

Research Article

# A Case Study of Land Acquisition in Raniganj Coal Filed, West Bengal

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## Abstract

The current study focusses on the features of land acquisition for new mining-related displacement, industrial facilities, and relocation occurring in different regions of West Bengal, India, as well as the widely differing local socioeconomic challenges. The study identifies the causes of major human rights issues as well as barriers to government laws and humanitarian aid organisations. Additionally, this study uncovers a number of facets of West Bengal's bulk land acquisition cases and related problems. As a result, the purchase of land for coal mining and the development of new enterprises is becoming a violent enterprise with little consideration for the human cost of the devastation and suffering it causes. The work explores the intricate aspects of land acquisition. Acquisition policy of the state government and public response regarding land acquisition for the creation of new sector along with the expansion of current industry. The results concentrate on different aspects of bulk land acquisition instances in West Bengal and the challenges linked to it.

## Keywords

Environment, Coal Mining, Displacement, Land Acquisition, Rehabilitation

## 1. Introduction

Although the word "development" describes positive change, it also has drawbacks since large-scale production-based development, which started with the industrial revolution, led to both development and devastation. When construction projects started in the past, everyone's attention was focused on the "development" rather than the "cost." As time goes on, thousands of people are evicted from their homes, lands, and means of subsistence every year all over the world to create room for massive development projects like road, dam, irrigation, mining, and so on. Such activities also lead to large scale defacing of land, deforestation, soil erosion and other inter related irreversible environmental disasters. In India, the Twelfth Five-Year Plan blandly noted that of the

estimated 60 million people displaced in development projects since independence, as many as 40% were *adivasis* [1].

Any form of coal mining, surface or underground causes a wide range of social and environmental problems such as decline in agricultural production, displacement and other socioeconomic impacts. Opencast coal mines damage a large land surface area, displace people from their ancestral homesteads and cause agricultural losses [2].

'Displacement' is not merely physical removal from one's land; it destroys people's lives economically, socially and culturally. Such displacement is often caused by land-based development projects that wrecks communities' social structure and leaves those displaced more vulnerable to impover-

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ishment [3]. The forced relocation by mining project is known as Mining Induced Displacement and Resettlement that basically caused by acquisition of homeland from the marginalized section [3].

‘Land Acquisition’ is a legal process of acquiring land of individual or organization by the central or state government for public purposes or for private entity after paying compensation to its owner. Though availability of land is limited on this earth but it is in great demand in farm sectors, industrial sectors, mining sectors, government sectors etc. and all these leads to acquisition of land which creates large number of landless people, evicted from their place of earnings. The accumulation of private and communal land for the expansion of mining results in massive displacement of people in the Sonpur Bazari area [4]. Though Land Acquisition, Rehabilitation and Resettlement Act, 2013 states that as far as possible, land will not be acquired in the scheduled areas but this basically affects the marginalized rural, scheduled people because they cannot raise their voice against the disorderliness. Marginalization of land looser group is the process of relegating a group of people to outer edge or margin of the society and is accorded with lesser importance. It may be social or economic, basically emanate from social backwardness and deprivation of economic means. Normally the land looser group bears the brunt of any development projects. The present study highlights how and at what amount the marginalized people have obtained and utilized the compensation packages given by ECL due to their displacement caused by open cast mining [5].

It is against this background that awareness of human rights and the concomitant spread of human rights groups emerged forcing governments across the nations to take proactive legislations to ensure the dignity of human beings and their right to livelihood. These legislations, centre on some basic premises that are defined below.

Resettlement means physical relocation or displacement of large group of people from their homestead to another region, often a form of forced migration imposed by state policy or international authority after getting full compensation for land and properties [6].

Rehabilitation means restoration of the displaced people to a satisfactory state. It refers to the reconstruction of livelihood of the displaced people which includes various measures and strategies to make the resettlement site ecologically, eco-

nomically, and socially sustainable. Thus, rehabilitation is a mode of re-establishing the lost livelihood of the displaced people through the following designs.

- Cash Based Rehabilitation;
- Land Based Rehabilitation;
- Employment Based Rehabilitation;
- Ecological Rehabilitation;
- Socio-Economic and Cultural Rehabilitation.

