

# Post-mining restoration of people's profile in Indian coalfields – an attempt towards safeguarding human rights

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*Coal is still a staple energy resource in India meeting over 50% of its energy requirement. Eastern Indian states are particularly blessed with coal with vast availability in Odisha, Jharkhand, West Bengal and Chhattisgarh. It has some major coalfields like Jharia, East and West Bokaro, Raniganj, Barakar, Karnpura, Ib valley, Talcher and Korba coalfields to name a few. Incidentally the land undulations, rivers, forest and geography render a climate range that supports soil fertility with rich promises of agricultural harvest. An additional booty of highly rich ecosystem services and aesthetics are offered due to pristine forest in the region. A balance has always been in the wish list that may bring inclusion and sustainability but so far been lurking.*

*Mining companies must encompass sustainability as its key governing principle in corporate philosophy. Sustainability encompasses harmony in dimensions of society, economy and ecology (SEE) to be incorporated in its entire operating practices (exploration to mine closure) in order to realize sustainable and inclusive growth.*

*The essence of the paper can be summarized by quoting a shloka from Atharva Veda:*

*“What of thee,  
I dig out  
Let that quickly grow over  
Let me not hit,  
thy vitals,  
thy heart!”*

*In order to meet ever evolving aspirations of growing population, adaptation to practices of sustainable agriculture appears a must. Meeting the need of food, feed, fiber and fuel for human and live-stocks, maintaining the sustainable balance among its various parameters extending to land, water, soil, biodiversity, agro biodiversity*

*and agro ecosystem appears sine-qua-non. In totality, it constitutes the base of entire gamut of natural resources.*

**Keywords:** *Post-mining restoration, peoples' profile, human rights.*

## 1.0 Introduction

This paper has been prepared based on focusing coal mining projects in coal rich states of India that affects vast chunk of land, people and associated livestock and the ecosystem. Though, coal mining contributes to energy and economy significantly but it also affects adversely on in-situ pattern of life and livelihood of its surrounding inhabitants. The present article moves on traversing through the following sub-objectives and been written being hyper-perceptive:

- To assess the impact of mining on local population and the ecosystem that includes land, soil, water, biodiversity and agro-biodiversity.
- Suggest measures for inculcating sustainability parameters in entire mining processes till its closure and reclamation of the mined out areas to help sustain carrying capacity of the pristine ecosystem.
- Restoring agricultural practices over reclaimed mined out areas by local habitants by adapting to sustainable practices.

This article concentrates on exploring possibilities on post mining restoration practices in alignment with nature. This would provide for restoring in-situ livelihood to habitants quite in alignment with nature.

Based on perception developed on extensive field visits made by authors in coal mines of West Bengal, Jharkhand, Odisha and Chattisgarh, this article has been prepared with some intuitive solutions as well. Mining companies engaged in mineral extraction appeared to be lost in making skewed growth in the region. In-bringing of forced modernity in a disjointed manner in the social fabric has been conspicuous at spotted patches of artificial urbanization in and around the coalfields. It has also been observed that the whole mining area has got converted into patch townships robbing the

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ethnic fabric of society and theirs' in situ vocational profile. Project affected people (PAPs) do get compensation for losing their land but their loss of livelihood pattern has seldom been compensated. The inherent vocational profile of people in Eastern Indian states can easily be plotted as agrarian and once their land is lost, it leads to a loss of one's vocation, livelihood pattern, loss of culture, aesthetic value ultimately hitting on to their basic rights to life and "human rights".

The article comprises four sections. The first section encompasses precise description of the article and objectives behind taking up this particular topic.

Second section elaborates the methodology adopted for acquiring information about the concerned subject, which are both from primary and secondary source of information.

This will be followed by third section where importance has been given to make mine operators realize about the loss of opportunity due to adopted unsustainable practices in mining operations. The statutory tool and the obligation of mine closure plan has not been properly leveraged to mutual benefit of operators and the stake holders.

A case-let of Piparwar mine of CCL has been given to contemplate for the readers.

