restoration, desertification and drought resilience)* और नारा हमारी भूमि. हमारी भविष्य. हम पुनर्स्थापन करने वाली पीढ़ी हैं।** ***(Our land. Our future. We are #Generation Restoration)*** है। हम समझते हैं कि उपजाऊ भूमि, पारिस्थितिकी तंत्र की बहाली और जलवायु परिवर्तन के प्रभावों को कम करना मानव जीवन के लिए अति आवश्यक है। हमारी कंपनी इस दिशा में निरंतर प्रयासरत है और हमने इसमें काफी सफलता भी हासिल की है।

हमारी कंपनी पारिस्थितिकी पुनर्स्थापन, वानिकी परियोजनाओं, जल-संरक्षण और इको पार्क को विकसित करने पर विशेष ध्यान दे रही है। इसके अतिरिक्त, हम खनन से विकृत हुई भूमि के पुनरुद्धार में सक्रिय रूप से योगदान दे रहे हैं। हम प्राकृतिक संसाधनों और प्रौद्योगिकी का उपयोग करके, संधारणीय विकास के लिए निरंतर प्रयासरत हैं। कंपनी द्वारा सघन वृक्षरोपण, स्थानीय लोगों के लिए खदान के पानी का प्रबंध, इलेक्ट्रिक वाहनों का उपयोग और सौर पैनलों का प्रतिष्ठापन आदि का कार्य भी बड़े पैमाने पर किया जा रहा है। यह इस दिशा में हमारी कंपनी की प्रतिबद्धता को दर्शाता है।

कंपनी के अधिकारियों व कर्मचारियों और आमजन के बीच जागरूकता के प्रसार के उद्देश्य से प्रकाशित की जाने वाली इस पत्रिका के संपादक मंडल को एक और नया अंक प्रकाशित करने के लिए हार्दिक बधाइयाँ प्रेषित करता हूँ और पत्रिका के उज्ज्वल भविष्य के लिए शुभकामनाएं देता हूँ।

मुरली कृष्ण रमैया
निदेशक (कार्मिक)
भारत कोकिंग कोल लिमिटेड

Message

Bharat Coking Coal Limited is pioneer company for production of coking coal as it produces bulk of the coking coal mined in the country. BCCL is committed to provide energy security to the country by attaining environmentally and socially sustainable growth through best practices from mine to market. As a company that has a synergistic relationship with the environment, it is our onus to safeguard it. The Company has been marching on the path of moving from being a traditional coal miner to an eco-friendly and sustainable miner with global standards.

World Environment Day -2024 campaign focuses on land restoration, desertification and drought resilience under the slogan "Our land. Our future. We are #Generation Restoration." To achieve the above goal, BCCL has done large scale plantation with land restoration and committed to continue with investments in sustainable infrastructure & technology.

Ecological Restoration and Environmental conservation is not a one-day event but a lifelong commitment. Together, we can create a greener, healthier, and more sustainable future for generations to come.

I am delighted to know that the Environment department is releasing the 21st issue of its newsletter "Paryavaran Darpan" on the occasion of World Environment Day to spread the awareness about the efforts of BCCL in sustainable practices and encouraging others to join the cause of improving the Environment.

R.K. Sahay
Director (Finance)
Bharat Coking Coal Limited

Message

World Environment Day is a global platform for inspiring positive change. People from more than 150 countries participate in this United Nations international day, which celebrates environmental action and the power of governments, businesses and individuals to create a more sustainable world.

This year's World Environment Day campaign focuses on land restoration, desertification and drought resilience under the slogan "Our land. Our future. We are #GenerationRestoration

At the onset of this year, temperature records were shattered. Much of the world felt the impacts, not just in heat but in storms, floods and drought. It's imperative to realize that every little deed matters when it comes to saving the environment. Let us infuse this into our everyday decisions, from the materials we use to the way we communicate and collaborate. Each action, no matter how small a step you are taking to lead a greener lifestyle, it does make a difference.

BCCL has been taking necessary steps to remediate the degraded mined out lands and OB dumps in its mining area to reduce the impacts of the environmental pollution and transform the degraded mined out areas in ecologically restored forest like areas.

We cannot turn back time, but we can grow forests, revive water sources, and bring back soils. We are the generation that can make peace with land.

I am delighted to know that the Environment department is releasing the 21st issue of its newsletter "Paryavaran Darpan" on the occasion of World Environment Day and wish that they will continue their work in improving the Environment.

Aman Raj
Chief Vigilance Officer
Bharat Coking Coal Limited

Message

The World Environment Day is the biggest annual event for positive environmental action taking place on every 5th of June. This year, the World Environment Day focuses on land restoration, desertification and drought resilience. Land restoration is a key pillar of the UN Decade on Ecosystem Restoration (2021-2030), a rallying call for the protection and revival of ecosystems all around the world, which is critical to achieve the Sustainable Development Goals and I am sure land restoration by mining companies all around the world will have an important role in achieving this goal

Earlier coal mining meant only coal extraction but today coal mining means extracting the coal with due care of Mother Nature, respecting all facets of environment. Coal mining is being done in BCCL with elephantine emphasis on reclamation of mined out, degraded land. Along with the production figures, each area is now in a race to have the best eco-park site. Environment along with production has been the centre of discussion at all forums in the closing month of 2023-2024.

BCCL has done biological reclamation over 1631.53 Ha consisting of 34, 84,699 no. of plants including 35,694 gabion plantation till 2023-24. Along with establishment of the natural forests over the degraded mined out areas and OB dumps, BCCL has also been developing eco-parks over some degraded mined out areas and OB dumps sites, with an aim to connect with the local communities residing nearby the mining areas of BCCL. BCCL has developed 06 Eco Parks namely Gokul Eco-cultural Park, Lodna Area; Vrindavan Eco Park, Kusunda Area; Parasnath Udyaan, Katras Area; Tetulmari Bio-diversity Park, Sijua Area; Netaji Subhash Chandra Bose Eco-Park & Govardhan Eco-park, Bastacolla Area. Furthermore, we have self-sustained our plantation needs by developing central nursery at Koyla Nagar Township and different nurseries in all the areas of BCCL with abundance of native and fruit bearing plant species.

We have been working dedicatedly in the arena of eco-restoration and every effort is being made to restore the degraded land. Greenery in coal mining area cannot be achieved overnight. It will take time to undo century old degradation. But I'm sure that through dedication, will and hard work one day we will have 'Green Jharia'.

BCCL's Environment newsletter being published on the occasion of Environment Day is a great way to create awareness about environment. I congratulate the Environment department for publishing the 21st Edition of Paryavaran Darpan and wish it all success.

Sanjay Kumar Singh
Director (Technical), Operations,
Bharat Coking Coal Lim

Message

World Environment Day unites millions of people across the nation to raise awareness and take responsible actions for the environment. It serves as a powerful reminder of the collective responsibility we share in preserving and protecting our planet. I am pleased to learn that on World Environment Day-2024, the Environment Department of Bharat Coking Coal Limited (BCCL) is publishing the 21st issue of its newsletter, "PARYAVARAN DARPAN." This milestone is a testament to our ongoing commitment to environmental awareness and sustainability. The theme for World Environment Day focuses on land restoration, desertification, and drought resilience. This campaign underscores the importance of land restoration as a key pillar of the UN Decade on Ecosystem Restoration (2021-2030), a global initiative aimed at protecting and reviving ecosystems, which is essential for achieving the Sustainable Development Goals (SDGs).As part of this global effort, BCCL is dedicated in contributing to land restoration initiatives. BCCL is continuing its drive for plantation at reclaimed areas/OB dump/roadside for mitigation of pollution and better environment, the biologically reclaimed areas are also converted into eco parks for recreational purpose of local communities. These efforts are aligned with the broader goals of the UN Decade on Ecosystem Restoration, reflecting our commitment to sustainable development.

BCCL, as a prime energy supplier, faces the complex challenge of balancing the need for energy efficiency with the imperative to conserve our abundant biodiversity. This task is indeed formidable, but despite the hurdles, we have made significant strides towards becoming a sustainable organization. One pivotal step that BCCL has taken in this direction is the implementation of a robust self-monitoring system. We have installed online PM_{10} analyzers across all our mines and railway sidings to ensure accurate and continuous monitoring of particulate matter. This will significantly enhance our ability to monitor and manage air quality comprehensively. In our efforts to achieve effective dust suppression while minimizing water use, BCCL has introduced fog cannons (both trolley and truck-mounted), Mechanical Sweeper & HEMM-based mist sprinklers into our fleet of water sprinklers. These contemporary measures help us maintain air quality standards and conserve water resources. BCCL has also introduced DWLR systems to enhance the ability to manage water resources effectively, contributing to sustainable water use and conservation efforts. Apart from these initiatives, BCCL has introduced E-vehicles and solar power installations to reduce carbon footprint and to promote renewable energy sources.

By sharing the abovementioned initiatives, the newsletter fosters a greater understanding and appreciation of our environmental responsibilities and achievements and also provides a platform to spread awareness about the efforts of BCCL in sustainable practices towards environment amongst its stakeholders. I congratulate the Environment Department for their dedication and hard work in publishing "Paryavaran Darpan"

Shankar Nagachari
Director Technical, P&P
Bharat Coking Coal Limited

A PEEK INSIDE....

संपादकीय

लोकतंत्र के महापर्व के पूर्णता के साथ पर्यावरण दर्पण का नया अंक प्रस्तुत हैं।देश के विकास ने रफ्तार पक़डी है और आने वाले वर्षों में और तेजी की उम्मीद है।इस विकास के लिए अधिक संसाधनों एवं आधारभूत संरचना की आवश्यकता होगी ।साथ ही बढ़ती जनसंख्या के साथ खाद्य सुरक्षा भी सुनिश्चित करनी होगी। इन सब के लिए एक संसाधन सीमित हैं जिसके तर्कपूर्ण एवं कुशल उपयोग से ही यह संभव है -

भूमि आधारभूत संरचना , आवासीय आवश्यकता, औद्योगिक आवश्यकता एवं कचरा निस्तारण स्थल की बढ़ती आवश्यकता से न केवल भूमि कि उपलब्धता घटी है वरन छोटे छोटे तालाब का अस्तित्व भी ख़त्म कर दिया है। साथ ही भूमिगत जल की उपलब्धता पर भी इसका असर पड़ रहा है।अतः पर्यावरण संरक्षण एवं खाद्य सुरक्षा के लिए बेहतर भूमि प्रबंधन की आवश्यकता है।साथ ही प्लास्टिक का उपयोग घटाने की आवश्यकता है क्योकि यह पुनर्चक्रण में भी पर्यावरण को नुकसान पहुँचाता है।

विश्व ने इस समस्या के महत्व को समझते हुए इस वर्ष LAND RESTORATION, DESERTIFICATION & DROUGHT RESILIENCE विषय पर" हमारी भूमि ,हमारा भविष्य "का नारा दिया है। हम समय को पीछे नहीं ले जा सकते परन्तु हम पेड़ उगा सकते है ,जलाशय पुनर्जीवित कर सकते हैं , एवं मिट्टी वापस ला सकते है (#GenerationRestoration)।

