

Coal Mining and Rural Livelihoods: Case of the Ib Valley Coalfield, Orissa

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This study analyses the diverse positive and negative impacts that coal mining has on the livelihoods of local communities of the Ib valley coalfield in Orissa. Using the sustainable livelihoods framework, it shows that coal mining, which is a form of physical capital, contributes to the enhancement of financial capital. It has a mixed impact on physical and social capital and a negative impact on human and natural capital. In this situation while the benefits seem to be for the short term, the costs are borne over the long run.

The opening of a mine has several economic, environmental and social consequences at the national, state or provincial and local levels. Mines not only create direct and indirect employment opportunities, but also generate foreign exchange earnings and tax revenues. New mining projects provide, in addition to business activities, basic facilities like roads, schools and health clinics to remote areas. Mining has also a range of indirect impacts, positive and/or negative, on the local communities and their livelihoods: It displaces them from their own land; they could lose their homes, agricultural land and forest-based livelihoods; their natural environment degrades day by day, creating air and water pollution; skilled labour migrates to work in mines, creating tension between the local people and the outsiders. Sometimes, the benefits may be unevenly shared, or they may not compensate for the loss of existing livelihoods and damage to environment and culture (MMSD 2002).

Livelihood, in its simplest sense, is a means of gaining a living and comprises the capabilities, assets and activities required for a means of living. A livelihood is sustainable which can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation and which contributes net benefits to other livelihoods at the local and global levels and in the short and long term (Chambers and Conway 1992). Ellis (2000) defines livelihood as that which comprises "...the assets (natural, physical, human, social and financial capital), the activities, and the access to these that together determine the living gained by the individual or household".

The impact of mining on the livelihoods of the local communities is largely neglected. Often, all the benefits accrue to the mining industry and its workforce, depriving the rest of the population in the locality. These populations bear only the costs, while the provision of benefit is lopsided.

Coal mining in the Ib valley coalfield in Orissa has affected the community in many ways: it has provided employment to the people, it has provided basic facilities like roads, schools and clubs; it has however caused air, water and noise pollution. The people have been displaced from their own land. To study these different impacts of coal mining on the livelihoods of the community, a livelihood approach – a way of thinking about the objectives, scope and priorities of development is necessary. This research attempts to study the positive and negative impacts that mining has on the livelihoods of the local communities in the Ib valley coalfield, using the sustainable

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livelihoods framework. The main research questions addressed in this paper are:

- (1) How does mining influence the livelihoods of the local people? And what exactly are the benefits/costs of the mining projects?
- (2) How can benefits, and indeed, potential negative outcomes be assessed?
- (3) Does mining support/provide sustainable livelihoods?

This paper has been organised as follows: The first section describes the livelihoods framework. Section 2 is on study area, data collection and methodology. Section 3 discusses the impact of coal mining on livelihoods assets. These assets are five different types of capital. The last section answers whether this will lead to sustainable livelihoods in the Ib valley coalfield.

1 Sustainable Livelihoods Framework

Livelihoods thinking dates back to the work of Robert Chambers in the mid-1980s, further developed by Chambers, Conway and others in the early 1990s. In this study the livelihoods framework was adapted from a model developed by the United Kingdom's Department for International Development (DFID 1999).¹ This approach has largely been used in agriculture and rural livelihoods projects, but its relevance to mining projects has not been assessed. In its simplest form, this framework views people as operating in a context of vulnerability. Within this context, they have access to certain assets or poverty-reducing factors. These help them gain their meaning and value through the prevailing social, institutional and organisational environment. This environment also influences the livelihood strategies – ways of combining and using assets – that are open to people in pursuit of beneficial livelihood outcomes that meet their own livelihood objectives. They all relate the processes of change to the conditions in which people's livelihoods operate and the response of livelihoods to these changes (DFID 1999).

Coal mining influences all activities; the effects of these activities on the assets, in the form of five types of capital are studied. These assets influence policies and institutions and also get influenced by them. Finally, they adopt different livelihood strategies, which result in diverse livelihood outcomes. The livelihoods frameworks identify five core asset categories or types of capital

upon which livelihoods are built. That is, people require a range of assets to achieve positive livelihood outcomes. They are, human capital, natural capital, financial capital, physical capital and social capital. These different forms of capital are different forms of livelihood assets that the households can use to make a living.