## 2. Study Area

The study area, Sonpur-Bazari Open Cast mine and its affected area (23°40'45" to 23°42'28" N & 87°13'11" to 87°15'37" E) that fall in Haripur panchayas under Pandabeswar CD block of Paschim Bardhaman district, West Bengal, India. The Sonpur-Bazari Open Cast project (OCP) is located in the eastern part of Raniganj Coalfield at a distance of about 30 km from Asansol, 15 km from Raniganj and 19 km from Durgapur town. The Raniganj-Suri Road passes through this area and the Ukhra Railway station on Andal-Sainthia line passes through the south west portion, at a distance of 8 km. The area is covered in Survey of India Toposheet No. 73 M/2 & 73 M/6.

## 3. Description of the Project

It is one of the largest OCP (Open Cast Project) of Raniganj Coal belt of Paschim Bardhaman district, first started in 1979 as Kumarkhala OCP then renamed as Sonpur-Bazari OCP in 1991 under Eastern Coalfield Limited (ECL), a subsidiary of Coal India Limited (CIL). Total 2404.85 hectare of the land has been acquired under CBA (Coal Bearing Area) / LA (Land Acquisition) Acts, 1957 and direct purchases out of which presently 1594.66 hectare of land is under possession of the mine and 110.87 hectare (5%) have been taken for Project Affected Families resettlement and rehabilitation purposes (CMPDI Report of Sonpur Bazari OCP, Aug 2014). The project has already rehabilitated 12 affected villages and 5 are in the way of rehabilitation in its near future. Where, a total of 3665 (PAFs) to be shifted of which 41% (1486) has been shifted. The rehabilitation of the project affected people (PAP) has been done in Dahuka and Chinchuria Mouza of Jamuria block and Bahula mouza of Pandabeswar block (Tables 1&2).

**Table 1.** Mode of Acquisition of Land in Sonpur-Bazari OCP.

| Mode of Acquisition of Land (Hectare) |                      |                          |                |                    |                     | Total                           |
|---------------------------------------|----------------------|--------------------------|----------------|--------------------|---------------------|---------------------------------|
| CBA Act Ph- 1, 68.01 ha               | CBA Act, Ph-2 547 ha | CBA Act, Ph- 111 1200 ha | LA Act, 398.54 | Inherited 38.58 ha | Govt. land 42.65 ha | Direct Purchase Ph—1, 110.07 ha |
|                                       |                      |                          |                |                    |                     | 2404.85 ha                      |

Source: CMPDI Report of Sonpur Bazari OCP, Aug 2024.

**Table 2.** Land Use Details of Sonpur-Bazari OCP.

| SL. NO.                                    | Land Use Type                      | Present Land Use |
|--------------------------------------------|------------------------------------|------------------|
| 1.                                         | Excavated Area including haul road | 466.0            |
| 2.                                         | Undisturbed Area                   | 1225.40          |
| 3.                                         | Colliery Infrastructure/Built-up   | 135.45           |
| 4.                                         | Village                            | 28.59            |
| 5.                                         | External OB Dump (Active)          | 60               |
| 6.                                         | Plantation on External OB Dumps    | 5.0              |
| 7.                                         | CHP                                | -                |
| 8.                                         | Railway Siding                     | -                |
| 9.                                         | Road                               | 9.50             |
| 10.                                        | Nallah                             | 38.21            |
| 11.                                        | Tank                               | 18.62            |
| 12.                                        | Lagoon                             | -                |
| 13.                                        | Greenbelt/ Plantation              | 82               |
| 14.                                        | Backfilled area (Active            | 222.21           |
| 15.                                        | Plantation on backfilled area      | 3.0              |
| Total                                      |                                    | 2293.98          |
| Land outside project area                  |                                    |                  |
| Project Settlement and Rehabilitation Site |                                    | 110.87           |
| Gross Total                                |                                    | 2404.85          |

Source: CMPDI Report of Sonpur Bazari OCP, Aug 2024.

#### 4. Primary Objective: The Major Objectives of This Study Are

- 1) To study the status of utilization of the rehabilitation packages offered by ECL to the land looser household of the 12 villages that fall within the ambit of Sonpur-Bazari OCP under ECL in Raniganj Coal belt.
- 2) To assess the viability of rehabilitation packages for alternative livelihood.