एक जिम्मेदार संगठन के रूप में भारत कोकिंग कोल लिमिटेड ने अपने सभी हितधारक का उचित ख्याल रखते हुए अपने राष्ट्रीय कर्त्तव्य का निर्वहन कर रहा है। देश की उर्जा आवश्यकता एवं पर्यावरण संरक्षण में संतुलन स्थापित करते हुए इस वर्ष १३.६ प्रतिशत की वृद्धि प्राप्त की गयी और फोग केनन, मिस्ट स्प्रिंकलर ,मैकेनिकल स्वीपर/मैन्युअल सफाई से धुल का नियंत्रण किया गया।अपने कार्यक्षेत्र के अतिरिक्त धनबाद के अन्य क्षेत्रों में भी वृक्षारोपण वन विभाग द्वारा कराया गया है। बेहतर परियोजना एवं भूमि प्रबंधन के लिए खदानों को बड़े ब्लाक में बनाया जा रहा है तथा नयी तकनीकों का प्रयोग किया जा रहा है। जो खदानें वर्षों से बंद थीं उनको चालू करने के प्रयास किये जा रहे है । इन प्रयासों से भूमि को खनन के पश्चात जल्दी पुनर्स्थापित किया जा सकेगा।साथ ही वित्तीय स्थिति में सुधार से अधिक सामाजिक एवं पर्यावरणीय कार्य करने के लिए कृतसंकल्प हैं।

अपने सामूहिक लक्ष्यों की प्राप्ति के लिए हम सभी को प्रयास करने होंगे, अपने कार्यक्षेत्र में अपने पर्यावरणीय कर्त्तव्य का निर्वहन करना होगा तथा अपने अगली पीढ़ी के लिए बेहतर भविष्य बनाना होगा।

आइये मिलकर आगे बढे एवं भूमि -जल का संरक्षण करे।

शुभकामनाओं सहित

प्रधान संपादक

Ecological Restoration across BCCL: A Holistic Approach to Reviving Mined out Landscapes

Bharat Coking Coal Limited (BCCL) is the pioneer company in the mining industry for conducting ecological restoration in its degraded and mined out lands. Ecological Restoration involves three tier plantations with native species consisting of lower level grasses, middle level shrubs/ bushes and top level trees. The objective being establishing a natural forest eco-system with biodiversity and to bring back original normalcy of function, structure, potential, service and process of eco system as existed prior to mining activity. BCCL had prepared a Road map for ecological restoration of degraded and mined out lands of BCCL through Forest Research Institute (FRI), Dehradun in July 2011 and constituted a dedicated team for successful implementation.

Mining and Ecological Restoration in India

Mining in India serves as a vital economic activity, contributing significantly to the nation's growth and development. With 84 minerals, including coal, fuels, metallic, and non-metallic industrial minerals, India ranks as one of the leading mineral producers globally. Coal, in particular, stands out as a cornerstone of power generation, with India boasting the fifth-largest coal reserves and ranking fourth in global coal production. Jharkhand, with its vast coal reserve of over 80,716 million tonnes, leads the list.

Ecological restoration vs. Plantation

- The earlier practice of plantation adopted by BCCL through the state forest department was of single-tier and monoculture. Although this method creates a green cover, it does not establish a biodiversity of species.
- Ecological Restoration involves three-tier plantation of native species consisting of lower level grasses, middle level shrubs and bushes and top level trees; the objective being establishing a natural forest ecosystem with biodiversity and to bring back original normalcy of function, structure, potential, service and process of an ecosystem.
- The earlier plantation system adopted by BCCL through state forest department did not yield any socio- economic benefits except a green cover from aerial view. Moreover, it was also unable to provide protection against soil erosion and soil amelioration because of its single tier nature.

Benefits of Ecological Restoration

Ecological restoration adopted by BCCL includes less financial inputs with more socio-environmental and ecological benefits like:

- Reduction of GHGs, establishing carbon sequestration and reducing carbon footprint of the company.
- To bring back the barren OB dumps and cut benches to their original natural ecosystems that regenerates the lost ecological services and goods to the local human communities.
- To establish biodiversity over mined out areas.
- To make unproductive voids into biologically productive ecosystem.
- To restore the hydrology of the area that has been disrupted due to open cast and underground mining.

Implementation and Impact

Practical implementation of ecological restoration initiatives has yielded promising results. Across various mining sites, extensive planting of native species has rejuvenated ecosystems and fostered biodiversity. Soil analysis reveals improvements in physicochemical properties, indicating the revival of degraded lands.For instance, at the Barora eco-restoration site, vegetation analysis identified 83 plant species, with significant carbon sequestration observed.

Similar outcomes were observed at sites in East Jharia, West Jharia, Basticolla, and CV Area, where diverse plant species and robust carbon sequestration indicate ecosystem recovery.

Notably, the restoration efforts have extended beyond terrestrial ecosystems, facilitating the re-establishment of functional ecological processes. Enhanced biodiversity has attracted various wildlife species, including birds, butterflies, and insects, signifying the long-term stability of restored ecosystems.

The restoration efforts in various mining sites have yielded significant results, with substantial improvements in biodiversity, carbon sequestration, and ecosystem health. Across different areas like Barora, Block-II, Govindpur, Katras, Kusunda, East Jharia, West Jharia, Basticolla, and C.V., extensive replanting and restoration activities have been conducted, resulting in the establishment of diverse plant communities. In terms of vegetation analysis, the restoration sites have shown remarkable progress. The density and diversity of plant species have increased significantly compared to previous assessments, with a total of 83 to 97 plant species recorded in each site. This includes a variety of trees, shrubs, herbs, grasses, bamboo, climbers, and creepers, contributing to the development of a three-tier canopy cover.

Overall, the successful restoration of mining sites into functioning forest areas demonstrates the efficacy of appropriate management strategies. The results underscore the potential of restored ecosystems to act as carbon sinks, support biodiversity, enhance soil quality, and strengthen ecosystem resilience.

Through re-vegetation and plant-animal interactions, these restored areas have become self-sustaining environments with full biodiversity, supporting food chains and mitigating potential environmental threats. This study highlights the feasibility and importance of restoring degraded landscapes for ecological and economic benefits.

Comparative Analysis

While all sites have shown significant ecological improvements, the Block-II and Kusunda areas stand out due to their exceptionally high carbon sequestration and successful vegetation diversity.

These sites utilized advanced soil amelioration techniques and careful species selection to optimize restoration success. BCCL's ecological restoration efforts have not only restored ecological balance but have also provided a model for similar projects worldwide. Future initiatives should

focus on continuous monitoring and adaptive management to maintain and enhance the gains achieved so far.

- **Best Performing Site**: The **Block-II Area** and **Kusunda Area** are standout sites with the highest levels of ecological restoration and carbon sequestration. These sites show very high restoration success due to effective soil amelioration strategies and diverse planting which has resulted in a rich accumulation of biomass and carbon stock.

- **Methodologies Used**: These successful sites employed a mix of direct seeding, use of native species, and introduction of soil amendments (organic matter, pH adjusters) which promoted rapid vegetation growth and ecological balance.

- **Reasons for High Success**: Key factors include the careful selection of plant species suited to the Local conditions, intensive soil treatment to improve fertility and structure, and ongoing management practices like mulching and controlled irrigation which have significantly helped in stabilizing the restored ecosystems.

Site Name	Physical Properties	Chemical Properties	Restoration Success	Carbon Sequestration (Mg ha−1)
Barora (Phularitand)	Coarse texture, low water retention	Slightly acidic,low nutrient availability	High	242.87
Block-II Area	Moderate texture, improved water retentio	Neutral pH, improve nutrient profile	Very High	261.89
Govindpur Area	Varied texture, moderate water retentio	Slightly alkaline, moderate nutrient levels	High	Not specified
Katras Area	Good texture, high water retention	Neutral to slightly alkaline, high nutrient levels	High	238.31
Kusunda Area	Sandy loam,good organic matter content	Neutral pH, high organic an nutrient content	Very High	278.95
East Jharia Area	Improved texture, good water and nutrie retention	Neutral pH, very hig nutrient and organic matter	Very High	234.86
West Jharia Area	Loamy, excelle structure and water retention	Slightly acidic, high nutrien and organic content	Very High	271.73
CV Area	Diverse texture, moderat to high water retention	Varying pH, good nutrie and organic content	High	253.24

Carbon Sequestration

The carbon sequestration capability has significantly increased across the sites, indicating a positive environmental impact. Block-II, for instance, has shown remarkable improvement, with a total carbon stock reaching 71.36 Mg ha−1. Such figures reflect the successful capture and storage of carbon, contributing to global efforts against climate change.

Carbon Sequestration case study

BCCL had engaged Indian School of Mines, Dhanbad for assessment of Carbon Sequestration at BCCL's eco-restoration sites in March 2015. FRI's Ecological Restoration site at Tetulmari, Sijua Area was one of the site. BCCL is the pioneer coal mining company, rather any mining company, to take up a study like this.

CO_2 sequestration by different components	Tetulmari Eco-restoration Site	Unreclaimed OB dump	Natural forest site
Aboveground & Belowground biomass (t/ha)	142.15	17.63	242.58
Litter fall (t/ha)	5.533	1.145	5.650
Soil (t/ha)	65.65	28.85	130.285
Total CO_2 sequestration (t/ha)	213.33	47.625	378.522

In 2017, 259.09 ton/ha Equivalent CO2 sequestration was also estimated as compared to 213.33 ton/ha Equivalent CO2 sequestration in 2015 (study by IIT-ISM, Dhanbad) at Tetulmari ecological restoration site.

Vegetation Diversity and Growth

Significant growth in vegetation diversity marks a successful outcome of the restoration efforts. For example, the Barora site now boasts 83 plant species, while Block-II has expanded to 97 species. This increase not only enhances the ecological value of the area but also stabilizes the ecosystem, promoting a healthier environment.

Soil Physicochemical Properties

Restoration efforts have led to improved soil conditions across the sites. Enhanced soil properties include better texture, increased organic matter, and balanced pH levels. For example, Kusunda area has achieved the highest carbon sequestration among the reviewed sites at 278.95 Mg CO2 sq. ha−1, thanks to its improved soil conditions conducive to plant growth.

Challenges and Innovations

The project has faced challenges, such as site-specific soil degradation and the need for ongoing management to ensure the sustainability of restored ecosystems. Innovative solutions, such as the use of seed mixed soil balls and non-destructive biomass estimation, have been pivotal in overcoming these challenges.

The Necessity of Ecological Restoration

Mining activities, essential for economic development, often leave behind degraded landscapes. Ecological restoration at BCCL aims to mitigate these impacts by reinstating native vegetation and restoring ecological balance, thus contributing significantly to environmental conservation and community well-being.

Project Overview

The restoration project spans nine different coal blocks, employing a range of techniques to improve soil conditions and reintroduce native plant species. Nearly 117,850 seedlings and 717.72 kg of seeds have been utilized across these areas, with an emphasis on variety to ensure robust ecological recovery.

Implementation Strategy

The project leverages advanced scientific methods and traditional ecological knowledge. Techniques like seed mixed soil balls and non-destructive biomass estimation are employed.

Detailed assessments of vegetation growth and soil physicochemical properties guide the ongoing maintenance and adjustments in the restoration strategy.

Achievements and Challenges

Significant progress has been documented in terms of vegetation diversity and biomass increase. The restored areas now boast a wide range of plant species, contributing to biodiversity and ecological stability. Challenges such as adapting to site-specific conditions and managing natural succession are systematically addressed to optimize outcomes.

Environmental and Social Impact

The restoration has led to substantial environmental benefits, including enhanced soil health, increased carbon sequestration, and improved local biodiversity. Socially, the project supports local communities by improving landscape aesthetics and potentially offering sources of non-wood forest products.

Future Directions

BCCL plans to expand these efforts to additional mined-out areas, applying lessons learned to new sites and continuously improving restoration methodologies. Long-term sustainability is emphasized through ongoing monitoring and community engagement. BCCL's ecological restoration project serves as a model for responsible mining practices. By restoring degraded mining sites, the initiative not only protects the environment but also enhances the quality of life for local communities, paving the way for a sustainable future. The success at BCCL demonstrates the effectiveness of integrated ecological restoration approaches, urging other Mining companies worldwide to adopt similar practices to mitigate environmental impacts and contribute to global sustainability efforts.