Other agencies like the United Nations Development Programme (UNDP), Oxford Committee for Famine Relief (OXFAM), and Cooperative for Assistance and Relief (CARE) have different approaches to livelihood. The UNDP focuses on the importance of technology as a means to help people rise out of poverty. The sustainable livelihoods agenda is a part of the organisation's overall sustainable human development. This includes poverty eradication, employment and sustainable livelihoods, gender, protection and regeneration of the environment and governance. CARE's basic emphasis is on household livelihood security linked to basic needs. Its livelihoods approach focuses on programmes which help the poorest and most vulnerable. It places less emphasis on its framework and approach on structures, and processes and macro-micro links. Oxfam, Great Britain feels the need for a broad framework that could accommodate issues of environmental change, together with the concerns about globalising markets, gender and social inequality, and the need to strengthen deprived people's participation in development process.

Generally, the livelihood approach discusses how different forms of capital affect different livelihoods. In this study, the influence of different livelihoods options, in general and mining, in particular, on the five forms of capital is explained. Then it is examined whether this mining, which is a source of livelihood of the community, is leading towards sustainable living or not.

2 Study Area, Data Collection and Methodology

This study concentrates on the Ib valley coalfield of Orissa. The state has two coalfields. One is Talcher and the other is the Ib valley coalfield. The state's inland area, where the study area is located, is much less developed than the coastal area. The whole region was underdeveloped before coal mining. With the nationalisation of the coalmines in the 1970s, mining operations accelerated, and consequently developed the area.

Table 1: Key Features of Sample Villages

Features	Mining Villages					Control Villages	
	Ainlapali	Bundia	Chharla	Lajkura	Ubuda	Saletikra	Tangarpali
Distance from near by mines (in km)	3	0	1	1	1	-	-
Total population	458	673	731	916	1,112	522	1,056
Social composition	Mixed	Mixed	Mixed	Mixed	Mixed	Mixed	Mixed
Total households (nos)	74	122	97	178	167	115	220
Livelihoods	Mine's employee and day labourer	Agriculture and day labourer	Agriculture and day labourer				
Infrastructure in villages	High school club	Primary school	Primary school club	Primary school	Upper primary school	Primary school	Primary school
Electricity	Available	Available	Available	Available	Available	Available	Available
Drinking water	Tube well	Village well	Village well	MCL is providing	Village well	Tube well	Tube well

Social composition includes all categories: scheduled caste (SC), scheduled tribe (ST) and other backward classes (OBC). High school (up to class 10th), primary school (up to class 5th), upper primary school (up to class 7th).

Source: Field Study.

The Ib valley coalfield is spread over two districts of Orissa – Jharsuguda and Sundargarh – covering an area of 1,375 sq km. The coalfield is named after the river Ib, a tributary of the river Mahanadi. This coalfield is part of the Mahanadi Coalfields Limited (MCL), a subsidiary of Coal India Limited (CIL). This coalfield has been divided into five areas comprising five underground and seven opencast mines. The five areas are Orient, Ib valley, Lakhampur, Basundhara and Garjanbahal. The first three are located in Jharsuguda and the last two are located in Sundargarh. The coalfields of Sundargarh are comparatively new compared to that of Jharsuguda. The older the coal mine, the more the impact. Hence, the so coalfields of Jharsuguda were selected for this study.

As coal mining began in this area nearly a century ago, it is difficult to go for a before and after comparison. Therefore, with and without comparison approach has been used. The sample consists of five villages situated near the coal mines (called the mining villages)² and two villages, which are away from the coal mines (control villages) but belong to the same district (Table 1, p 118). Data were collected during January to May 2005. Information was gathered with the help of a structured questionnaire. The households (HH) were selected using the circular systematic sampling method. In total 360 households, were selected, 260 from the mining villages and 100 from the control villages.

