Challenges of Development-Induced Hazards on Tribal Livelihood in Singrauli, Madhya Pradesh: An Empirical Study

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Abstract

Energy generation has been the cornerstone of the human socio-technical system since the inception of civilization. Thermal Energy generated from coal is the most abundantly used means of energy generation and the process of development as historically defined is largely tied with coal-based fossil fuel energy generation. The study explores the various hazards and livelihood challenges associated with coal mining on the local population. The study area is rich in coal reserves and has witnessed extensive mining operations by various companies, leading to significant disruptions in the lives of local tribal populations. The selected population is mainly tribal and they reside in the forest. These forest dwelling communities are culturally, economically and socially tied to the forest land and its endowments for survival, existence and identity assertion. Due to mining activities, the population goes through numerous unseen challenges such as, health risks from coal dust, structural damage from mine blasting, water scarcity by groundwater depletion, reduced agricultural productivity due to soil contamination and many more. This research paper delves into the few clearly visible hazards and challenges faced by tribal communities in Singrauli District, Madhya Pradesh, due to coal mining activities. The paper also discusses the marginalization of local tribal communities in the labor market, and lack of skill development opportunities. Lastly, the paper proposes strategies to enhance tribal livelihoods, including agricultural interventions, skill development initiatives, and advocacy for fair labor practices. By addressing these challenges and promoting sustainable development practices, the paper advocates for the holistic advancement of tribal communities in coal mining regions.

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1. Introduction

Energy generation has been the cornerstone of the human socio-technical system since the inception of civilization. Thermal Energy generated from coal is the most abundantly used means of energy generation and the process of development as historically defined is largely tied with coal-based fossil fuel energy generation. Modern energy services are a powerful engine of economic and social development. As a fast-growing country India also has a large demand of energy in various fields for rapid growth. India is the third largest country in terms of power generation and consumption as well as the second largest coal producing country in the world[1], which is the major source of Indian thermal energy. About 57% of the electricity consumed in India is generated by thermal power plants in which 50% is generated through coal. (CEA 2023). Energy consumption of the country has multiplied since the year 2000 and despite government emphasis on renewables, thermal energy produced by coal will play the most important role and is expected to grow by 6-7% annually in the next few years to reach about 1.5 billion tons in 2029-30.[2] (PIB, 2023)

Singrauli, comprises one of the most important coalfields in India both in terms of reserves and productions. Large scale mining activities have generated a great deal of environmental stress not only on the Land use, Land Cover but also on ecosystems in this region (Greenpeace 2008; Singh et al. 1997). Mining sites, primarily located in forest areas inhabited by tribal families for decades. It poses complex challenges of livelihood and displacement. Singrauli emerges as a battleground between land oustees and proposed projects. (Singh, 2009) Due to an increase in mining activities, social networks of local communities get disturbed and have a negative impact on health. Agricultural production and forest areas are decreasing day by day. Ultimately, local communities have to leave their lands and move to other places. However, most of the time the socio-economic, cultural and environmental costs are ignored while discussing mining. It is observed that the poor had closer livelihood and consumption linkages with environmental resources (Niti Aayog, 2000). There are few major issues associated with

[1] www.statista.com/statistics/265638/distribution-of-coal-production-worldwide/
[2] Ministry of Coal, Enhanced Coal Demand & Production Posted On: 18 DEC 2023 5:13PM by PIB Delhi

the context of coal mining impacts such as, how does it force indigenous people to leave their own, cultural and traditional way of living? To what extent it impacts the livelihoods and what impact does it have on the health of vulnerable populations especially women and children? With these questions in mind, the present a Study of Hazards and Challenges of Coal Mining on Tribal Livelihoods in Singrauli District of Madhya Pradesh.

2. Study Area

District Singrauli extends between latitude 23° 49' and 24° 42' North and longitudes 81° 18' and 82° 48' East in the north eastern part of Madhya Pradesh. Total geographical area of the district is 5675 sq. Km and it ranked 28th in the state. The district is divided into 3 Tehsil (Deosar, Chitrangi and Singrauli) and 3 development blocks (Deosar, Chitangi and Waidhan). The area is covered with many opencast coal mines operated by various companies like - NTPC, Reliance, Essar, DB Power etc. Only Northern Coal Limited (NCL) operates more than 10 coal mines alone in that area. Population share of Schedule Tribes (ST) in Singrauli is 32.6% of the total population of the district, which has increased by 0.3% from the previous 2001 census. The major tribes of the district are Baiga, Kol, Gond, Pal, and Agriya. [3]The 80-90 % population belongs to the ST community who live inside the forest and majorly depend on them for daily survival.