Conclusion:

The ecological restoration efforts across the various sites of BCCL, except for Site 8, have positively impacted the physical and chemical properties of the soil, making it more conducive for plant growth and ecosystem recovery. Improved soil texture, optimized pH levels, enhanced nutrient profiles, increased organic matter, and boosted microbial biomass are notable improvements that contribute to the overall goal of ecological restoration. These changes not only support the current vegetation but also set the stage for sustainable ecological success in the future. These improvements are vital for the long-term stability and productivity of the restored ecosystems, which now show increased biodiversity and potential for carbon sequestration, contributing to broader environmental benefits. The detailed analysis from the report points out that the choice of species, combined with targeted soil improvement techniques, has been critical in achieving high levels of restoration across these sites. Each site, based on its specific conditions, was treated uniquely which led to varying levels of success, but overall, the ecological restoration efforts show positive outcomes in improving biodiversity, soil quality, and carbon sequestration.

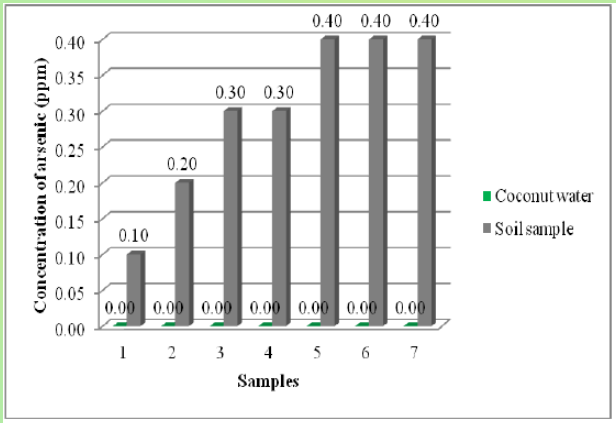
नारियल: एक पर्यावरणीय रक्षक

उष्णकटिबंधीय नारियल के पेड़, उनके हरे-भरे पत्तों और स्वादिष्ट फलों के साथ, एक अद्भुत पेड़ पर्यावरण सुपरहीरो हैं। भोजन और धार्मिक महत्व का एक हिस्सा हैं परन्तु नारियल के पेड़ों की क्षमता उनके पर्यावरणीय और आर्थिक लाभों से परे है।

नारियल पानी शरीर के लिए हाइड्रेशन का एक उत्कृष्ट स्रोत है। इसमें वसा और कोलेस्ट्रॉल की मात्रा कम होती है। यह क्लोराइड और पोटेशियम में समृद्ध है और इसमें प्राकृतिक शर्करा है। एक आइसोटोनिक इलेक्ट्रोलाइट होने के नाते यह आसानी से रक्त में अवशोषित हो जाता है । नारियल पानी संभावित रूप से चयापचय को बढ़ावा दे सकता है, पाचन में सहायता कर सकता है और रक्त को शुद्ध और डिटॉक्सीफाई कर सकता है। इस पेड़ के सभी भाग का अपना अत्यंत महत्वपूर्ण उपयोगिता है ।

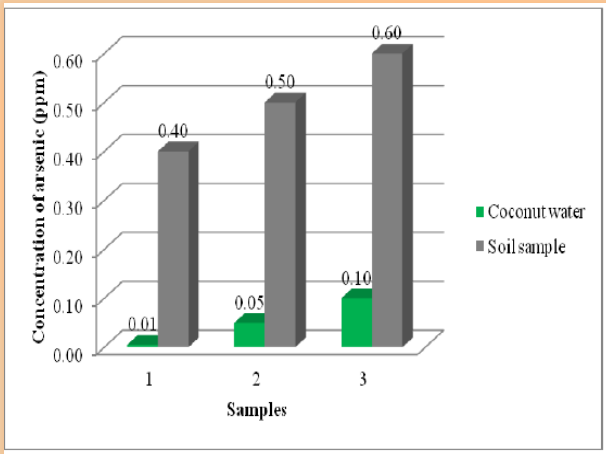
नारियल के पेड़ वातावरण से कार्बन डाइऑक्साइड को अवशोषित करते हैं, ग्रीनहाउस गैस उत्सर्जन को कम करने और जलवायु परिवर्तन से निपटने में मदद करते हैं। चार से 10 साल पुराने नारियल के एक हेक्टेयर पेड़ 20.45-75.24 टन कार्बन डाई ऑक्साइड को अवशोषित कर सकते हैं।

नारियल के पेड़ों की व्यापक जड़ प्रणाली मिट्टी के कटाव को रोकने और तटीय क्षेत्रों को तूफान और बढ़ते समुद्र के स्तर के विनाशकारी प्रभावों से बचाने में मदद करती है।उनकी गहरी जड़ें भी मिट्टी को बांधती हैं, जिससे इसे बहने से रोका जा सकता है। यह तूफान और उष्णकटिबंधीय तूफान से ग्रस्त क्षेत्रों में विशेष रूप से महत्वपूर्ण है।



Concentration of arsenic in soil and corresponding coconut water in Dinajpur Sadar.

नारियल के पेड़ भी जैव विविधता पर सकारात्मक प्रभाव डालते हैं। वे विभिन्न प्रकार की पक्षी प्रजातियों के लिए आश्रय और घोंसले के शिकार स्थल प्रदान करते हैं, जबकि उनके फूल मधुमक्खियों और अन्य परागणकों को आकर्षित करते हैं।



Concentration of arsenic in coconut water and in the relevant soil of Sonargaon area.

इंडियन इंस्टीट्यूट ऑफ साइंस एजुकेशन रिसर्च से पता चलता है कि नारियल के पेड़ों में हानिकारक पदार्थों से मुक्त होने की क्षमता होती है। इससे पहले, आर्सेनिक से दूषित भूजल में बांग्लादेश के जहांगीर विश्वविद्यालय द्वारा इसी तरह का अध्ययन किया गया था। यह पाया गया कि मिट्टी पर 0.4 पीपीएम तक आर्सेनिकसांद्रता के साथ,

सौजन्य से -जहांगीरनगर विश्वविद्यालय बांग्लादेश

नारियल फल में नगण्य/ कोई अवशेष नहीं पाया गया। यहां तक कि उच्च सांद्रता में, बेबी नारियल आर्सेनिक से मुक्त था, लेकिन यह नारियल के फल की उम्र के साथ बढ़ना शुरू होता है।

उनके पर्यावरणीय लाभों के अलावा, नारियल के पेड़ों के कई व्यावहारिक उपयोग हैं। बहुमुखी नारियल फल भोजन, तेल और पानी प्रदान करता है, जबकि पेड़ की लकड़ी का उपयोग निर्माण और फर्नीचर बनाने के लिए किया जाता है।

पत्तियों को टोकरी और मैट में बुना जा सकता है, और भूसी का उपयोग रस्सियों और प्राकृतिक फाइबर बनाने के लिए किया जाता है। स्थायी प्रथाओं के महत्व के बारे में बढ़ती जागरूकता के साथ, नारियल के पेड़ और भी अधिक महत्व प्राप्त कर रहे हैं।

कई समुदाय एग्रोफोरेस्ट्री को अपना रहे हैं, जिसमें अन्य फसलों के साथ नारियल के पेड़ लगाना शामिल है। यह अभ्यास जैव विविधता को बढ़ावा देता है, मिट्टी की उर्वरता में सुधार करता है, और स्थानीय समुदायों के लिए आर्थिक अवसर प्रदान करता है। वे अपने लचीलेपन और चुनौतीपूर्ण वातावरण में पनपने की क्षमता के लिए भी जाने जाते हैं।

नारियल के पेड़ों की खेती स्थायी भूमि उपयोग प्रथाओं को बढ़ावा देती है। कुछ गहन कृषि पद्धतियों के विपरीत, नारियल की खेती में रासायनिक उर्वरकों के न्यूनतम उपयोग की आवश्यकता होती है| यह पर्यावरण पर नकारात्मक प्रभावों को कम करते हुए मिट्टी के स्वास्थ्य की रक्षा करने और पानी की गुणवत्ता बनाए रखने में मदद करता है।

इसके अलावा, वे कई उष्णकटिबंधीय क्षेत्रों में स्थानीय अर्थव्यवस्था में योगदान करते हैं। नारियल उद्योग किसानों, हार्वेस्टर, प्रोसेसर और व्यापारियों के लिए रोजगार के अवसर प्रदान करता है।

इसके अतिरिक्त, नारियल उत्पादों का निर्यात, जैसे नारियल तेल, नारियल का दूध और अन्य सौंदर्य प्रसाधन आय उत्पन्न करते हैं और आजीविका का समर्थन करते हैं।

Celebration of World Environment Day 2023

"It is very important to organize our efforts to protect the climate and environment. We will be able to give a safe environment to our coming generations only when every citizen of the countrymakes a united effort to maintain the balance of water, air and land..."

Prime Minister of India

The theme for World Environment Day 2023 (June 5) was solutions to plastic pollution under the campaign # BeatPlasticPollution. World Environment Day is an occasion which brings together millions of people across the globe for awareness and action for the environment.

Since 1974, it has been celebrated every year on 5th June. BCCL celebrated the World Environment day 2023 at Panchavati Eco Park, Koyla Nagar under the chairmanship of Uday A. Kaole, Director (Technical) P&P, BCCL. He also administered oath for environmental protection. During the celebration, Shri M.K. Ramaiah, Director (Personnel), Shri Vinay Kajla, Deputy Inspector General, C.I.S.F., BCCL Unit, Dhanbad, Shri Kumar Ranjeev, General Manager (Minning/Environment) and General Manager of Headquarters, planted trees in the premises of Panchavati Eco Park. On this occasion, 20th Edition of "Paryavaran Darpan" with theme of " Beat plastic pollution" was released for the awareness of environment.

Various environment related competitions such as Green Rangoli, T-shirt paintings, quiz competition, Essay writing and slogan writing for employees, their wives and school children were organized on world environment day.

Along with headquarter, different areas have celebrated WED 2023 by distributing saplings and plantation.

Sapling distribution

Green Rangoli Competition

Quiz competition and Essay writing for employees and school children

Plantation and Release of 20th edition of Paryavaran Darpan on world Environment Day

Activities of Environment Department

Hon'ble Minister of Coal, Mines & Parliamentary Affairs, Shri Pralhad Joshi flagging off truck mounted fog canons on 13.07.2023.

Inauguration of Govardhan Eco-park, Bastacolla Area by Shri Pralhad Joshi, Hon'ble Minister of Coal, Mines & Parliamentary Affairs on 13.07.2023.

Vriksharopan Abhiyan on 15th August 2023.

Quiz competition and distribution of Jute Bags in DAV, Koyla Nagar on international day of clean air for blue sky on 7th Sept. 2023

Presentation organised on international day of clean air for blue sky and world ozone day on 7th and 16th September respectively

Earthly expressions creative writing competition on Earth Day on 22nd April 2024

Pledge on World Earth Day 2024 at EJ area

THE FOREST (CONSERVATION) AMENDMENT ACT, 2023

The Indian Forest Act, 1927 was framed with the objective of managing timber and other forest resources. It provides for state governments to notify any forest land they own as reserved or protected forests. The Forest (Conservation) Act, 1980, was enacted to prevent large-scale deforestation. It requires the prior approval of central government for any diversion of forest land for non-forest purposes.

The Forest (Conservation) Amendment Act, 2023 renamed Forest (Conservation) Act, 1980 as Van (Sanrakshan Evam Samvardhan) Adhiniyam,1980. The amended act focuses on afforestation and reforestation as a strategy for fulfilling India's carbon goals—of creating an additional carbon sink of 2.5-3 billion tonnes by 2030. The amended Act came into force on 1st December 2023.