In this study, the Herfindahl index has been used to measure the income diversification among the different mining villages and also control villages. The Herfindahl index is a measure of the size of firms in relationship to the industry, and an indicator of the amount of competition among them. It is defined as the sum of the squares of the market shares of each individual firm.

$$\text{Formula: } H = \sum (s_i^2) \quad \dots(1)$$

Where s_i is the market share of firm i in market. The Herfindahl index (H), also known as Herfindahl-Hirschman Index (HHI), has a value that is always smaller than one. A decrease in the Herfindahl index generally indicates a loss of pricing power and an increase in competition, while an increase implies monopoly. This Herfindahl index can be used in the diversification measurement issues (Barrett and Reardon 2000). The diversification index is calculated as:

$$D_1 = 1 - H \quad \dots(2)$$

where, H is Herfindahl index

The advantage of the Herfindahl index is its computational simplicity. Since its computation requires just simple arithmetic, it is easier to memorise than the discrete approximation to an integral that comprises the Gini (Barrett and Reardon 2000). The Herfindahl requires only knowing positive values because the square of a zero share is always zero, and therefore, does not affect the sum. One does not have to identify the full range of admissible assets, activities or income sources in the population before one calculates the first Herfindahl index. On the other hand, the Gini coefficient value varies with the number of zero-valued entries. So it is important to know the full range of possibilities before estimating the first household's Gini coefficient (Barrett and Reardon 2000). In this study, the Herfindahl index has been used to study the income

diversification among the different mining villages and also control villages. To compare the means of two groups the t-test is used.

3 Mining and Livelihood Assets in Ib Valley Coalfield

Coal mining started in Ib valley area nearly a hundred years ago. The Himgir Rampur colliery has been in operation since 1909. Coal production increased with the starting of opencast mines. By 2001, coal mining was providing employment to 10,630 workers in Jharsuguda district (GOO 2001).

All the five villages were very much there before mining ever started process.

Prior to independence, agriculture and allied activities (animal husbandry, forestry and fishing) were the main sources of livelihood and employment in these mining villages. With changing times (for example, the advent of manufacturing units in the vicinity), it is seen that the focus of the labour shifted from the agricultural activities to non-agricultural employment opportunities. For example, the Orient Company started a paper mill in Brajaraj Nagar (municipality of Jharsuguda), employing large number of people. The Tata Refractory Limited (TRL), started in Belpahar (notified area of council of Jharsuguda) in 1958, and also provided an alternative source of employment to the local people. In 1992, the Ib thermal power plant had started operating in this area. In addition, people were also engaged in small-scale, cottage and handloom industries. Nevertheless, since 1982 coal mining has become a major source of employment for the local people. The control villages existed before mining operations began. Agriculture was their main source of income. With uncertainty of rain and non-availability of irrigational facilities, they have now shifted to non-agricultural activities, mainly wage work in the construction sector. Nonetheless, the socio-political conditions such as social networking, political influence of representatives are not taken into account in the case of the control villages. This is a limitation of this study.

The livelihood approach is the first and foremost issue of the people. According to this, people require a range of assets to achieve positive livelihood outcomes; no single category of assets, on its own, is sufficient to yield the many and varied livelihood outcomes that people seek. The framework identifies five core asset categories or types of capital upon which livelihoods are built. So it is interesting to study the impact of mining on the following five types of capital.

3.1 Impact on Financial Capital

Financial capital denotes the stocks and flows of financial resources that people use to achieve their livelihood objectives. In this study it is observed that mining has a positive impact on

Table 2: Mean Household Income of Villages

Villages	Mean HH Income (Rs)*	Mean Per Capita Income (Rs)	Mean HH Size (No)*
Villages near opencast (OC) mines	51,130	10,330	5.05
Villages near underground (UG) mines	61,020	12,402	5.2
Villages near OC+UG	49,020	10,280	4.78
Control villages	35,492	8,505	4.44

* Mean comparison t test for mining and control villages significant at 5% level.
Source: Field Study.

financial capital. Table 2 (p 119) shows the difference between mean household income and mean per capita income in both mining and control villages. Mean household incomes of the mining villages are high in comparison to the control villages. In the mining villages, half of the sample households have a job in the mines, giving them a higher level of income. In the control villages, people work as farmers or labourers. In the mining villages, the casual labour in mines are paid Rs 50 per day, hence, the same wage rate has been fixed for all other activities. This situation is the same in one control village, Saletikra, as it is closer to the town.