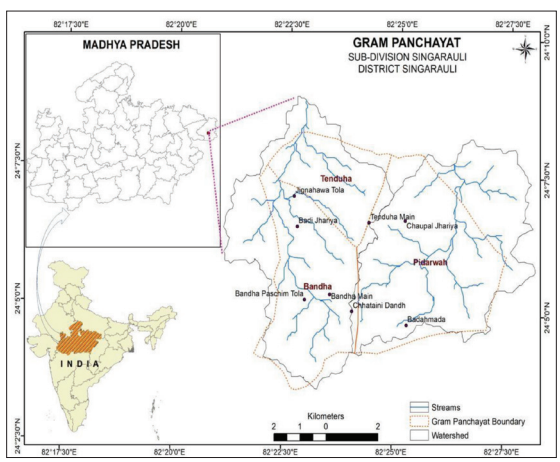

Figure 1 : Study Area (Prepared by Author)

[3] www.statista.com/statistics/265638/distribution-of-coal-production

3. Methodology

This study is based on empirical data collected through field visits conducted by the author in two panchayats, "Tendhua" and "Bandha," encompassing nine villages. A total of 114 samples were selected for the study. Data collection employed a combination of methods, including questionnaires, interviews, and focus group discussions, allowing for a comprehensive understanding of how mining activities have impacted the livelihoods and well-being of local tribal communities. The challenges were observed and documented. A mixed-method approach was used for analysis. The quantitative component draws from both primary and secondary sources, including censuses, government portals, annual reports from various ministries, and data gathered through questionnaires, interviews, focus group discussions, and participatory rural appraisals (PRAs). This provided a detailed factual overview. The qualitative component focuses on understanding the behavioral and psychological effects of mining on the tribal communities, particularly in terms of the loss of livelihoods and exposure to hazardous activities.

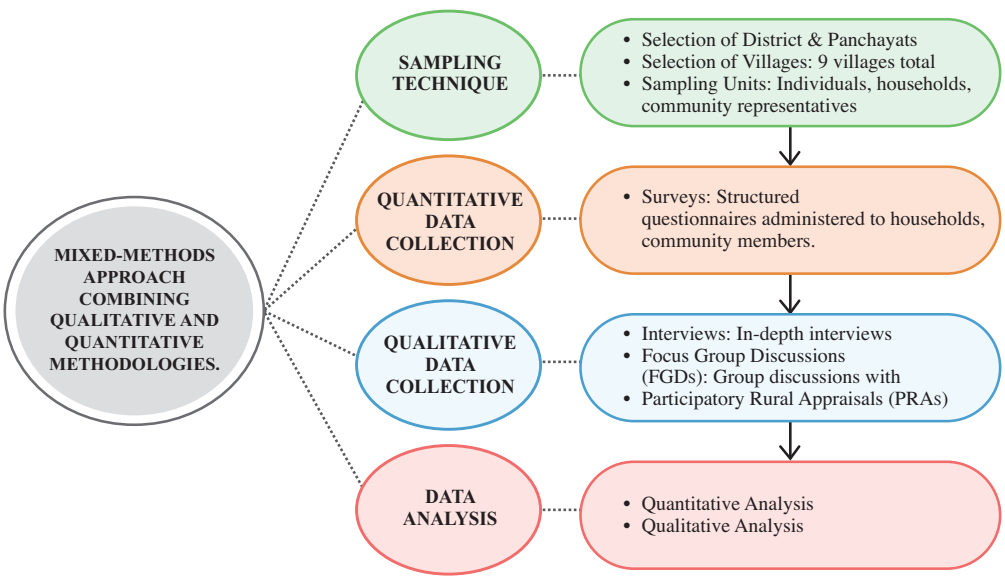

Figure 2 : Methodology and framework (Prepared by Author)

4. Results and Discussion

In the name of development, massive challenges of livelihood and sustainability are being imposed on the tribal populations, who have traditionally been dependent upon their local ecosystems for survival. In the energy capital of India (Singh et al., 1997), while energy production is crucial for the country's growth, it also raises significant concerns. These include environmental degradation, health issues, reduced agricultural productivity, groundwater depletion, accidents, and the impact on the survival of tribal communities.