#### 5. Secondary Objectives

The primary objective of this case study would be to conduct an in-depth investigation into the socio-economic and environmental consequences of ECL mining operations in the Raniganj-Asansol belt on the affected local communities, with a specific focus on the experiences of land-losing households. However specific objectives could include:

- 1) To assess the changes in livelihood patterns and eco-

nomie status of households due to land acquisition and mining activities.

- 2) To evaluate the effectiveness and adequacy of the rehabilitation and resettlement processes for displaced communities.
- 3) To identify and document the key environmental impacts of mining (subsidence, pollution, etc.) on the local environment and public health.
- 4) To understand the social impacts, including changes in community structure, social networks, and well-being.
- 5) To gather perceptions and experiences of different stakeholders (land looser, non-displaced residents, ECL officials, local authorities) regarding the impacts and mitigation measures [6].

##### 5.1. Study Area

The study area would focus on the Raniganj-Asansol coal belt, specifically identifying villages, blocks, or clusters of communities that have been directly impacted by land acquisition, ongoing mining operations, subsidence, or mine fires

related to ECL projects. Selection of specific sites could be based on the type of mining (underground vs. opencast), the severity of impacts, and accessibility.

## 5.2. Research Design

This study would best utilize a Case Study design employing a Mixed-Methods Approach.

**Case Study:** Focusing on the Raniganj-Asansol region as a specific case allows for an intensive, holistic description and analysis of the complex interactions between mining activities and the local environment and communities.

**Mixed-Methods:** Combining both quantitative and qualitative data collection and analysis methods provides a more comprehensive understanding. Quantitative data can measure the extent of socio-economic changes and environmental parameters, while qualitative data can explore the lived experiences, perceptions, and nuances of the impacts [7].

## 5.3. Sampling Strategy

A multi-stage sampling strategy would be appropriate:

**Purposive Sampling (of communities/villages):** Select specific villages or clusters within the Raniganj-Asansol area known to be significantly affected by ECL's operations, including those where land acquisition and displacement have occurred and those experiencing environmental impacts like subsidence or pollution.

**Stratified Sampling (of households/individuals):** Within the selected communities, stratify the population based on relevant characteristics such as:

Land loser households (categorized by amount of land lost, compensation/rehabilitation status).

Non-displaced households in affected areas (experiencing environmental impacts but not necessarily land loss).

Households in resettlement colonies [9].

**Random Sampling (within strata):** Select a random sample of households or individuals from each stratum to ensure representativeness within that group.

**Purposive Sampling (of key informants):** Select individuals with specific knowledge or experience relevant to the study, such as community leaders, representatives of local NGOs, ECL officials (involved in land acquisition, rehabilitation, environment), and local government authorities [10].

## 5.4. Data Collection Methods

### 5.4.1. Primary Data

**Household Surveys/Questionnaires:** Administer structured or semi-structured questionnaires to a sample of households from different strata. This would collect quantitative data on demographics, livelihood before and after the project, income levels, assets, employment status, details of compensation and rehabilitation received, health status, and perceptions of environmental issues.

**In-depth Interviews:** Conduct detailed, open-ended interviews with a smaller sample of individuals from each stratum (especially land losers and community leaders) and key informants. This allows for exploration of personal experiences, challenges faced, social impacts, effectiveness of policies, and nuanced perspectives [8].

**Focus Group Discussions (FGDs):** Organize FGDs with different groups within the community (e.g., male farmers, women, youth, residents of resettlement colonies).

### 5.4.2. Secondary Data

**Literature Review:** Review academic research papers, books, reports by government agencies, NGOs, and media reports related to coal mining impacts, land acquisition, displacement, and rehabilitation in the Raniganj-Asansol region and other similar contexts in India.

**ECL and Government Documents:** Analyze official documents such as Environmental Impact Assessment (EIA) reports, Social Impact Assessment (SIA) reports, Resettlement and Rehabilitation (R&R) plans, annual reports of ECL, environmental monitoring data, land acquisition records, and relevant government policies and notifications [19].

**Census Data and other Official Statistics:** Utilize census data and other relevant statistics to understand demographic changes, occupational shifts, and economic trends in the region over time.