Highlights of the Forest (Conservation) Amendment Act, 2023 & Van (Sanrakshan Evam Samvardhan) Rules, 2023

Applicability of the Act:

Provisions of this act will be applicable to:

1. Land declared/notified as forest in accordance with the Indian Forest Act, 1927 or under any other law for the time being in force,
2. Land not covered in the first category but has been recorded in Government record as forest on or after 25th October, 1980

Provisions of this act will not be applicable to such land which has been changed from forest use to non-forest purpose on or before 12th December 1996 in pursuance of an order issued by any authority authorized by a state/UT.

Exemptions from this act to certain categories of forest land:

a) Forest land situated alongside a rail line or a public road maintained by government, which provides access to a habitation, or to such rail, and roadside amenity up to a maximum size of 0.10 hectare in each case;
b) Such tree, tree plantation or reafforestation raised on non-forest lands
c) Forest land situated within 100 km along international borders or Line of Control or Line of Actual Control proposed to be used for construction of strategic linear project of national importance and concerning national security.
d) Up to 10 Ha proposed to be used for construction of security related infrastructure
e) Construction of defence related project or camp for paramilitary forces or public utility projects as specified by Central Government, the extent of which does not exceed five hectares in a Left Wing Extremism affected area as may be notified by the Central Government.

Redefined non- forest purpose:

"Non-forest purpose" includes breaking up or clearing of any forest land or a portion thereof for—
(a) Cultivation of tea, coffee, spices, rubber, palms, oil-bearing plants, horticultural Crops or medicinal plants;
(b) Any purpose other than reafforestation but does not include any work relating to or ancillary to conservation, development and management of forests and wildlife, such as:

1. Silvicultural operations including regeneration operations;
2. Establishment of check-posts and infrastructure for the front line forest staff;
3. Establishment and maintenance of fire lines;
4. Wireless communications;

5. Construction of fencing, boundary marks or pillars, bridges and culverts, dams, waterholes, trenches and pipelines;
6. Establishment of zoo and safaris, referred to in the Wild Life (Protection) Act, 1972, owned by the Government or an Authority, in forest areas other than Protected Areas;
7. Eco-tourism facilities included in the Forest Working Plan or Wildlife Management Plan or Tiger Conservation Plan or Working Scheme of that area; and
8. Any other like purposes, which the Central Government may, by order, specify.'

The Central Government may, by order, specify the terms and conditions subject to which any survey, such as, reconnaissance, prospecting, investigation or exploration including seismic survey, shall not be treated as non-forest purpose.

Requirement of FRA:

The State Government or Union territory Administration, as the case may be, after receiving the 'Final' approval of the Central Government under sub-section (1) of section 2 of the Adhiniyam, and after fulfillment and compliance of the provisions of all other Acts and rules made thereunder, as applicable including ensuring settlement of rights under the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest 16 Rights) Act, 2006 (2 of 2007), shall issue order for diversion, assignment of lease or dereservation, as the case may be.
(Definition of forest land in the FRA includes notified forest & deemed forest). Furthermore, even concerning recorded forests, the consent of the Gram Sabha is not required for projects excluded under Section 1A (2) of the Amendment Act.

Provision of land for Compensatory Afforestation:

Earlier in case of central PSUs, there was provision of exemption of providing CA land, and only payment was to be done for carrying out compensatory afforestation in degraded forest land (double the amount of area proposed for diversion).
As per new rules, Compensatory afforestation land equivalent to the forest land proposed for diversion needs to be provided by User Agency.

The exemption of providing equivalent forest land for Compensatory Afforestation in lieu of diversion of forest land will be provided only in case if the project does not acquires any non-forest land for the execution of the project. As per Schedule II of the Van (Sanrakshan evam Samvardhan) rules 2023 if any non-forest land is also acquired, then, equivalent size of Compensatory afforestation land is required against the forest land proposed to be diverted for non- forest purpose.

Balancing forest conservation and economic activities

Ensuring balance between forest conservation and economic activities: The 1980 Act was enacted to curb deforestation. The amended act adds certain activities to this list such as silvicultural operations, safaris, and eco-tourism facilities. The rule also allows the central government to specify terms and conditions for carrying out certain surveys without its approval. These include reconnaissance, prospecting, investigation or exploration, and seismic surveys. These activities may help in economic development, and in the case of prospecting for minerals (which may lead to mining) may even contribute to national priorities such as energy security and industrial growth.

Jharia CBM Block-I: A foray into Cleaner Energy

In recent years, a remarkable surge in natural gas demand within India has been noticed which can be attributed to several key factors, including its higher availability, the expansion of transmission and distribution networks, the cost-efficiency and environmental advantages associated with substituting alternative fuels with natural gas, and the favourable economic feasibility of providing competitively priced gas to end consumer. Indian Government has set a target to raise the share of natural gas in the energy mix to 15% by 2030 from current share of 6%.

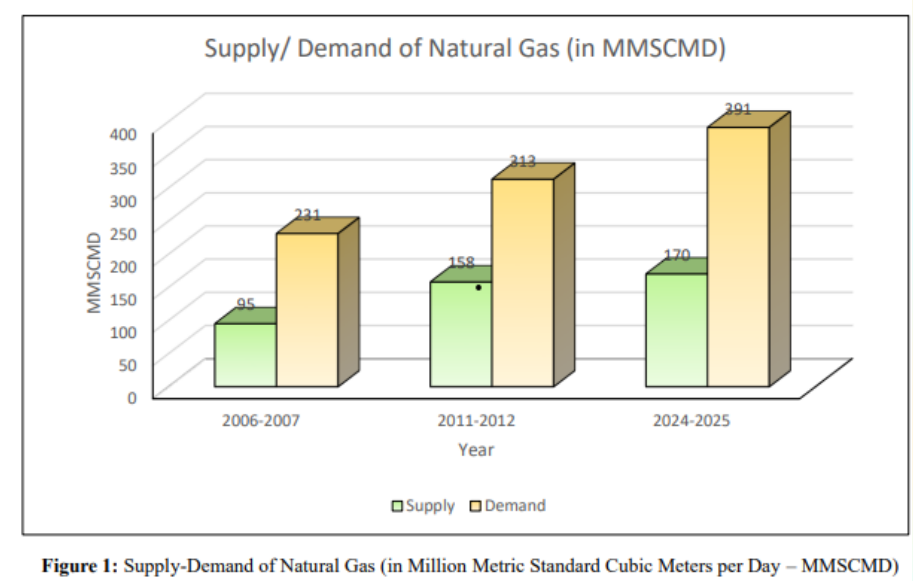


Figure 1: Supply-Demand of Natural Gas (in Million Metric Standard Cubic Meters per Day – MMSCMD)

Within this context, Coal Bed Methane (CBM) has emerged as a noteworthy natural gas resource. CBM, a distinct form of natural gas, is nestled within coal deposits or seams, where it forms during the coalification process which involves the transformation of plant materials into coal. CBM represents methane gas that becomes absorbed within the solid matrix of coal, positioning itself as a valuable and versatile energy resource within India's evolving energy landscape.

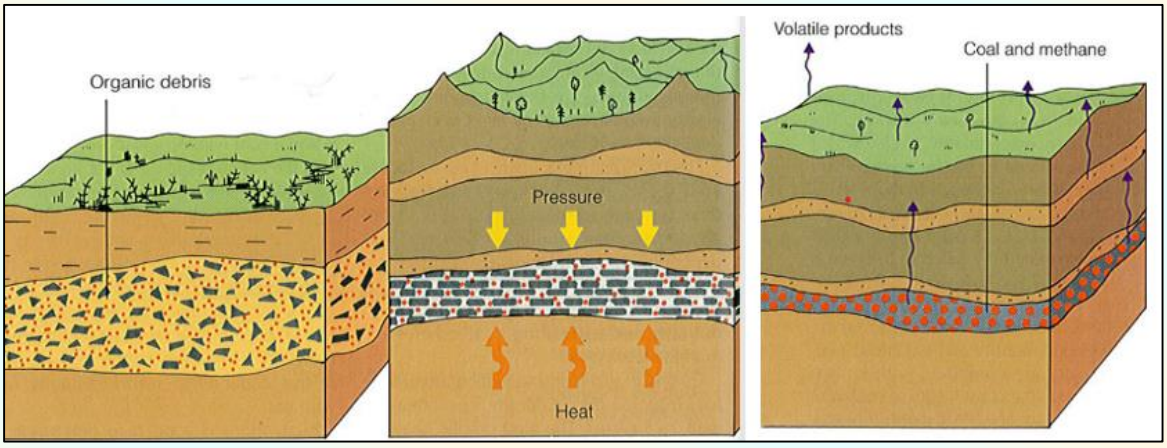


Figure 2: shows the chronological process of coalification and formation of coal bed methane.

CBM also poses a unique environmental paradox. On one hand, methane is a potent greenhouse gas, approximately 21-23 times more effective at trapping heat in the atmosphere than carbon dioxide (CO_2). Moreover, within underground coal mines, methane can pose a severe safety hazard as it readily forms explosive mixtures with ventilated air. However, when harnessed and utilized, CBM emerges as a remarkably clean and environmentally friendly energy source, virtually free of emissions. This presents a compelling case for the controlled extraction of CBM, not only for its energy potential but also as a means to mitigate greenhouse gas emissions and enhance safety within underground coal mining operations.

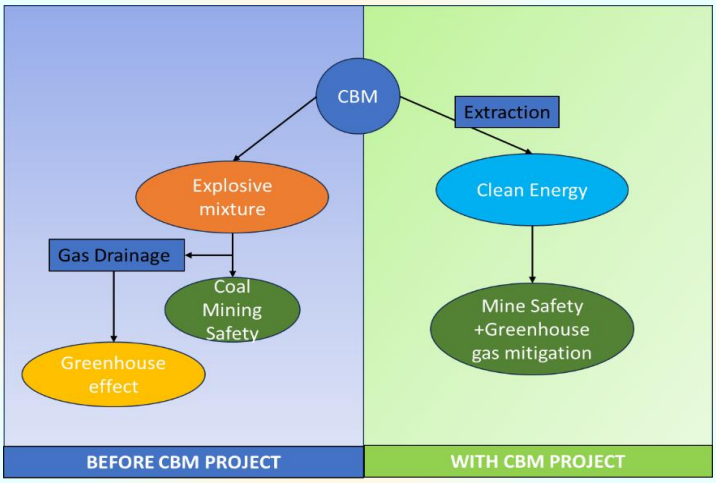


Figure 3: Benefits of CBM extraction

Currently, CBM extraction is an established commercial practice in countries such as China, the USA, Canada, Australia, Germany, and Poland. In India, in alignment with the Coal Bed Methane policy, 33 coal blocks have been allocated to various companies for the exploration and potential commercial production of CBM. Coal India Limited (CIL) has also embraced CBM as part of its clean energy diversification strategy, in line with the Indian government's commitment to achieving Net Zero Emissions by 2070. The Ministry of Petroleum and Natural Gas has designated a specific CBM block, "Jharia CBM Block-I," within which Kapuria, Moonidih, Jharma Sector, and Singra Coal Blocks are situated.