This particular section also talks about the appropriate reclamation and restoration strategy under mine closure and management plan, sustainable in nature by virtue of being in alignment with extant ecosystems. Adapting to sustainable agriculture practices over such mined out areas and restoring back sustainable life and livelihood pattern of the local inhabitants could be one desirable option to practice.

The last section concludes the article with policy recommendations for a sustainable mining in practice.

## 2.0 Methodology

The study is based on extensive literature survey and field visits as mentioned below.

The source of primary information is field visit to Korba coalfields in Chattisgarh, Ib valley in Odisha and Karnpura coalfields in Jharkhand.

The sources of secondary data are:

- Review of government documents on R&R
- Existing literature on peoples' displacement, human rights issues with special reference to Jharkhand.
- Project reports on planning and implementation of CSR policy of Coal India Limited and its subsidiaries.
- Environment impact assessment and environment management plan
- Resettlement and rehabilitation policy of various coal mines.
- Mine closure plan of coal projects.

## 3.0 A case to contemplate

Piparwar opencast mine, located in North Karnpura coalfield, Jharkhand has been a show-case project of Central Coalfield Ltd. since 1990. With a very favourable geo-mining condition, it was planned and executed in collaboration with White Industries, Australia producing to the tune of 7 mty of coal with a stripping ratio of 0.65. Gradient of seam has also been gentle and uniform throughout. A patch of 3km × 3.5 km was the gifted deposit with 25m of coal seam thickness comprising lower/upper Dakra and Bukbuka seams, easily mineable in nature.

River Damodar passes by near to it and inhabitants of the surrounding geography are primarily tribal communities with agriculture as their traditional vocation for livelihood.

The mine was systematically planned for 5.5/6 mty with a strike length exposure of 1 km that will continue for 25 years up to its dip most economic extent. The mine will proceed by cutting a strip of 60m every year with progressive back filling of overburden strata and reclamation work following with afforestation. 25 years hence, the mirror image of the mine with same dimension will recede taking out the balance coal of the original block of coal in another 20/25 years of time span.

The mine had all potential to be an ideal case of sustainable mining model with land as an interim use exhibiting exemplary work on sustainable mining and inclusiveness restoring in-situ pattern of life sand livelihood of inhabitants as well as restoring the pristine ecology.



Fig.1 A working face at Piparwar mine, CCL (February 2018)



Fig.2 Current status of in-pit crusher and conveying system installed at PiparwarMine



Fig.3 A shrinking working face at Piparwar mine (February 2018)

A few photographs of the mine have been taken recently and put hereunder to have a feel of the loss of opportunity of discovering inclusiveness in this particular case. The mine, though has been practicing backfilling in mine voids since beginning but the opportunity of restoring the ecosystems and bringing in inclusiveness for making growth sustainable has yet been lurking. And now it seems rather more difficult as the method of mining has been observed to be shifting from an integrated system to a flexible one customized to coal patch working.

Now, it is for us to contemplate as to where does it stand today and why!



Fig.4 A water logged coal-face at Piparwar mine (February 2018)

#### 4.0. Restoring pristine ecological pattern in post-mining areas

The challenge today forming industry is to strike a balance between the socio-economic and environmental issues in a way that maximizes benefits to its stakeholders and minimizes degradation (Worrall et al, 2009).

Apart from operating mines in alignment with nature, restoring greening with native species in and around mining suburbs should be the reclamation strategy as an integral part of progressive mine closure plan. The importance of technological innovation and environmental rehabilitation cannot be further overemphasized when it comes to impact of mining on environmental degradation and depleting

resources (Van Below, 1993).

Land reclamation process should consist of physical as well as biological reclamation. Physical reclamation involves bringing the overburden material back to the mining voids while biological reclamation brings back its vitality by intrinsic afforestation.

It has been further emphasized that while conducting mining operations; economic, environmental and social parameters may be constantly referred to as the 'triple bottom-line' for making growth sustainable in nature (Laurance, 2006).

Coal mining operators must assure adherence to progressive mine closure plan containing provisions of reclamation of degraded land, landscaping, afforestation as well as rendering skilling opportunity to its stakeholders.

In rural areas, it has been observed that mining may have provided livelihood opportunities readily available to local habitants however at an un-ignorable cost of in-situ agricultural productivity (Mishra et al, 2008).