**Geographic Information Systems (GIS) and Remote Sensing Data:** Acquire and analyze satellite imagery and other spatial data to assess land use and land cover changes, monitor the extent of mining areas, identify subsidence zones, and analyze environmental parameters over time.

## 6. Results and Discussions

The target groups of the study are the 12 affected villages of which only the marginalized sections of population have been taken into consideration. To assess the socio-economic marginalization, the social compositions of the surveyed households have been analyzed here. From the Figure 1, it is evident that two major caste groups are noticed here, Schedule Cast and Schedule Tribe. 30% households are SC dominated and 61% are ST dominated. Besides 7% households are OBC and 2% are general caste [11].

After assessing this, target groups are divided into two categories based on their social composition.

**Tribal dominated villages:** Arusola, Kuchibera, Basadanga, Bandhghat, Banglapara, Chhatimdanga, Behladanga, Panjabidanga.

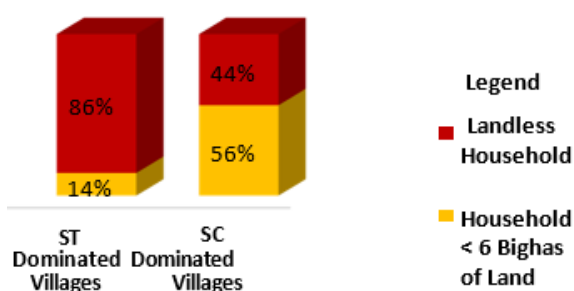
**Non-tribal mixed character villages:** Sonpur, Bhaluka, Hasdiha, Ruidaspara.

Economic Status and occupational structure of the Target Groups having identified their social marginalization, we now see the economic status of these groups. Since this is a rural area, the indicators for identification of economic status are

the land tenurial rights, size of the land holdings and the occupational character of the occupant households. For this purpose, two indicators of land ownership have been examined for the following two phases for the two major caste groups.

Phase I: Period before land acquisition by ECL (Before 1992).

Phase II: Period after land acquisition by ECL (After 1992).



**Figure 1.** Economic Status (Land Holding) in Phase I.

## 6.1. Land Holding and Occupational Character

In case of land holding, it is found (Figure 2) that in phase I, among the ST dominated households 14% had < 6 bighas of land and 86% were landless. Whereas among the SC dominated households 56% had < 6 bighas of land and 44% were landless.

In the context of occupational character, it is found (Figure

2) that in phase I, 100% household were basically engaged in agriculture of which 31% as cultivator and 69% as agricultural labour. It should be mentioned here that the landless household were the labour and household with little amount of land were the cultivator. It is very clear from the table that there was no other occupation except agricultural activities [12].

After land acquisition by ECL the scenario become reversed as the earlier producers or cultivators has turned into an industrial labour force. Due to non-availability of land there is no cultivator. The household having less than 6 bighas of land are engaged as daily wage labour (26%) in the OCP patches but not in permanent basis. Whereas the land less household did not get any alternative livelihood from ECL and they engage themselves as construction labour (27%), brick kiln labour (28%), farm labour (15%) and some other activities (4%) like dairy business, religious activity or as worker in electric or medical shop.

Extent and Impact of Land Acquisition on the Target Groups:

The ECL has acquired a total amount of 2404.58 hectares land for the whole project which is clearly mentioned in Tables 1 & 2. Now in Table 3, it is found that from the 12 displaced villages a total amount of 788.5 hectares land has been acquired by the project of which 516.2 hectares from Sonpur mouza, 95.1 hectares from Bhaluka Mouza and 177.2 hectares from Hansdiha mouza. From the total households of the 12 villages 47% are the target population that means they have been affected by the project.