The mean household income of villages near underground mines is the highest because most of the households of this village have a job in the mines. Villages near opencast mines have lower mean household income. In these villages, the mine workers relatively fewer in number. Some villagers, who have a job in the mines, are now staying in MCL quarters, and hence, do not contribute to the income of this village. The number of people depending on agriculture is more in this village, and this income does not significantly contribute to the mean household income. The same is true in the case of villages, which are in the vicinity of both the opencast and underground mines. On the other hand, there is a big difference in mean household income in the control villages. Here, the wage rate is Rs 40 per day. The availability of employment opportunities is less in these villages. A comparison of the control villages with the mining villages shows the extent to which mining has a positive impact on the financial capital.

The sources of income considered here for determining the Herfindahl index include mining, agriculture, wage labour, business, government service and others. Diversification is defined as the deduction of Herfindahl index from 1. The control villages have more diversified sources of income than the mining villages (Table 3).

A village near underground mines is the least diversified, as most of the households have a job in the mines, and so the people do not need to look for other sources of income. The other two mining villages have comparatively more diversified income sources than the village near underground mines.

3.2 Impact on Physical Capital

Physical capital comprises the basic infrastructure and producer goods needed to support livelihoods. The important components of infrastructure, which are usually essential for sustainable livelihoods are affordable transport, secured shelter and buildings, adequate water supply and sanitation, clean affordable energy and access to information. Here, mining has a mixed impact on physical assets. As the previous section shows, mining has a positive impact on the annual income of the people. Hence, the household's capacity to keep durable assets in home is also more (Table 4).

All the sample households own houses, except for one household in the Lajkura village where the head of the household is a widow, who lives with her only son in her relative's house. There are fewer households having livestock in the mining villages than in the control villages, as there is no land left for grazing in the

mining villages. Only in Ubuda and Bundia villages do more than 20% of the households have livestock. However, 34% of the households in the control villages are found to have livestock. As agriculture is no more a primary source of income in the mining villages, the extent of use of livestock and plough as productive assets is also low. Similarly, some households in the mining villages own pump sets, as they indulge in cultivation, while in the control villages, this percentage is not much as their per capita income is low.

The percentage of households with tractors as a productive asset is greater in the mining villages not only because they have greater purchasing power, but also because they are used in mines and for other construction work. Most of the households in the mining villages own television sets, while this number is comparatively less in the control villages. This percentage is high in villages near UG mines, as the per capita income is high. The percentage of households owning a motorcycle is higher in the mining villages than that in the control villages, as there is no transportation facility to the mining villages, and because of better income. As the Tangarpali village is near the state highway and the Saletikra village is near the district headquarters, the percentage of households owning a motorcycle is comparatively less. Other assets include cars, jeeps and vans. In all the villages such vehicles are used for business purposes.

Land is another important physical asset in rural areas. As agriculture is the main source of livelihood in the control villages,

Table 3: The Herfindahl Index for Income Diversification

Villages	Herfindahl Index	Diversification
Villages near OC	0.413106	0.586894
Villages near UG	0.526931	0.473069
Villages near OC+UG	0.407392	0.592608
Control villages	0.224236	0.775764

Source: Field Study.

Table 4: Physical Capital (Percentage of HHs Having Physical Assets)

Particulars	Villages Near OC Mines	Villages Near UG Mines	Villages Near OC+UG	Control Villages
House	100	100	99.04	100
Livestock	16.19	22	9.52	34
Plough	24.76	10	5.71	41
Pump sets	12.38	12	7.61	11
Tractors	2.85	2	0	1
TV	56.19	82	58.09	42
Fridge	3.80	6	7.61	14
Motorcycle	37.14	50	33.33	15
Others	3.80	0	1.90	1

Source: Field Study.

Table 5: Landholding in Sample Villages

Cultivators	Villages near OC+UG	Villages near OC Mines	Villages near UG Mines	Control Villages
Landless	91 (86.66)	74 (70.48)	33 (66)	44 (44)
Landholder	14 (13.33)	31 (29.52)	17 (34)	56 (56)
Marginal	12	13	15	28
(0.1-2.5 acres)	(11.42)	(12.38)	(30)	(28)
Small	2	11	2	17
(2.51-5 acres)	(1.91)	(10.47)	(4)	(17)
Large	0	7	0	11
(>5 acres)	(0)	(6.66)	(0)	(11)

Figures in parenthesis show the percentage of households to total households.