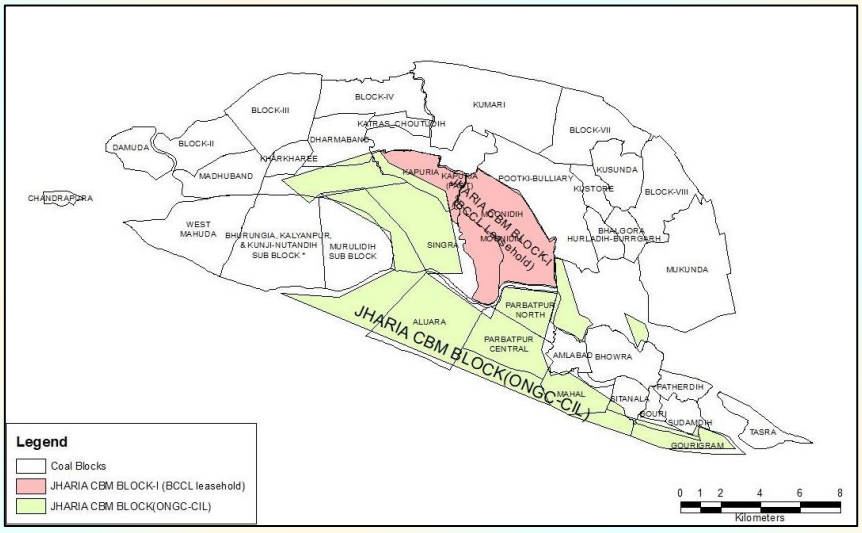


Figure 4: Location of Jharia CBM Block – I.

A commercial development project is also being pursued in Jharia CBM Block by consortium CIL-ONGC with ONGC as operator and is currently in the development stage. BCCL is actively pursuing independent CBM production on the Jharia CBM Block I apart from the consortium. A CBM-related demonstration project has been successfully executed within the Moonidih Project of BCCL, where the produced gas was utilized to generate power via gas-based generators for internal consumption. This demonstration project validated the feasibility of CBM development in India's geological and mining conditions. The Jharia CBM Block I project, building on the insights from the demonstration, is now focused on the commercial exploitation of CBM reserves. The development of the CBM block has been awarded to Prabha Energy Private Limited (PEPL), which is a subsidiary of Deep Energy Resources Limited (DERL), on

Revenue revenue-sharing contract signed on 20 September 2021. The development will take place in three distinct phases as shown in the table below:

Sl. No.	Phase	Major Operation	Duration
1	Phase – I (Exploration)	Drilling 5 Nos. of Core holes (Target depth: 900-1400 m) and 5 Nos. of Test wells (Target depth: 1450-1550 m); related geological and reservoirs studies as per Work programme.	2 Years
2	Phase – IIA (Pilot Assessment)	Drilling of Pilot Assessment Wells and Generation of Production profiles; Environment Impact of related studies; Technical Assessment of Contract area	3 Years
3	Phase – IIB (Market Survey)	Market Survey, Investigation of potential markets and obtain market commitments; Submission of Field Development Plan	
4	Phase – III (Development and Production)	Development Operation as per Approved Field Development Plan and Commercial Production of CBM	30 Years

CBM is extracted from the coal bed by lowering the hydrostatic water pressure which holds the menthane within the coal matrix pores, micropores in adsorbed state, bedding planes, and natural fractures. Pumping of water lowers the hydrostatic water pressure which leads to desorption of gas. The mass transport of the gas is governed by Fick's law of diffusion in micropores and Darcy's law in fractures. The water production rates are dependent on the type of reservoir but generally, they decrease after the initial dewatering stage. An effective water management strategy has been established to optimize the utilization of water generated during Coal Bed Methane (CBM) well operations. This water will undergo treatment processes, such as reverse osmosis and ion exchange, to ensure its quality and suitability for various applications, including drilling and hydrofracturing, dust suppression activities, coal washing, and dilution by incorporating it into the mine water discharge system.

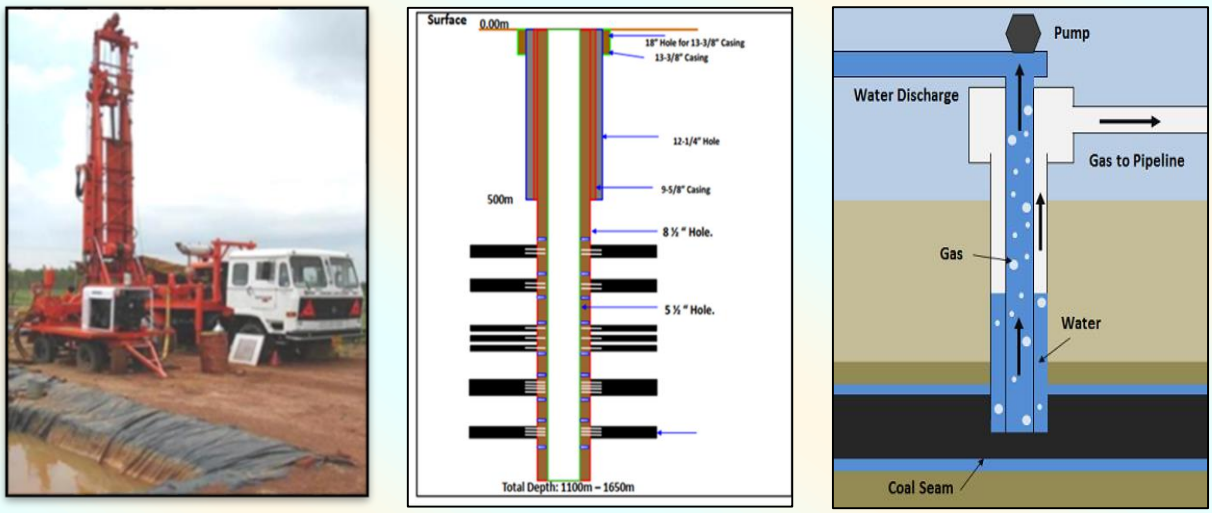


Figure 5: Drilling Rig in Operation (Left), Standard Well design (Middle), and Simplified Operation diagram of CBM Well (Right)

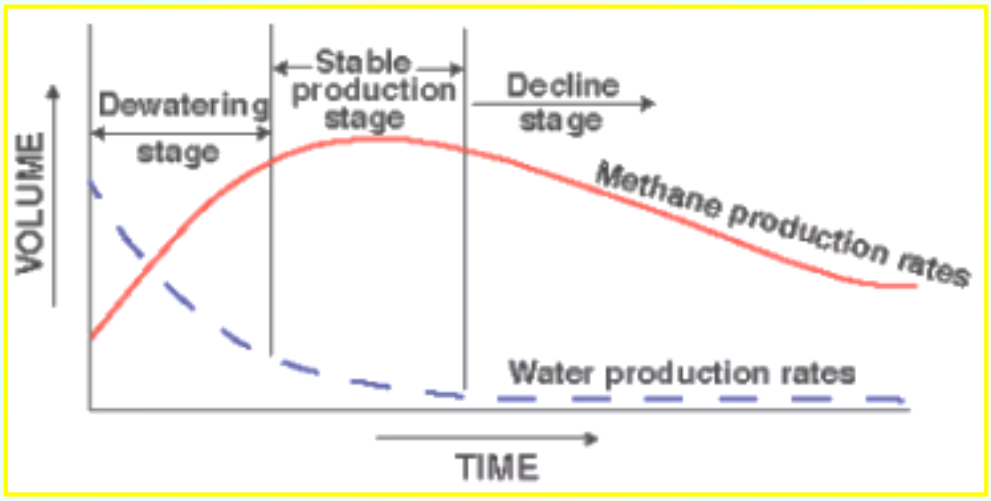


Figure 6: Water production rates decreases after initial dewatering phases.

In summary, BCCL's Jharia CBM Block I stands as a pivotal step towards India's vision of a diversified, sustainable energy future. This project not only aligns with the nation's clean energy goals but also promises economic growth, increased energy security, and a commitment to responsible environmental practices. It represents a significant contribution to India's ever-evolving energy landscape, symbolizing the nation's dedication to cleaner, self-sufficient, and environmentally responsible energy solutions.

Plantation Activities in BCCL under Mission LiFE

Mission Life

Mission Lifestyle for Environment, is an India-led global mass movement to nudge individual and community action to protect and preserve the environment. BCCL participated in MoEF&CC program at Ranchi and organised various programs and activities in its mining areas and surroundings for Mission Life.

Workshop under the aegis of VIBHA was also organized regarding Environment Management in Mines at Koyla Bhawan HQ and was addressed by Shri Narmada Prasad Shukla (EAC Member, Coal Mining MoEF&CC) and Shri J.K. Pandey, (Chief Scientist CIMFR Dhanbad) on 11.05.2023.

Distribution of red clay bottle along with jute bag by CMD, BCCL on theme "Say No to single Use of Plastic".

In run up to World Environment day, BCCL has undertaken various activities under Mission LiFE from 22.05.2023 to 05.06.2023, which included Pond cleaning , Awareness Drive and Mission LiFE Pledge program , Awareness drive on theme "Say No to single Use of Plastic", Distribution of red clay bottle along with jute bag , Plantation drive , Environmental Quiz Competition among the employees, Essay competition, slogan and oath taking ceremony, ,Nukkad Natak on various themes of "Mission LIFE" by the team of 'Kala Niketan' ,VTC awareness programme-Pledge, presentation, interaction session, Plastic clean up drive , Distribution of LED and Cloth Bag, Cycle race was held to promote mass movement for adopting fuel free transport means.

Nukkad Natak on various themes of "Mission LIFE" by the team of 'Kala Niketan' by Sijua Area

ECO- MINING TOURISM PROGRAM: NURTURING GENERATION RESTORATION

Eco- Mining Tourism is an initiative taken by BCCL for nurturing the young minds- GENERATION RESTORATION by bringing them close to the nature, and making them feel the experience of tough life of miners responsible for strengthening and brightening India through fulfilling energy requirements of the nation.


Students from IIT-ISM, Dhanbad

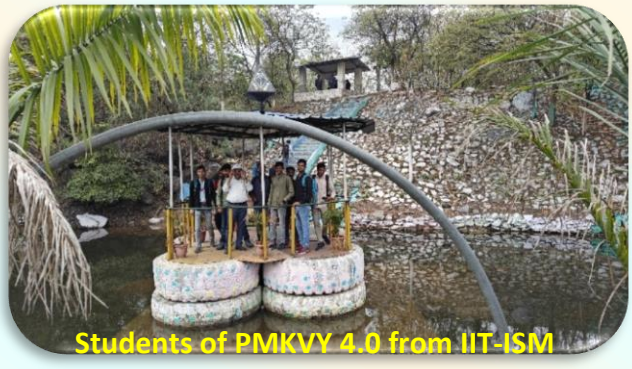
Generally people don't think of coal mines as places to be visited. However this perception of people is being changed by the BCCL enabling people to have a glimpse into the lives of coal miners while showcasing the mining activities with due consideration of safety. BCCL is promoting ecotourism in order to make a bridge between development (coal mining) and nature, protect environment, generate income and employment opportunities for local communities, and conserve biodiversity.

Since 2016-17, BCCL has been promoting the Eco-mining tourism in its mines and ecological restoration sites /Eco-Parks for showcasing the mining activities and ecological restoration sites /Eco-Parks. Every year various schools, colleges and professional institutes have been visiting these eco-restoration sites and eco-parks to know about the mining and the suitable method to restore these degraded lands into natural vegetation of the region.