**Table 3.** Extent and Impact of Land Acquisition on the Target Groups.

| SL. No. | Name of the village | Panchayat and Block | Area of Land Acquisition (in hectare) | Total population | Total No. of household | No. of household having less than 6 bighas of land | No. of landless household |
|---------|---------------------|---------------------|---------------------------------------|------------------|------------------------|----------------------------------------------------|---------------------------|
| 1       | Sonpur              |                     |                                       | 2358             | 520                    | 47                                                 | 25                        |
| 2       | Arsula              |                     |                                       | 300              | 100                    | 10                                                 | 83                        |
| 3       | Kuchibera           |                     |                                       | 250              | 50                     | 8                                                  | 41                        |
| 4       | Basadanga           |                     |                                       | 300              | 100                    | 6                                                  | 93                        |
| 5       | Bandhghat           |                     |                                       | 80               | 30                     | 0                                                  | 30                        |
| 6       | Sonpur              | Banglapara          | 516.2                                 | 38               | 12                     | 0                                                  | 9                         |
| 7       |                     | Chhatim-danga       |                                       | 90               | 34                     | 0                                                  | 34                        |
| 8       |                     | Behladanga          |                                       | 212              | 94                     | 31                                                 | 61                        |
| 9       | Panjabidanga        |                     |                                       | 317              | 119                    | 58                                                 | 22                        |
| 10      | Ruidaspara          |                     |                                       | 200              | 64                     | 35                                                 | 12                        |
| 11      | Bhaluka             |                     | 95.1                                  | 681              | 153                    | 5                                                  | 30                        |
| 12      | Hansdiha            |                     | 177.2                                 | 482              | 210                    | 23                                                 | 42                        |

| SL. No. | Name of the village | Panchayat and Block | Area of Land Acquisition (in hectare) | Total population | Total No. of household | No. of house-hold having less than 6 bighas of land | No. of landless household |
|---------|---------------------|---------------------|---------------------------------------|------------------|------------------------|-----------------------------------------------------|---------------------------|
| Total   |                     |                     | 788.5                                 | 5308             | 1486                   | 223                                                 | 482                       |

Source: Census of India, 2021 & Field Survey, 2024

## 6.2. Compensation Packages for Rehabilitation Provided by ECL

According to *CMPDI (Central Mine Planning & Design Institute)* report of EIA & EMP (2014), the rehabilitation scheme involves provision of adequate compensation for the losses of land and homestead for the outsees from Sonpur-Bazari Project through the following ground:

**10a. Land for construction of the houses:** An area equivalent to twice of the plinth area of existing house has been given to the owner for construction of his own houses subject to a minimum of 3 katha lands.

**10b. Amount for construction of the houses:** House survey committee assesses the value of existing houses and after assessment the adequate amount has been paid to the house owner for construction of his new house.

**10c. Monetary Compensation for the loss of land:** A monetary compensation of Rs. 3 lakhs have been paid to each ward

of the affected families who have gain above 18-year-old age. Moreover 1 ECL job has been provided in lieu of 2 acres (6 bighas) of land as per RR Policy, 2012 of CIL [13].

Moreover, the report also said that the land looser families who are not provided with employment in lieu of loss of earning from land will be compensated as per RR Policy, 2012 of CIL. Tribal affected families are to be given one-time financial assistance of 500 days MAW (Minimum Agricultural Wages) for loss of customary rights or usage of forest produce [12].

**10d. Rehabilitation Status:** The project has sufficient land in possession for township. It has already rehabilitated 12 affected villages and 5 are in the way of rehabilitation in its near future, where 1486 families have been rehabilitated. The rehabilitation of the project affected Families (PAFs) has been done in Dahuka and Chinchuria Mouza of Jamuria block and Bahula mouza of Pandabeswar block which is clearly shown in Table 4.

**Table 4.** Rehabilitation Details.

| SL. No. | Name of the village | Year of Rehabilitation | Rehabilitation Site |
|---------|---------------------|------------------------|---------------------|
| 1       | Sonpur              | 2016-17                | Dahuka              |
| 2       | Arsula              | 2014-15                | Dahuka              |
| 3       | Kuchibera           | 2014-15                | Dahuka              |
| 4       | Basadanga           | 2014-15                | Dahuka              |
| 5       | Bandhghat           | 2014-15                | Dahuka              |
| 6       | Banglapara          | 2014-15                | Dahuka              |
| 7       | Chhatim dang        | 2014-15                | Dahuka              |
| 8       | Behladanga          | 2016                   | Bahula              |
| 9       | Panjabidanga        | 2020                   | Kalipahari          |
| 10      | Ruidaspara          | 20206                  | Chinchuria          |
| 11      | Bhaluka             | 2016                   | Dahuka              |
| 12      | Hansdiha            | 2014                   | Dahuka              |

Source: Survey, 2024.