Based on empirical studies conducted by the referred authors, conditions of displaced people have generally been observed to be shifting from bad to worse (Cernea et al, 2000; scudder, 2005; Modi, 2009).

The compensation package provided in lieu of lost land, are insufficient as against the loss of life and livelihood pattern that requires attention for redressal of human rights issues (Cernea, 2003).

The negative impact of mining induced displacement is loss of agricultural land that basically affects basic source of their livelihood and ultimately changes the vocational profile of particularly the male counterparts that eventually cascades down to fairer gender in ramified dimensions (Bose 2004).

Mining leads to loss of land and local inhabitants get forcibly into wage labour rather farming as their independent occupation. This affects their economic independence of women and life pattern gets changed (Lahiri-Dutt, 1999 and Bhanumati, 2002).

The reclaimed land could be used for agriculture purpose which will contribute in providing livelihood to the project affected people and food security for them. For enhancement and sustainability in agriculture, sustainable agriculture practices should be adopted, which involves methods like crop diversification method, zero tillage, genetic diversity, integrated nutrient management, integrated pest management, sustainable water management, climate smart agriculture practices, post harvest management, investment in sanitary and phyto-sanitary measures, energy management, extension of technologies and managing information input, social engineering and decision support system method.

Plantation helps in restoring various ecological/societal issues like fertility of soil, dust suppression, combating noise

pollution, water conservation, carbon sequestration and ameliorating micro-climatic conditions which can as well be gauged by regular monitoring through leveraging technology like remote sensing and geomatics.

People related issues due to mining have been found to be mostly on account of displacement, land and environmental degradation. It has also been observed that the basic vocation of PAPs is agriculture or activities connected to extant ecological resources naturally available to them that also govern their life and livelihood pattern. Once, it gets intruded by mining activities, issues start smothering and culminates to majority of human rights issues encompassing all possible spheres. An attempt to realize mining as an interim use of land would pave a long way to combat human right issues to a great extent. An initiative to not only reclaim the land but also to restore it to its near pre-mining profile would help restore their original pattern of vocation; mostly agriculture to them. Abiding with R&R/CSR Policy, mining companies as well provide jobs to PAPs/land looser on some pro-rata basis. Restoration of post mining land for agriculture purpose as an initiative to be undertaken in tandem would actually eliminate the entire domain of human rights issues. In the light of above, introduction of sustainable agriculture practices (SAP) may prove to be extremely fruitful and the mining companies would evolve from a status of land breaker to earth makers.

#### 4.1 SUSTAINABLE AGRICULTURAL PRACTICES (SAP) MAY BE ADOPTED IN MINING AREAS UNDER

4.2 *Zero Tillage* or no till farming is about growing selective crops without much of tillage into the land profile. Post-mining soil is not left like in plains in order to prevent soil erosion and selective plantations are preferred suiting to undulating terrains.

4.3 *Crop Diversification*: It includes methods like crop rotation, mixed cropping, inter cropping and double cropping help in reducing soil erosion, improving soil fertility, increasing yield and minimizing risk of crop damage.

4.4 *Integrated farming*: A shift from commodity centered approach to integrated farming system with suitable combination of appropriate mix of crop, animal husbandry, forestry, fishery, poultry and other agro based products is warranted. Use of eco-friendly technology and participatory farming approach may be initiated. It will help achieve better triple goal of "more food, more income and better livelihood".

4.5 *Genetic Diversity*: It led to genetic homogeneity with a greater genetic vulnerability to biotic stresses. To minimize the risk of crop failure during insect-pest and disease attack as well as during adverse climatic situation, there is a need to grow crop varieties with different genetic constitutions in different agro climatic conditions.

4.6 *Integrated Nutrient Management*: To make the productive potential of soil sustainable without adversely

affecting the environment, different sources of nutrients like organic manures, on-farm residues, biological nitrogen fixation, farmyard manure, green leaf manure, blue green algae, vermicompost etc. should be used in an optimum manner as per the suitable variety and optimum cultural management.