Source: Field Study.

this percentage of households with land is more. On the other hand, in the mining villages, land is acquired by MCL for mining. So the percentage of households having agricultural land is lesser (Table 5, p 120).

Infrastructural facilities are important for the integration of the remote areas. But none of the mining village have a pucca road, except Lajkura. The roads to mining offices, colonies and the ways in which coal is transported are very good, while in the villages, there is no such facility. Not a single bus comes to these villages. While people earning a better income use bikes or cycles, the only option for the poor is to walk. The situation is slightly different in the control villages. While Tangarpali is a roadside village, and it is well-connected to other places, Saletikra is away from the main road and does not even have a pucca road to connect the village to the main road.

MCL provides free electricity to one village – Bundia. It has also constructed a community centre in Ainlapali and in Chharla, it has constructed a pucca road from the beginning to the end of the village. In all these villages, there are a few grocery shops. Other assets like school buildings and anganwadi centres have been constructed by the government in both mining and control villages.

3.3 Impact on Human Capital

In the livelihood framework, human capital is taken as a livelihood asset, or as a means of achieving livelihood outcomes. It represents the skills, knowledge, ability to work and good health that together enable people to pursue different livelihood strategies and achieve their livelihoods objectives. With the advent of mining employment opportunities, the living

Table 6: Major Health Problems in Ib Valley Coalfield

Villages	No of HHs Affected	Major Problems
Villages near to OC mines	32 (30.47)	Fever, TB, gastritis
Villages near to UG mines	21 (42)	Fever, skin diseases
Villages near to OC+UG	55 (52.38)	Fever, skin diseases, gastritis
Control villages	8 (8)	None

Figures in parentheses show the percentage of households to total households.
Source: Field Study.

Table 7: Displacement and Compensation

Villages	HHs Displaced	Compensation Received	
		Physical	Monetary
Villages near UG mines	10 (20)	10	6
Villages near OC mines	44 (41.90)	27	40
Villages near OC+UG	16 (15.23)	16	11

Percentage of households displaced is given in the parenthesis.
Source: Field Study.

standards of the locality rise. Companies develop health facilities for employees and their families. However, these facilities are not available to the larger community. This is the situation in the Ib valley coalfield. The major health problems faced by the villagers are fevers, gastritis, skin diseases, joint pain and TB (Table 6). There are also cases of weakness, cough and cold, asthma and gynaecological problems.

In the sample households, it has been observed that people working in UG were affected by TB, and the number of cases of skin diseases is found to be rising. With the increase in coal production, the average temperature in the area is also found

to be rising gradually. Furthermore, coal mines store and radiate a great deal of heat. As the whole area is now covered by coal, there are an increasing number of cases of gastritis and dehydration.

On the other hand, there are no major health problems in the control villages. The free medical facilities provided by MCL are available only for its employees. People with very low income are still in need of medical aid, as they cannot afford to visit private doctors.

Access to educational services and facilities can improve communities close to or around large mines. A mining company is often involved in the provision of educational facilities. But in Ib valley coalfield, MCL has not done anything for educational improvement. In general, there is not much difference between the mining villages and control villages in terms of literacy, except in one control village, Tangarpali. In this village, both the male and female literacy level is low in comparison to other villages. This is mainly due to the scheduled tribe (ST) population, which prefers work to education. Their general belief is that since educated people are not getting jobs it is better not to waste time in school. The MCL is not doing anything for the educational improvement of the mining area. It is providing a school bus to Lajkura village only for the children of its employees. This shows the inequitable distribution of facilities.

The Centre for Action Research Training (CART) had conducted training programmes for the people in Lajkura village for five years. They provided training in driving, computer use, making dolls and wall hangings. The Operation Research Group (ORG) was also working in the area for some time. Though people have been trained in a variety of skills and income-generating activities in the course of the project, market opportunities have not been identified. The developed human capital in the form of people's newfound skills is inappropriate and unused.