Students from BBMKU, Dhanbad

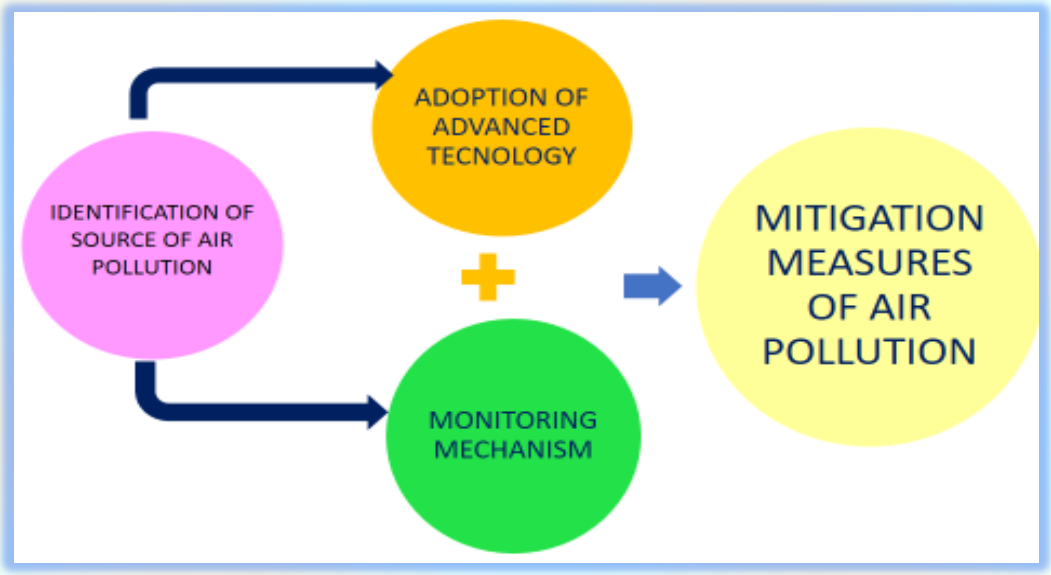
In FY 2023-24, approx. 300 students along with faculty members from various renowned institutes such as IIT-ISM, Dhanbad; Dhanbad Public School, Dhanbad; Binod Bihari Mahato Koylanchal University (BBMKU) Dhanbad visited eco restoration sites/eco parks at Parasnath Udhyan, Katras; and Govardhan Eco- Park, Bastacolla, respectively during December & January 2024 for enhancing their knowledge about mining and reclamation works being done in BCCL. They praised the work being done by BCCL in form of eco-park development in the coalfield areas and were also surprised to see the lush greenery over once a degraded mined out land.


Students from Dhanbad Public School


Students of PMKVY 4.0 from IIT-ISM

TECHNOLOGICAL ADVANCEMENT FOR POLLUTION CONTROL IN BCCL

BCCL has been pro-actively using technological advancement for making its mining operation oriented towards Sustainable development. From Fog Canons to flow-meter, BCCL has invested in technologies playing important role in pollution control and mitigation.



Adopting Advanced Technology:

BCCL has deployed 13 Truck Mounted fog Canon The truck mounted Fog Canon have water capacity of 12 KL with Mist nozzle radial throw of 40 mtrs. The Use of Fog canons enables greater reduction in suspended dust.

In addition to 08 Trolley Mounted Fog Canons, BCCL has 109 conventional water sprinklers, 18 mist sprinklers (28 KL) and 382 Fixed Sprinklers. Further, Water Curtain have been installed in various areas to prevent fugitive emission

BCCL has also procured one mechanical sweeper and is in process of hiring of 04 Mechanical sweeper for removal of fugitive dust.

For Monitoring, BCCL has implemented the following

- EIA/ EMP vetted by JSPCB and approved by MoEFCC (for all 17 clusters and 05 standalone washeries)
- Environment parameter monitoring by CMPDI NABL accredited Laboratory at stations approved by JSPCB.
- 40 Online PM10 Analyzers covering mines and sidings of BCCL
- Source apportionment study through NEERI to assess pollutant contribution of different stakeholders of Jharia Coalfield
- CAAQMS Installation

The Role of Bamboo in Restoring Ecology and Sustainable Livelihood

Land degradation occurs in every country as a result of which biodiversity loss, soil erosion and depletion, soil pollution and water shortage or other ecological losses. One of the major anthropological activities is mining, particularly Open cast Mining. However, mining is an inevitable activity in present case scenario as mining contributes significantly in basic requirements and economy. Degraded land has serious adverse impacts on the environment, including soil quality degradation, local water loss and threats to biodiversity. This in turn has a knock-on effect on economic and social services derived from the ecosystem by reducing the productive capacity.

For restoration of such degraded lands left after the mining operations, BCCL has adopted 'Ecological Restoration' which may be summarised as the process of short-circuiting the natural recovery of degraded ecosystems through ecological interventions. The ecological restoration is to establish a three-tier vegetation comprising of native species grasses as lower tier, shrubs and bushes as middle tier and trees as upper tier with an objective to establish biodiversity and food chain; to improve the local climate regime and socio-economic condition.

In the ecological restoration, BCCL has focused on plantation of Bamboos due to its various benefits ranging from ecological to socio-economic. Bamboo is a versatile crop and an integral part of forestry being one of the major NTFPs (Non-Timber Forest Products) in the tropical and sub-tropical forests in Asia. Bamboo is a long tree like woody grass belonging to family Poaceae and subfamily Bambusoideae. It is an exceptionally diverse plant and unevenly distributed. Globally, more than 1,250 species encompassing under 75 genera of bamboo are found in various part of humid tropical, subtropical and temperate regions where the annual rainfall ranges between 120 to 400 cm and temperature varies between 16°C to 38°C. However, in India, 136 species under 20 genera have been recorded. Bamboos grow naturally in almost all states except in Kashmir region of Jammu and Kashmir.

The various benefits of inclusion of bamboo species in the ecological restoration can broadly be classified as follows:

Sequestering carbon

Bamboo's fast-growing and renewable stands sequester carbon in their biomass – at rates comparable, or even superior to, a number of tree species. Substantial amounts of carbon are stored in the bamboos. It grows three times faster than any *Eucalyptus* spp. besides releasing 35 per cent more oxygen than other forest plants and yield six times more cellulose than fast growing trees. It is estimated that one bamboo can hold 6 m^2 of soil and one hectare of bamboo forest can absorb 12 tonnes of CO_2 from air and store 1000 tonnes of water. Hence, bamboo provides great benefits to the natural environment and also solves many environmental problems.

In addition, bamboo have specific characteristic for environmental emulation such as soil erosion control, soil conservation, soil stabilizer, check dams, bamboo barrier in pond, river banks and slips, water conservation, land rehabilitation and carbon sequestration.

Restoration: Bamboo is integral to many natural and agricultural ecosystems in and near the tropics. It is useful for restoring degraded lands as it may thrive on degraded soils and steep slopes, an effective windbreak, and its sturdy rhizomes and roots regulate water flows and prevent erosion.There has been a growing consensus that NTFPs are not only crucial to ecosystem, but are also invaluable to the sustainable foreign exchange and are being regarded as valuable commodity around the world. It is estimated that around 80 per cent of bamboo forest lies in Asia with India, China and

Myanmar having 19.8 million hectares of bamboo. Bamboo is commonly known as "the poor man's timber" in China, "the friend of the people" in India and "the brother" in Vietnam.

Bamboo possesses qualities that make it ideal for restoring degraded lands. It is able to thrive on degraded soils and steep slopes where many plants cannot grow. Being a perennial monocot plant, it has extensive fibrous roots that make it capable of stabilising loose soil to prevent soil erosion. Its underground biomass makes it capable of surviving and regenerating when the biomass above ground is destroyed, for example, by fire. As well as its extensive root system, bamboo is one of the fastest growing woody plants able to grow up to one metre in a day. It is therefore able to re-vegetate and restore productivity to the degraded mined land over a short period.

Replacing fossil fuels and reducing deforestation: Bamboo helps avoid fossil fuel use, and reduce deforestation, by offering an alternative, highly renewable source of biomass energy. Bamboo can provide a sustainable source of bioenergy for cooking, such as charcoal or briquettes etc. It can also be converted into gas or pellets, to provide a source of electricity and heating. Bamboo charcoal and gas boast a similar calorific value to commonly used forms of bioenergy: a community of 250 households require only 180 kilograms of dry bamboo to generate sufficient electricity in six hours. Bamboo can be converted into pellets for electricity generation and heating, as a sustainable form of biomass and contribution to renewable energy targets.

Livelihoods: Bamboo is a versatile and rapidly renewable resource with a wide range of livelihood applications. Everything from furniture and paper to fabrics, processed flooring, and climate-smart housing. It offers a proven tool to fight rural poverty and restore the natural resource base that is the foundation for economic sustainability. Bamboo has an incredible capacity to provide regular employment and income to large number of people especially suited to women providing flexible working hours. Bamboo is considered as "Green Gold" of the 21st century as it is available at the much lower price compared to wood and is as strong as strongest wood.

Bamboo has many small but important uses such as manufacturing of fishing rods, flutes, fishing traps, handicrafts, walking sticks, packing cases for tea and fruits, cages for poultry, pipes for water supply and irrigation, cradles, cart yokes, bullock carts, ladders, winnows and sieving for cleaning grains. Traditionally, bamboo has been used to hold up scaffolding, simple suspension bridges, supplemental or decorative element in buildings. It also serves as a superior material for utensils, weapons, fuel, fodder, food, firewood, furniture, mats, chopsticks, toothpicks, handicrafts, musical instruments etc. Recent improvements and processing technologies allow bamboo to be utilized for high end products such as decking, flooring, panels and veneers and structural beams. In modern uses, bamboos are being converted into engineered products such as bamboo mat board, laminated bamboo board, ply bamboo, bamboo curtain board etc. Throughout the tropical and sub-tropical regions of the world, bamboo, has a long and well established tradition for being used due to its high tensile strength and very good weight to strength ratio.

Bamboo as food source: These shoots are usually harvested when they attain an approximate height of 15-16 cm and after eliminating the fibrous sheaths the inner tender portion or meat is thoroughly washed in water and Bamboo shoots are used as a good source of dietary fiber, low in fat and calories for human being. Bamboo shoots contain high protein but less fat, moderate dietary fiber, having essential amino acids, selenium, potassium, a potent antioxidant and minerals for healthy heart. Bamboo shoot contains 17 different types of enzymes and over 10 mineral elements such as Cr, Zn, Mn, Fe, Mg, Ni, Co, Cu etc. thus may be considered an ideal vegetable for healthy diet.

Standard Operating Procedure (SOP) for Obtaining Environmental Clearance for Coal Mining

Process for obtaining Environmental Clearance

S.no.	Activities	Responsible Agency	Timeline (days)	Remarks
1	Site Visit and survey by the Team	User Agency	15	-
2	Preparation of Form-I and PFR as per prescribed format for obtaining TOR	User Agency	15	Documents required to be uploaded on Parivesh - Approved Mine Plan, NOC from Various Departments (Forest, Gram Sabha, Certificates from sensitive zones etc).
3	Apply for TOR on Ministry portal (PARIVESH)	User Agency	2	Common Application Form (CAF), Form-1 (Part A & Part B) to be submitted on Parivesh.
4	Submission of hardcopies of proposal to MoEF&CC/SEIAA	User Agency	2	15 copies to be submitted.
5	Presentation before EAC/SEAC Committee	User Agency	15	Proposal for TOR can be recommended or rejected as per minutes of meeting issued.
6	Grant of TOR	MoEF&CC/SEIAA	60	Grant of TOR with certain conditions.
7	Environmental Baseline data collection as per Standard TOR (can be done parallelly while applying for TOR)	User Agency	90	Non-monsoon seasons (Pre-monsoon: March-May; Post-monsoon: Oct-Dec; Winter: Dec-Feb) ***Baseline data is valid for 3 years (can be conducted before or after grant of TOR).***
8	Preparation of Draft EIA/ EMP Report for public hearing if project is A-Category	User Agency	60	Submission of Baseline study, socio-economic study, traffic impact assessment study, ecological study, hydro- geological study & Pollution study reports.
9	Submission of Draft EIA/EMP Report along with required documents to State Pollution Control Board.	User Agency		Submission of 15-20 copies of Executive summary (English & local language) alongwith Draft EIA/EMP report.
10	Notice/Advertisement for conducting public hearing.	State Pollution Control Board (SPCB)/ Union territory Pollution Control Committee (UTPCC)	30	In two newspapers (English & local).
11	Conduct of Public hearing under the chairmanship of DM/DC/ADM	State Pollution Control Board (SPCB)/ Union territory Pollution Control Committee (UTPCC)	45	User Agency to take appropriate actions to address the issues raised in the Public Hearing.