### 6.3. Target Group's Perception About the Project

The people's perception regarding the project was very positive before land acquisition and Rehabilitation. They thought that project would open the door for livelihood opportunities to them. Moreover, being locals, they would be hired as mining labour. They did also expect that ECL would provide them vocational training so that after rehabilitation they will have another option for new livelihood. But all their expectation and perception regarding the project went in vain. The ECL did neither give them job for alternative livelihood nor provide alternative cultivated land to maintain their previous livelihood. Moreover, in new relocation site they are feeling lack in access to resource and infrastructure and the tribals are feeling insecure than previous. They express their reluctance to rehabilitation and to accept the alternative livelihood instead of their previous agricultural activity, which is very clear from the [Tables 3 & 4](#) that the tribal villages are completely unwilling in both for rehabilitation and for alternative livelihood respectively. So, they were far better in their previous location in comparison to the new relocation site (Sharan, 2005). Land acquisition in Raniganj, West Bengal, like in any other region, has significant social impacts. These impacts can be both positive and negative, and their nature and extent depend on various factors, including the purpose of the land acquisition, the scale of the project, and the implementation process [\[14\]](#).

Here is a breakdown of the potential social impacts:

### 6.4. Negative Impacts

- 1) Displacement and Loss of Livelihoods: Land acquisition often leads to the displacement of people who reside on the land being acquired. This can result in the loss of homes, agricultural land, and other sources of livelihood, particularly for farmers, agricultural laborers, and small businesses.
- 2) Loss of Community and Social Networks: Displacement can disrupt existing social structures and community bonds, leading to a sense of loss and isolation for those affected.
- 3) Cultural and Heritage Impacts: Land acquisition may impact sites of cultural or historical significance, leading to their destruction or alteration.
- 4) Increased Vulnerability: Marginalized communities, such as Scheduled Castes and Scheduled Tribes, may be disproportionately affected by land acquisition due to their dependence on land and limited resources.
- 5) Social Conflicts and Tensions: Inadequate compensation, lack of transparency, and unfair practices in land acquisition can lead to social conflicts and tensions between the project proponents and the affected communities.

### 6.5. Positive Impacts (Potential)

- 1) Employment Opportunities: Large-scale projects resulting from land acquisition can create employment opportunities during the construction and operation phases.
- 2) Infrastructure Development: Land acquisition can facilitate the development of essential infrastructure like roads, railways, and industrial facilities, which can benefit the wider community in the long run.
- 3) Economic Growth: New projects can stimulate economic growth and development in the region.
- 4) Improved Living Standards (Potentially): If handled well, land acquisition and subsequent development can lead to improved living standards for some sections of the population through better access to amenities and services.

### 6.6. Factors Determining the Nature of Social Impact

- 1) Compensation and Rehabilitation: The adequacy and fairness of compensation and the effectiveness of rehabilitation and resettlement measures are crucial in mitigating negative social impacts.
- 2) Transparency and Participation: A transparent and participatory process that involves the affected communities in decision-making can help minimize negative impacts and build trust.
- 3) Legal Framework and Implementation: The existing legal framework for land acquisition and its effective implementation plays a vital role in ensuring that the rights and interests of the affected people are protected.

### 6.7. Specific Context of Raniganj

Raniganj is a coal mining area, and land acquisition for mining and related activities has been a long-standing issue. Studies and reports on land acquisition in the Raniganj coal belt highlight concerns about displacement, loss of agricultural land, and the vulnerability of local communities. It is important to note that the social impact of land acquisition is a complex issue with diverse perspectives. While development projects are often necessary for progress, it is crucial to ensure that they are carried out in a just and equitable manner, with due consideration for the social well-being of the affected communities. For a comprehensive understanding of the social impact in land acquisition at Raniganj, it would be beneficial to refer to specific studies, reports, and local news related to land acquisition projects in the area [\[15\]](#).

The Eastern Coalfields Limited (ECL) projects in the Raniganj-Asansol region have had profound environmental impacts on the local communities, significantly affecting their living conditions, health, and the natural resources they de-

pend on. These impacts stem from various aspects of coal mining, both historical and ongoing.