Singrauli is home to several prominent coal mining blocks, serving as vital sources of fuel for the region's thermal power projects. Notable among these are the NCL Coal Mines, supplying coal to NTPC's Shaktinagar plant established in 1977 with a capacity of 2000 MW, and the Nigahi mines, providing coal to NTPC's Vindhyachal plant established in 1987, boasting a capacity of 4760 MW.

Table 1 : Coal Mining Fields in Singrauli District, Singrauli District

S.No.	Company Name / Coal Field		Year of Allocation	Area	Coal Production
1	Northern Coalfields Limited				
	a.	Jhingurda Project	1965	235 Ha.	22.66 MT (Last 5 year)
	b.	Dudhichua Opencast mine	1975	2400 Ha.	15.500 MT (2017-18)
	c.	Block – B	2004	1339 Ha.	4.475 MT (2014-15)
	d.	Amalhori	1982	9.28 Km.^{2}	11.105 MT (2017-18)
	e.	Jayant	1976-77	3.8 Km.^{2}	11.850 MT (2014-15)
	f.	Kakari	1982-83	-	2.8 MT (2017-18)
	g.	Nigahi	1980	-	15.52 MT (2016-17)
2	Mahan Coal Block		De-allocated		
3	M.P. Jaypee Minerals		2006	729 Ha.	250 MT Reserve

	a.	Amelia			4.2 MTPA (Peak Cap.)
	b.	Dongarital			
4	THDC India Ltd. (Amelia)		2016 (Allocated)	1905 Ha.	393.59 (Net Geological Reserve)

*Source - NCL Website, Coal Ministry Report, Jaypee Group and THDC India Ltd.

** MT – Metric tonnes , MTPA – metric tonnes per annum

These coal mining blocks play a major role in defining the geographical and sociological characteristics of the region. Various hazards and challenges directly or indirectly associated with the coal mining in the region is discussed below:

5. Hazards and Challenges:

a. Coal Dust

The dust caused by an explosion in mines and the transportation of coal has a negative effect on human health, arable land and crops etc. (Figure 3). Particles smaller than 2.5 microns go into human lungs and become the cause of deadly diseases like lung cancer. The dust from coal mines spreads on agricultural land and affects its fertilizer capacity and water storage capacity. Other than this, dust settled on crops and trees restrict their growth and also hinders the process of photosynthesis, which ultimately affects the production capacity.

Figure 3 : Dust on Road

Figure 4 : Mining Site

b. Blasting at Mines

Daily blasting for coal extraction in the mines creates vibrations akin to earthquakes in the surrounding areas. The majority of residents in these coal mining zones are tribal communities, often dwelling in mud houses nestled within forested regions, their roofs covered with makeshift materials. These vibrations cause structural damage, roof breakage and in severe cases complete collapse, endangering lives and exacerbating property loss.

Figure 5 : Effects of blasting in the region

Figure 6 : Broken leg

c. Water Issues (Quality, Availability & Groundwater Depletion)

Deep mining operations exacerbate groundwater depletion, as subterranean water channels through the mines, leading to a significant decline in the local groundwater table. Consequently, a substantial portion of the district grapples with acute water scarcity during the summer months, amplifying the challenges faced by these communities. Mining activities also trigger a series of interconnected challenges for the affected communities. The displacement of borewells due to blasting in coal mines disrupts access to essential water sources, compounding the already acute water scarcity issue. Additionally, seepage of groundwater from open-cast mine sites further exacerbates the problem, diminishing the available water resources in the vicinity. Moreover, the presence of coal dust layers reduces groundwater porosity, hampering

natural filtration processes and further limiting water availability. Consequently, water quality deteriorates as the depletion of water levels creates open ponds contaminated with coal dust, posing health risks and exacerbating the challenges faced by these communities.

Figure 7 : Wells are not in use

Figure 8 : Rust due to poor quality of water

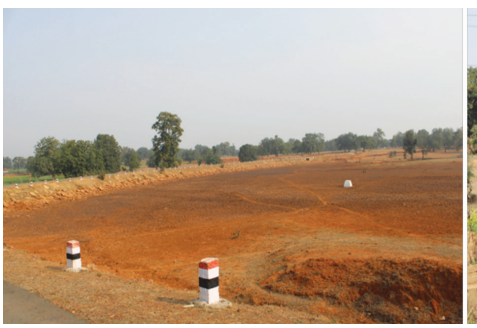

Figure 9 : Dried pond

Figure 10 : Water to home

d. Agriculture Productivity

Limited groundwater and coal dust on crops make **agricultural activities** difficult. There's not enough water for irrigation, and when crops are harvested, they get dirty with coal dust, which lowers their quality and value. Also, farmers struggle because they don't have modern tools, good seeds, or fertilizers, and they can't afford to buy them. **In addition**, the area doesn't get much rain. All these things together make it tough for farmers to grow enough food and make a good income.