12	Preparation of Final EIA/EMP Report after incorporating minutes of public hearing meeting and share with client for their review and suggestions	User Agency	30	Compilation of supportive documents for submission on Parivesh.
13	Submission of Form-2 on Ministry Portal for obtaining Environmental Clearance	User Agency	7	Documents required to be uploaded on Parivesh: 1. Public hearing proceedings & notice 2. CGWA permission (for GW extraction) 3. Conservation plan (if any) for scheduled species 4. Green belt plan 5. NOC for Nallah Diversion, 6. Environment Cost Benefit Analysis report 7. Cluster certificate (if any) 8. LOI & lease deed 9. Traffic Impact Assessment Study 10. Accreditation Certificate 11. Flora & Fauna study 12. Socio-economic study 13. Risk assessment & management study 14. OB dumping strategy & management.
14	Submission of hardcopy of Final EIA/EMP to MoEF&CC/SEIAA	User Agency	-	15 copies to be submitted.
15	Reply to the EDS/ADS raised if any	MoEF&CC/SEAC/ SEIAA	-	EDS/ADS can be sought if there is requirement of additional supportive documents.
16	Presentation before EAC/SEAC Committee for grant of Environmental Clearance	User Agency	20	EC can be recommended or rejected by EAC/SEAC as per the decision and minutes of meeting issued.
17	Grant of Environmental Clearance	MoEF&CC/SEIAA	45	Grant of EC with certain conditions.
Total Timeline (Days)			**436**	
Total Timeline (Months)			**15**	

Note: The above-mentioned timelines are tentative it may go beyond the stipulated timeframe.

Standard Operating Procedure (SOP) for acquisition of Land for Coal Mining Projects

Forest Land

S.No	Activities	Responsibility	Timeline (Days)	Remarks
1	DGPS Survey of the project area with clear demarcation of forest land and certification of the same form DFO.	User Agency/NABET	45	-
2	Preparation of Land schedule and Revenue Maps.	User Agency	15	-
3	Forest Management Information System (FMIS) Maps to be prepared after superimposing the coordinates and will be	User Agency	45	Cost to be borne by user agency.
4	Identification of CA Land	User Agency	60	CA land identification will be started just after allocation of
5	DGPS survey of the identified CA land and preparation of DGPS report	User Agency		DGPS report is being verified by DFO/SDO Forest and thereafter
6	FMIS Maps of CA Land to be prepared after superimposing the coordinates and obtain from forest department on user agency cost.	User Agency	30	-
7	In schedule area, Gram Sabha NOC to be obtained in respect of Transfer of CA Land in favor of Forest Department.	User Agency by order of Deputy Commissioner	30	Deputy Commissioner's NOC also be taken
8	Site inspection done by concerned DFO/SDO/Ranger regarding issuance of suitability certificate of CA land	DFO/Ranger	15	-
9	Suitability certificate and CA Scheme approval from concerned DFO	DFO	30	CA Scheme prepared by Ranger as per Forest guideline Rates.
10	Application to Deputy Commissioner for issuance of Gram Panchayat NOC in respectof Diversion of Forest Land.	Deputy Commissioner	90	S.No. 10 to 29 are parallel activities.
11	Forwarding of application by Deputy Commissioner to SDM for further action in the matter of Gram Panchayat NOC	Deputy Commissioner/ SDM		
12	CO/BDO obtains Gram Panchayat NOC through Mukhiya/Up-Mukhiya and forward to Deputy commissioner	User Agency		
13	Deputy Commissioner provide the Gram Panchayat NOC	Deputy Commissioner		
14	Application to Dy. Commissioner for issuance of Forest Right Act (FRA) NOC under the provision of the Schedule Tribes and others Traditional Forest Dwellers (Recognition Forest Rights) Act, 2006.	User Agency		
15	Forwarding the application by Deputy Commissioner to SDM for further action on FRA NOC.	Deputy Commissioner		
16	SDM/CO issue letter for Gram Sabha and village level Vanadhikar Samiti Meeting regarding settlement of Rights under FRA and issuance of FRA NOC.	SDM/CO		For settlement of rights under the provision of the Schedule Tribes and other traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006
17	Sub-Divisional level Forest Committee (SDLC) review the recommendation of village level vanadhikar samiti report and forward it to Deputy Commissioner within their view.	SDLC		-

18	Deputy Commissioner review the recommendation of Sub-Divisional level Committee with District level and thereafter issue the FRA NOC in prescribed form.	DLC		FRA NOC may be issued after Stage - I Approval also.
19	Application to Deputy Commissioner for Revenue Forest Land NOC.	User Agency		S.No. 10 to 29 are parallel activities.
20	Deputy Commissioner issue the letter to SDM for verification and reporting of Revenue Forest Land.	Deputy Commissioner/ SDM		
21	SDM issue letter to CO to submit the report.	SDM/CO		
22	CO get the revenue record verified throug CI/AMIN/Karamchari and submit the report to Deputy Commissioner through SDM.	CO/SDM		
23	Deputy Commissioner issue the revenue forest NOC.	Deputy Commissioner		
24	Application for NOC from Deputy Commissioner regarding Historical Place within 10 Km radius of Project.	Deputy Commissioner		
25	Deputy Commissioner obtains the report from SDM, Archeological Department and issue NOC regarding Historical Place.	Deputy Commissioner/ SDM		
26	Deputy Commissioner issue the NOC regarding Historical Places within 10 Km Radius of the Project Area.	Deputy Commissioner		
27	Application for NOC from CCF-Wildlife regarding Elephant corridor, wildlife sanctuary, historical monuments etc. within 10 Km radius of the project	User Agency		
28	CCF-Wildlife get it verified through DFO/Ranger regarding Elephant Corridor, Wildlife Sanctuary, Historical Monuments etc. within 10 Km.	DFO/Ranger		
29	CCF-Wildlife issue NOC regarding Elephant Corridor, Wildlife Sanctuary, Historical Monuments etc. within 10 Km as per report.	CCF-Wildlife		
30	Wildlife Management Plan is being prepared through the credential agency and submitted to PCCF-Wildlife for Approval.	User Agency/PCCF	45	Application will be processed simultaneously.
31	PCCF-Wildlife issue the demand note for the cost towards managements of wildlife and approve accordingly.	PCCF-Wildlife		-
32	Online Application for Registration in Parivesh Portal.	User Agency	15	Proposal of Mining Projects, documents like approved GR, Mine Plan & EIA/EMP required
33	After verification of the proposal, DFO issue the Demand Note for Tree Enumeration over the Forest land proposed for diversion.	DFO	60	Tree Enumeration will be done after deposition of requisite amount.
34	Hard copy of the Forest Diversion Proposal as per forest Guideline to be submitted in the office of DFO, Deputy Commissioner,CF, CCF& Nodal Officer.	User Agency	15	-

35	After the verification of the proposal site inspection will be conducted by DFO. Thereafter forward the proposal to CCF	DFO	15	-
36	After the verification of the proposal site inspection will be conducted by CCF. Thereafter forward the proposal to PCCF	CCF	15	-
37	Nodal Officer forwards the proposal to Central Government through State Government for prior approval u/s 2 of FC Act, 1980 after securitizing of the proposal.	Nodal Officer/State Government	15	-
38	Central Government forward the proposal to Regional FAC to review the proposal an submit the report.	MOEF&CC	15	-
39	Proposal is being examined by the Regional Expert Appraisal Committee of MOEF&CC.	EAC of MOEF&CC	30	
40	FAC sent the recommendation to Central Government and accordingly Stage-I is granted by MOEF&CC with certain condition therein.	MOEF&CC	15	In-Principal Approval (FC-I/Stage-I)
41	Compliance of In-principal approval to be done by the User Agency	User Agency	30	-
42	Transfer and Mutation of CA Land in favor of State Forest Department.	User Agency	60	-
43	Notification of CA Land as Protected Forest/Reserve Forest by State Forest Department.	State Forest Department	45	-
44	Deposition of NPV by User Agency to State Forest Department CAMPA Funds as per type of Forest.	User Agency	15	-
45	Deposition of CA Scheme cost by User Agency to State Forest Department CAMPA Fund.	User Agency		-
46	Submission of Stage-I compliance by User Agency to Concerned DFO	User Agency	10	-
47	Forwarding of compliance report by State Forest Department with its opinion to Central Government	State Government	10	-
48	Central Government grants Final Approval (FC-II/Stage-II)	MOEF&CC	30	Final approval u/s 2 of FC Act, 1980.
49	Based on Central Government Stage-II approval, State Government issue Stage-II approval and forwarded to PCCF issue letter to CF & DFO for further action.	State Government	20	
50	Based on State Government final Approval, DFO issue the demand note for numbering/blazing of tree, cutting of Tree,logging of Trees & transportation of Logs to Forest Depot.	DFO	15	-
51	User Agency deposit the amount as demanded by DFO. Thereafter DFO get approval of PCCF through CCF for tree	User Agency	10	-
52	After PCCF Approval, DFO issue hammer and direction to Ranger to start tree felling on diverted land.	DFO/Ranger	10	-
53	After Tree cutting and cleaning of the diverted Forest and DFO issue the possession letter to User Agency.	DFO	45	Thereafter Forest land can be used by User Agency for Non-Forestry purposes.
Total Time (Days)			**900**	
Total Time (Months)			**30**	
Note: The above-mentioned timelines are tentative it may go beyond the stipulated timeframe.				

Standard Operating Procedure (SOP) for FLY ASH DISPOSAL into Mine Voids

SOP for allocation of mines in respect of safety and administration related matters, both UG/OC working as well as abandoned

The mine voids which are not used for supply of water to surrounding communities forirrigation, domestic needs as well as the voids not feasible for pump storage project, coal gasification project and other purpose etc. may only be considered for fly ash disposal.
The mine owners and TPPs shall be responsible for the identification of abandoned mines that are suitable for the disposal of fly ash. A list of such mines shall be shared with the committee members comprising Ministry of Coal, Ministry of Power, NTPC and CIMFR.
The TPPs shall forward its request to the Ministry of Coal through the Central Electricity Authority (CEA), as stated in the minutes of the 2nd Central Level WorkingGroup issued by MoC dated 13 April 2023.
The Central Level Working Group (CLWG) shall be responsible for the allocation of the mines to TPPs for the purpose of fly ash disposal.offer for mine voids to TPPs may be prioritized/given preference as per considerationslisted below in decreasing order of preference:

Priority 01: TPPs which are located within 10 kms of any protected areas, ecologicallysensitive areas or areas of other ecological significance.

Priority 02: In case TPPs are located in critically polluted areas (CPAs) and severely polluted areas (SPAs) as identified by CPCB, may be prioritized for allotment of voids.

Priority 03: TPPs which have been issued specific directives by Hon'ble Supreme Court/NGT w.r.t ash disposal into mines to get priority accordingly.

Priority 04: In case of TPPs located in close proximity (within 2 kms) to rivers orsignificant reservoirs may get priority.

Priority 05: For TPPs located within 50 kms of high fly ash utilizing sectors (like brickmaking, tile making, cement plants, civil constructions, etc.),

Priority 06: Other TPPs located within 300 kms from the target mine site shall be dealtwith the lowest priority.