## 7. Here Are the Key Environmental Impacts on Local Communities in the Raniganj-Asansol ECL Project Area

- 1) **Land Subsidence:** This is one of the most critical environmental problems in the Raniganj coalfield, particularly in areas with a long history of underground mining. The extraction of coal creates underground voids, which can lead to the sinking or settling of the land surface above. This subsidence causes severe damage to houses and other buildings, roads, railway lines, and other infrastructure. It also disrupts natural drainage patterns, leading to waterlogging in some areas and affecting agricultural land. Communities living in subsidence-prone zones face constant fear for their safety and the loss of their homes and property [16].
- 2) **Mine Fires:** The Raniganj coalfield is plagued by numerous underground and surface mine fires, some of which have been burning for decades. These fires release toxic gases like carbon monoxide, sulfur dioxide, and carbon dioxide into the atmosphere, significantly degrading air quality. They also consume valuable coal resources and further destabilize the ground, exacerbating subsidence risks. The smoke and fumes from mine fires directly impact the health of residents in nearby areas.
- 3) **Air Pollution:** Coal mining operations generate substantial amounts of dust from activities like excavation, blasting, loading, transportation, and coal handling. This particulate matter pollutes the air, leading to respiratory problems, allergies, and other health issues among the local population. Gaseous pollutants from mining machinery, burning coal, and mine fires further contribute to poor air quality.
- 4) **Water Pollution:** Mining activities can contaminate both surface and groundwater sources. Acid mine drainage, formed when water reacts with sulfide minerals in disturbed rock, can lower the pH of water and leach out heavy metals, making the water unfit for drinking, irrigation, and aquatic life. Runoff from overburden dumps and coal stockpiles can also carry pollutants into nearby rivers, streams, and ponds, affecting water quality and availability for communities.
- 5) **Land Degradation:** Beyond subsidence, mining operations directly degrade land through the creation of open-cast pits, waste dumps (overburden), and infrastructure like roads and buildings. This leads to the loss of fertile topsoil, disruption of natural landscapes, and reduced land availability for agriculture, forests, and other uses. Reclaiming and rehabilitating these degraded lands is a significant challenge.

- 6) **Impact on Water Regime:** Underground mining can disrupt groundwater flow patterns, leading to the depletion of aquifers in some areas and waterlogging in others. This affects the availability of water for domestic use and agriculture, forcing communities to rely on alternative, sometimes less reliable, sources.
- 7) **Noise and Vibration:** Drilling, blasting, and the operation of heavy machinery in mining areas generate significant noise and vibration, which can be a constant source of disturbance and stress for residents living nearby, affecting their quality of life.
- 8) **Loss of Biodiversity and Vegetation:** Mining activities often involve clearing vegetation and forests, leading to habitat loss and a decline in biodiversity. This can impact local ecosystems and the availability of forest produce that some communities may rely on.

These environmental impacts are not isolated but are interconnected and collectively pose a significant threat to the health, safety, and well-being of the local communities in the Raniganj-Asansol coal belt. While efforts are being made towards environmental mitigation and rehabilitation through various master plans and policies, the legacy of historical mining and the ongoing nature of operations mean that these environmental challenges remain a major concern for the residents [17].

The Eastern Coalfields Limited (ECL) projects in the Raniganj-Asansol region have profoundly impacted the socio-economic fabric of the local communities. While coal mining has historically been a significant economic activity providing employment and contributing to the regional economy, it has also brought about numerous challenges and negative consequences for the people living in the area [18].

## 8. Here's a Breakdown of the Socio-economic Impacts on Local Communities

Economic Impacts:

- 1) **Employment Opportunities:** ECL operations are a major source of formal employment in the region, providing jobs directly in the mines and indirectly in associated industries and services. This has historically attracted migration to the area. However, increased mechanization in modern mining, particularly in open-cast mines, has limited the overall job creation potential compared to older, labor-intensive underground mines [18].
- 2) **Changes in Livelihoods:** The expansion of mining has led to a significant decline in traditional agricultural activities due to land acquisition and environmental degradation. This forces people to seek alternative livelihoods, often leading to a shift from farm-based work to wage labor, sometimes in less secure or informal sectors.
- 3) **Ancillary Economic Activities:** The presence of a large mining enterprise can stimulate some local businesses

and services catering to the needs of the workforce and the company.