**4.7 Integrated Pest Management:** To control the pest in the crop field utilize all suitable technique and method and maintain the pest population at level below those causing economic injury and un-sustainability. The sustainable important component of Integrated Pest Management are use of pest resistant or tolerant varieties, cultural practices like early or late planting, summer plough, use of pheromone traps, parasites, predators, hand collection etc.

**4.8 Water Conservation:** Water, the scarce and key ingredient for sustainable agriculture should be managed in an appropriate manner by various water harvesting and management techniques. Like-water auditing, equity in water sharing, efficiency in water delivery and use, maintenance and recharge of ground and surface water, integrated policy for conjunctive and appropriate use of rain, river, ground and waste water management etc. Natural resource conservation is the best mode for sustained living.

**4.9 Post-harvest management:** Quality enhancement through better management of plant produce by ensuring good transport, grading, processing, storage and value addition will help compete in open economy.

**4.10 Investment in sanitary and phytosanitary:** In order to providing quality food to consumers for being sustainable in market, facilities like communication, storage, warehousing, sanitary and phyto-sanitary measures should be adopted.

**4.11 Energy management:** Energy efficient system of land, water and pest management should be adopted. Biogas, biomass, solar, wind, and tidal energy wherever possible be harnessed for sustainable agriculture.

**4.12 Extension of technologies and managing information input:** Remote sensing and other space satellite output provide detailed geographic information for land and natural resource management. These methods should be applied for sustainable agriculture.

**4.13 Social Engineering:** It is an important option in extension technology towards sustainable agriculture. Farmers should be aware about ecological production and economic consequences of technology and policy in adoption.

**4.14 Decision Support System:** It involves simulation modeling comprises studying soil-plant-environment continuum.

## 5.0 Conclusions

Coal mining projects are basically part of development process and economic growth. It contributes in the important

pie of energy generation in an energy starved country like India and thus in building the basic economy of the country. However, at the same time it hits at the other basic contributor of primary economy i.e. agriculture.

The basic raw material required for any mining activity is primarily and conspicuously land and the extant ecosystems. Further, coal mining necessarily has been found to be involving land which is either under forest or with agricultural potential. In view of this, how mining could be done in alignment with nature limited to its carrying capacity with an appropriate closure plan implemented progressively shall have to be explored. The pattern of sustainable mining *inter-alia* also reclaim mined out land that would render its availability for agricultural purposes.

Thus, there is an urgent need of a paradigm shift in the mining operation that demands for adoption of mining practices being in alignment with local ecosystem observing various resource conservation plans to reclaim the mined-out land. This would help in turn ensure restoring in situ agricultural practices back to local inhabitants.

The most common profession of the inhabitants is agriculture which is quite in alignment with nature and their tradition. Under the scenario aforesaid, the idea of introduction of sustainable agriculture practices over mined out areas invites paramount importance.

Development of sustainable agriculture practices is prerequisite towards mitigating ecological, social and economic hazards being caused due to unsustainable mining practices. It will basically help in food security for rapidly growing population by maintaining sustainability of natural resource base i.e. land, water, soil, biodiversity, agrobiodiversity etc.

Land information system and land mapping using GIS could be helpful as a tool by taking into consideration sustainability parameters into its domain. Apart, bench marking of good practices throughout the coal companies would really pay rich dividends towards social entrepreneurship and issues on human rights shall soon be extinct.

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## EXPLOSIVES EFFICIENCY IMPROVEMENT WITH DUE REGARD TO SAFETY – STEP TOWARDS SUSTAINABLE MINING PROCESS

*(Continued from page 119)*

- Persons at risk from misfired blast holes, particularly during subsequent excavation or re-drilling of the blast area.

The purpose of codes is to provide practical guidance on meeting regulatory requirements on mine safety. In the event of any conflict between this code and regulatory requirements the regulations shall always take precedence.

### Conclusion

As a sustainable mining practice the challenge is to increase the efficiency of explosives one of the critical resources by reducing the total cost of operation by monitoring and measuring the key performance indicators cost, upgrade the requisite capabilities in terms of skilled technical manpower, use of the cutting edge technology for manufacturing quality explosives products and adopt blasting systems and practices of global standards and establishing best practice systems and procedures for safety of mine personnel, contractors, general public and the wider community.

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