Responsibility of TPPs

1. All the regulatory compliances, safety and environmental & operational issues associated with fly ash disposal into mine voids will rest with the TPPs.
2. TPP should do scientific study as per OM dated 28.08.2019 issued by MoEFCC and CPCB guidelines and amendment thereof. The TPPs should obtain NoC from concerned State Pollution Control Boards.
3. The fly ash disposal should comply with the requirement of OM dated 28.08.2019 issued by MoEFCC including obtaining requisite permission from DGMS, which will be obtained by TPPs. Transport and handling of ash to prevent surface and sub-surface water pollution shall be the sole responsibility of TPPs.
4. Fly ash disposal must be accompanied by rigorous environmental monitoring (as per OM dated 28.08.2019 issued by MoEFCC) by TPPs on regular basis. Fly Ash disposal within mine premises should be done in Slurry form through pipelines.In case of any adverse impact, the fly ash filling shall be stopped and appropriate remediation measures shall be taken.

5. The closure of the mine void site after fly ash disposal up to permitted height should be associated with blanketing with top soil as per study but not less than minimum 30 cms thickness and ecological restoration of the site through suitable landscaping and plantation of native species.
6. Alternatively installation of ground mounted solar or other re-purposing activities may be explored.
7. During post closure, garland drains should be provided around the site to ensure that there is no ingress of water into the disposal site.
8. In case of UG mines submission of design, drawing and location etc. of the Stowing plant will be assisted by mine owner. Cost of supply, erection and commission of Stowing plant, borehole as well as cost of laying pipelines and other infrastructure for the fly ash filling purpose both above & below ground shall be borne by TPPs.
9. Since the subsidiaries of CIL remains the custodians of the land as per CB Act, 1957, the liability in terms of legal, environmental and safety issues shall lie with the TPPs, in accordance with mutually agreed MoU, starting from preparation of the site and fly ash disposal up to the time of closure of the site.
10. Post closure scientific study of allotted mine void area including stability of reclaimed area shall be done through a scientific agency and final study report with compliance shall be submitted to mine authority before handing over the site by the TPPs.
11. Hazard identification and Safety Management plan should be prepared in accordance with CMR no 39 and 104 and related circulars.
12. Scientific studies in accordance with CMR no 106 and related technical circular is of the responsibility of TPP before commencement of fly ash filling and all the recommendation made in the scientific study shall be complied with.
13. .Monitoring by TPPs or other agencies for entire ash disposal operation, conducting different studies and maintaining all records as prescribed, are to be certified by concerned Area Nodal Officer as per OM of MoEFCC dated 28.8.2019. After closure of the site, it shall be ensured by TPPs that the disposal site has been suitably reclaimed through plantation of native tree species and other measures in accordance with the prescribed guidelines/statutes.
14. In case of any adverse report/notice by the regulatory agency for the non- compliance/damage to environment, the mine owner shall have liberty to cancel the MoU and stop the fly ash operations. Fly Ash disposal shall resume after necessary mitigation measures are taken and clearance from the Regulatory authority is obtained.

The guidelines issued by MOC regarding responsibility of mine owners and TPPs after the site is handed over to TPPs for fly ash disposal, shall apply.

Responsibility of the Coal Companies

1. The Coal Companies shall examine all the clearances, studies and permissions obtained by the Thermal Power Plant vis-à-vis OM dated 28.8.2019 by MoEFCC and various decisions taken in the Fly Ash Management and Utilisation Mission meeting organized from time to time by MoEF&CC. If found satisfactory, coal companies willcommunicate to the concerned TPP or agency to enter into a MoU and also related formalities for the disposal of fly ash .

2. In case of UG mine subsidiary with be associated with TPPs for all the works belowthe surface (laying of pipelines, barricading etc)

The guidelines issued by MoC regarding responsibility of Mine owners and TPPsafter the site is handed over to TPPs, shall apply for fly ash disposal in mine voids.

SOP for signing MOU between identified mines and TPPs (Both UG/OC)

1. Once the mine is allotted for the disposal of fly ash, the MoU for the disposal should besigned within 30 days from the date of allotment of the mine void. The date of allotmentwould be the date of publishing of Minutes of the Meeting or any other communicationissued by the Central Govt. in this respect.

2. Both the parties- the concerned Coal Company and the respective TPP shall inform theMinistry of Coal, the Ministry of Environment Forest & Climate Change and the Ministry of Power about the date of signing of the MoU.

3. The MoU shall be framed in such a way that it covers all the safety, administrative andarbitration-related matters. It should be consistent with the guidelines of MoEFCC, Central Pollution Control Board and other Central Govt. guidelines.

4. Consultancy Contract for the submission of design, drawing and location etc. shall be in the scope of the respective TPPs.

5. The concerned parties shall be freeto incorporate any other relevant points that are necessary for safety and are environment-friendly.

SOP for carrying out feasibility studies for mixing of ash with OB in operational mine.

1. As per past study reports it is concluded that mixing of fly ash in running mines isnot feasible due to safety issues.

2. As per the minutes of the 2nd Central Level Working Group constituted under the Fly Ash Notification, Only abandoned mines or areas of abandoned mines are to beconsidered for fly ash filling. It was also recorded in 3rd Central Level Working Group that DGMS agreed that the mixing proportion of Fly ash and OB is practically not possible and it may lead to reduction of the Factor of Safety of slopestability. Thus, OC mines abandoned or closed quarries/ mines shall be allotted forfly ash filling and operating mines shall not generally be considered for filling of fly ash.

3. The guidelines issued by MoC regarding responsibility of mine owners and TPPs after the site is handed over to TPPs, shall apply for fly ash disposal in mine.

SOP for carrying of Scientific studies for backfilling of ash in mine voidsof working U/G and opencast mine.

1. As per the minutes of the 2nd Central Level Working Group constituted under the Fly Ash Notification, Only abandoned mines or areas of abandoned mines are to be considered for fly ash filling. It was also recorded in 3rd Central Level Working Groupthat DGMS agreed that the mixing proportion of Fly ash and OB is practically not possible and it may lead to reduction of the Factor of Safety of slope stability. Thus, OCmines abandoned or closed quarries/ mines shall be allotted for fly ash filling and operating mines shall not generally be considered for filling of fly ash.
2. Scientific studies for backfilling of ash in mine voids of working UG and Opencast mines is under the scope of the TPPs to which the void has been allotted. This shall beundertaken in accordance with applicable guidelines issues by MoEFCC/CPCB/SPCB and other agencies. The fly ash disposal should comply with the requirement of OM dated 28.08.2019 issued by MoEFCC including obtaining requisite permission from DGMS, which will be obtained by TPPs.
3. The guidelines issued by MoC regarding responsibility of Mine owners and TPPs after the site is handed over to TPPs, shall apply for fly ash disposal in mine voids.

हरियाली

हरियाली इस धरती की रंग बिरंगी बड़ी निराली है।
जगमग करता धरती को ,जीव जगत की रखवाली है।
आंधी पानी कड़कती धूप में खुद खड़ी बेजान सी,
मगर सबको देती बसेरा हैं।
आसमान से इसका नाता हैं, जमीन से इसका जुड़ाव है,
जीव जगत की रक्षा के लिए मिट्टी को करती उपजाऊ हैं।

गुम हो गई है वो कोयल की मधुर आवाज़
जो कुहू कुहू से हमे जगाती है।
अब तो नित्य सिरहाने पर अलार्म की आवाज सुनाई देती हैं।
हरियाली इस धरती की रंग बिरंगी बड़ी निराली हैं।

नजर लगी आधुनिक विकास की हैं।
काट दिया धार धार हथियार से हैं।
अभिशाप लगा जगत को है।
दंश झेल रहा मानव दूषित पर्यावरण की मार से हैं।
हरियाली इस धरती की रंग बिरंगी बड़ी निराली हैं।

चलो मिलकर शपथ लेते है,
एक पौधा अपना आंगन में लगाते हैं।
प्रकृति की उपहार को धरती को वापस करते है।
हरियाली इस धरती की,रंग बिरंगी बड़ी निराली है।
जगमग करता धरती को,जीव जगत की रखवाली है।

प्रेमचंद मांझी
सामान्य मजदूर
निदेशक (तक.)संचालन सचिवालय
कोयला भवन

हरी भरी वसुंधरा

हरी भरी वसुंधरा पुकारती सँवार लो।
वसंत गीत कोकिला बयां करे बहार को।
प्रवाह शुद्ध हो रहा समीर पात-पात-से।
भरे सुगंध निर्मला कली-कली प्रभात-से।।

सुकोमला सुमंगला बनी धरा प्रबोधिनी।
प्रकाश वर्ष ओज-सी मृणालिनी सुभाषिनी।
दुलारती सँवारती न मांगती कभी शिखा।
सुवर्ण पीत शुभ्रता सुधारसों सना लिखा।।

सुरम्य सौम्य शोभिता कली-कली बहार की।
ललाट रक्त पुष्पिता चली बयार प्यार की।
सजी खड़ी उपासना करे सदा अराधना।
अनूप भाव कल्पना प्रभूत भाव साधना।।

हुई जरा अधीर है हरी भरी वसुंधरा।
लुभा रही पुकारती सजी सजीव कंदरा।
खिली कली अवंतिका बिखेरती सुगंधिता।
बनी सजीव स्वामिनी कहे सदा सुवंदिता।।

कहे धरा सुनो प्रिये हवा बिना न ज़िंदगी।
सुकर्म कीजिये न कीजिये बलात गंदगी।
कृपा कहाँ न की धरा यही सवाल पूछती।
यही कहे सुनो धरा नदी हजार सूखती।।

...

रिंकु दुबे वैष्णवी

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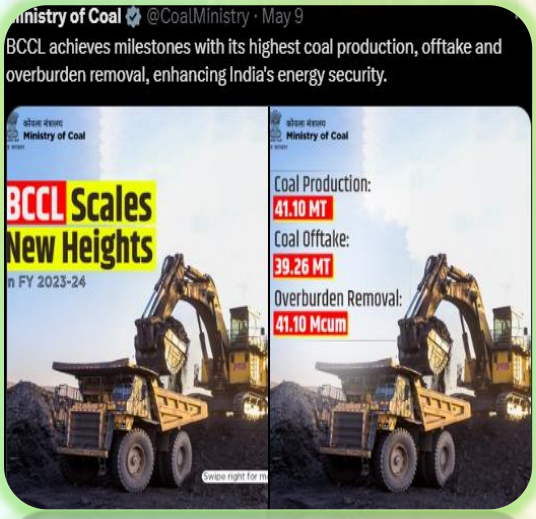

भारत कोकिंग कोल लिमिटेड

एक मिनी रत्न कंपनी

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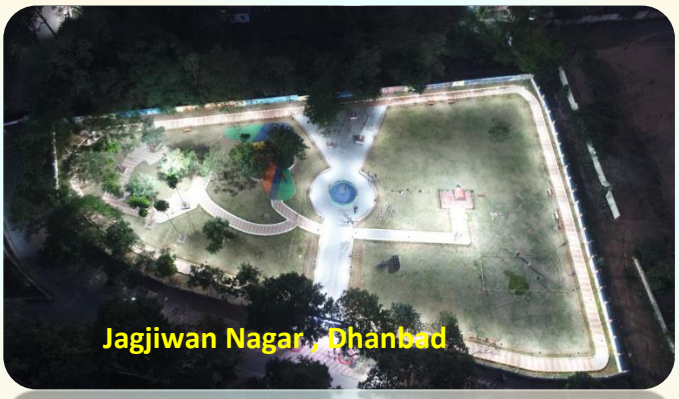
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