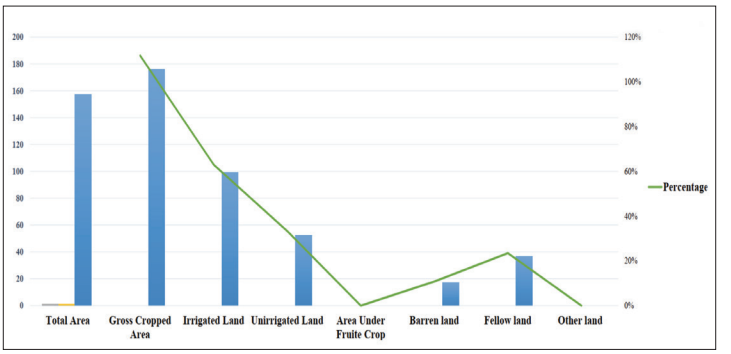

Figure 11 : Agricultural land use

e. Forest as Major Livelihood Source

Local population mostly relies on the forests for their sustenance and livelihoods. They depend on a variety of resources found within the forest, including essentials like Mahua, Tendu Leaves, Honey, Fuel, Fodder, and Medicines. Of these, Mahua fruits and tendu leaves are particularly crucial as they serve as key sources of income for the community. Tendu leaves, for instance, are used in bidi making, providing a significant source of revenue. Additionally, firewood collected from the forests serves as a vital source of fuel for cooking and heating needs.

Figure 12 : Tendu leave

Figure 13 : Mahua leave

Figure 14 : Firewood

The forests also serve as important grazing fields for their livestock, ensuring their animals have access to food and sustenance. Moreover, the forests also offer opportunities for small-scale activities such as mining of White Stone for mud house painting and honey collection, further contributing to the community's economic well-being. In essence, the forest plays a central role in meeting the diverse needs of the tribal community, serving as both a source of sustenance and economic opportunity.

f. Other Livelihood Sources

Opencast mining takes up a lot of land. It clears away the top layer of land, including forests. This affects tribal people because they often rely on the forest for their livelihoods. Since many tribal people lack extra skills, technology knowledge, or education, they struggle when the forest is destroyed. They lose their jobs and struggle to survive. Local people often work in jobs like making furniture, which relies on materials from the forest. But when the forest is cleared, these jobs disappear too. It's ironic that in mining areas, most of the workers actually come from places like Bihar or Chhattisgarh, not from the local tribal communities.

The local tribal groups usually have less education and skills for higher-paying jobs, so they end up doing labor work. But even in these jobs, they often don't get hired much, they have a high competition with migrant laborers from other neighboring states. There's a big problem with the low number of local people working in the mines. In many coal mining areas, laborers are hired through brokers. These brokers take a big cut of the wages, leaving the workers with very little. This means they don't get the fair wages they deserve.

With the above analysis and findings, it is clear that the mining activities can have a number of negative socio-economic and ecological impacts. The mining associate hazard and challenges are very high for the tribals living in surrounding areas.

Figure 15 : Furniture work

Figure 16 : Brick work

Table 2 : Major Hazards and Associated Impacts in the Study Area

Coal mining Associated Hazard	Impact on Life
Mine Blasting	Damages in Houses (both in kutcha & pucca), Displacement of borewell machine, Accidents and Loss of life.
Coal dust	Causes respiratory problems such as chronic obstructive pulmonary disease (COPD), silicosis, and pneumoconiosis (black lung illness), Decreased agricultural productivity due to dust settlement on soil and leaves. Open ponds also get polluted.
Groundwater Depletion	Due to excessive and deep mining water continuously starts flowing from mining and it impacts the ground water level of the surrounding area.
Loss of livelihood	Loss of essential resources such as fuel, fodder, timber, fruit, and other commercial products that tribal communities rely on for their livelihoods and have honed specialized skills to utilize.
Degradation of environment	Ecological disbalance, human wildlife conflict, loss of species and biodiversity.
Failure of agriculture	When coal dust falls on crops, it harms crop health, and reduces agricultural output. Mining-related chemical spills pollute water and soil, making land unusable and damaging crops and livestock.