- 4) **Impact of Mine Closure:** The eventual closure of mines can lead to significant economic distress for communities that have become dependent on mining for generations, resulting in job losses and a decline in local economic activity if not planned for with alternative development strategies.
- 5) **Illegal Mining:** In some areas, the formal mining economy coexists with illegal mining activities, which can create a complex socio-economic dynamic, often associated with safety risks, environmental damage, and law and order issues.

## 9. Environmental and Health Impacts

- 1) **Land Degradation and Subsidence:** Coal mining, especially underground mining, has caused widespread land subsidence, damaging houses, infrastructure (roads, railways), and rendering land unstable and unsafe for habitation and cultivation. Abandoned mines also pose risks.
- 2) **Mine Fires:** The Raniganj coalfield is notorious for underground and surface mine fires, which release toxic gases, pollute the air, and further destabilize the land, posing serious health and safety risks to nearby communities.
- 3) **Air and Water Pollution:** Mining activities generate significant dust from excavation, transportation, and coal handling. Burning of coal and mine fires release noxious gases. Mining can also contaminate surface and groundwater sources through acid mine drainage and runoff from waste dumps, affecting the availability of clean drinking water and impacting health.
- 4) **Health Issues:** Exposure to air and water pollution, dust, and other environmental hazards leads to various health problems among the local population, including respiratory illnesses (like pneumoconiosis among workers and communities), skin diseases, and other ailments [19].

## 10. Social Impacts

- 1) **Displacement and Resettlement:** As discussed previously, land acquisition for mining leads to the displacement of communities, disrupting social structures, cultural practices, and traditional ways of life. The process of resettlement and rehabilitation, if not handled effectively, can cause prolonged hardship and social unrest.
- 2) **Changes in Settlement Patterns:** The growth of mining has led to urbanization in certain pockets, as people migrate in search of work. Conversely, areas affected by severe subsidence or mine fires may experience out-migration.

- 3) **Infrastructure Development:** ECL has contributed to the development of some infrastructure in the region, such as roads, housing colonies for employees, and sometimes healthcare and educational facilities. However, environmental damage like subsidence can also severely impact existing public and private infrastructure [19].
- 4) **Social Tensions:** Issues related to land acquisition, compensation, employment, and environmental damage can lead to tensions between the local communities, mining authorities, and sometimes migrant workers.
- 5) **Safety Concerns:** Living in areas prone to subsidence and mine fires poses continuous safety risks to the residents.

## 11. Concluding Remarks

In conclusion, the ECL projects in Raniganj-Asansol have created an industrial landscape that offers economic opportunities but at a considerable environmental and social cost to the local communities. While the projects are vital for energy production, mitigating the adverse socio-economic and environmental impacts and ensuring sustainable development and equitable benefits for the local population, particularly the most vulnerable, remain critical challenges.

The social impact of land acquisition is a multifaceted and often complex issue, with both potential benefits and significant negative consequences. It's crucial to understand these impacts to ensure that land acquisition processes are just, equitable, and sustainable.

The development of Eastern Coalfields Limited (ECL) projects in the Raniganj-Asansol region has had significant and often challenging socio-economic impacts on the people who have lost their land due to mining activities. These individuals, often referred to as "land looser" or "project affected persons" (PAPs), face a multifaceted disruption to their lives and livelihoods.

## Abbreviations

|       |                                      |
|-------|--------------------------------------|
| ECL   | Eastern Coalfields Limited           |
| PAP   | Project Affected Persons             |
| NGO   | Non-Government Agencies              |
| CIL   | Coal India Limited                   |
| SIA   | Social Impact Assignment             |
| CMPDI | The Central Mine Planning and Design |
| OCP   | Open Cast project                    |
| CBA   | Coal Bearing Area                    |
| LA    | Land Acquisition                     |
| PAF   | Project Affected Families            |
| GIS   | Geographic Information Systems       |

## Author Contributions

Tania Ghosh is the sole author. The author read and ap-

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## Conflicts of Interest

The author declares no conflicts of Interest.

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