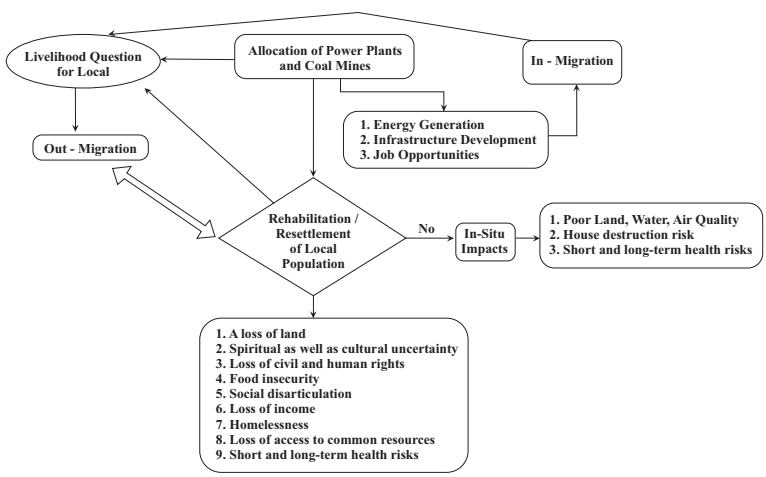

Figure 17 : Framework of mining induced issues and their interconnectivity (Prepared by Author)

6. Conclusion

The study showcased that coal mining in Singrauli, Madhya Pradesh, has caused serious problems for the tribal communities living in the area. These issues include environmental damage, health risks and the loss of their traditional ways of making a living. While coal mining is important for India's energy production, the negative effects on these vulnerable communities cannot be overlooked.

The tribal people in Singrauli depend heavily on the forest and natural resources for their livelihood. Creating sustainable livelihood options is key to helping these communities. This could include offering skill development programs and promoting eco-friendly farming practices. It is also important to involve the local people in decision-making, especially when it comes to mining operations and their rehabilitation.

Protecting the environment is equally important. Mining companies should be held accountable for reducing pollution, managing water resources properly, and helping restore agricultural land. In conclusion, solving the challenges faced by the tribal communities in Singrauli requires a balanced approach. We need to rethink current policies, support the local people in finding new ways to earn a living, and ensure that economic growth doesn't come at the cost of their well-being and environment. By doing so, we can achieve sustainable development that benefits everyone.

References

1. (2009) Census of India | Office of the Registrar General & Census Commissioner, India. India.
2. Bjureby, E., Britten, M., Cheng, I. (2008). The True Cost of Coal: How people and the planet are paying the price for the world's dirtiest fuel. *Greenpeace International*. Amsterdam The Netherlands
3. Guha, A. (2014). Book Review: Hari Mohan Mathur, Displacement and Resettlement in India: The Human Cost of Development, *Institute of Development Studies Kolkata*.
4. Khanna, A. (2013). Governance in Coal Mining: Issues and Challenges, *The Energy and Resources Institute* (TERI).
5. Mandal, S. (2017). Tribal dispossession through land acquisition: a study of open cast mines in west Bengal, *Journal of Rural Development*, Vol. 36, No.2, pp. 181-202, NIRD&PR, Hyderabad.
6. Mehar, R. (2007). Globalization, Displacement and the Livelihood Issues of Tribal and Agriculture Dependent Poor People, *Journal of Developing Societies*, Vol. 25, No. 4, pp. 457–480.
7. Mishra N. (2015). Coal Mining, Displacement and Rural Livelihoods: A Study in Mahanadi Coalfield Odisha, Department of Humanities and Social Sciences, National Institute of Technology (NIT) Rourkela, Odisha.
8. Sharma, R.N. 2009. Singh, S.R., Displacement in Singrauli Region: Entitlements and Rehabilitation, Economic and Political Weekly, Vol. 44, No. 51, pp. 62-69.
9. Siddiqui, K. (2018). Development induced displacement of rural communities in India: A critical review, *Turkish Economic Review*, Vol 5, No. 2.
10. Terminski, B. (2012). Mining induced displacement and resettlement: Social problem and Human Rights issue (A Global Perspective), *SSRN Electronic Journal*. http://dx.doi.org/10.2139/ssrn.2028490. Global Perspective), SSRN Electronic Journal. http://dx.doi.org/10.2139/ssrn.2028490.