3.4 Impact on Social Capital

In the sustainable livelihood framework, social capital is taken to mean the resources which people draw upon in pursuit of their livelihoods objectives. The displacement of local communities is a significant cause of social conflict associated with mining. For the sake of national development, the local communities lose their land and livelihood. In addition to bearing the effects of pollution, they are forced to relocate to a new settlement without adequate resources. Compensation payments are not adequate and the people are often helpless. This problem in Ib valley area looks different.

Most of the people in the mining villages have been displaced from their agricultural lands (Table 7). They have received physical compensation in terms of a job in the mines. The nature of the job they get is based on the educational qualification of the person. Initially, monetary compensation was granted at a rate of Rs 20,000 to Rs 30,000 per acre. As the demand for coal-rich areas is rising, a new compensation rate has been fixed at Rs 1,00,000 per acre. In Lajkura, five households have not received any monetary compensation, since they were displaced

from their homestead land (they still stay in the house as it has not yet been destroyed). The MCL has given them only physical compensation. But the number of people being given physical compensation is coming down gradually. These days, MCL is giving only monetary compensation for those displaced from land. Nevertheless, some households demand jobs in preference to monetary compensation.

The above discussion makes it clear that MCL has tried to deal with compensation issues fairly. All married daughters also got their share in monetary compensation. MCL did not give the total money to the patta³ holder. Every person who had a right to get a share was requested to present in the MCL office in order to receive their respective share. Though MCL gave compensation to people who had lost their land, landless people did not get anything. Moreover, they also lost accessibility to common reserves – like forest lands, the common grazing lands and in some villages, the common pond – on which they depended for their livelihoods. Now they are not getting anything. The monetary compensation and jobs in the mines also led to social illness like alcoholism. There were many instances, where people got drunk and missed their day's work. After remaining absent for days, they were suspended from work by the MCL and they had to take up lower graded jobs like working as daily labourers. However, after the establishment of MCL, local people's social network and connectedness has increased, which is a positive impact in terms of social capital. They unanimously put forward complaints to the company. When they have to complain about something connected with the mining company's actions, all of them go together to the concerned officials. For any matter related to their village, they work in unison. There are also cases where there is a difference between the rich and the poor, upper castes and lower castes. But according to the village head, MCL is not providing any infrastructural facilities in the new area. Most of them want rehabilitation in a new area since it is close to impossible to live in an area full of coal dust. Moreover, the area provided by MCL for rehabilitation is very small. MCL had measured their homestead area in 1980s, at the time when the mines started, and it is only now that they are providing area for rehabilitation. But it is now more than 25 years and the number of family members in each house has increased tremendously. This issue of displacement and rehabilitation is causing conflicts not only among fathers and sons, but also between brothers. Generally, the eldest son of the household gets a job in the form of compensation. This creates hostility among the other brothers. Therefore, it is seen that mining has both positive and negative impact on social capital.

3.5 Impact on Natural Capital

Natural capital can be defined as the stock of natural resources and environmental assets, including water, soils, air, flora, fauna, minerals, and other natural resources. For the rural people, natural capital is important because they derive all or part of their livelihood from farming, fishing and collecting forest products. In Ib valley coalfield, mining has its worst impact on natural assets.

The first impact is on water. There is an acute scarcity of water in all the mining villages, which gets more worse in summer. The groundwater level has gone down substantially and the tube wells are not functioning in most of the villages. People depend on open wells, but in summer season they also become dry. For bathing and washing, all villagers depend on the village ponds. After mining, the ponds have been filled with coal dust. MCL provides water only to the Lajkura village everyday. To the Chharla and Ubuda villages, the company provides water only in summer, which, however, is not sufficient for the villagers. In the case of the control villages, there is no water problem as the panchayat has constructed well-functioning tube wells. In addition, there are more than two ponds in both the villages. In the mining villages, the number of ponds is fewer, as some ponds fall in the MCL area.

The major difference between the mining and control villages is not only in the quantity of drinking water, but also in its quality. Rich households have their own wells, which they keep covered in order to protect it from coal dust. They also use water filters to get good quality water. Only the poor suffer from the limited quantity and poor quality of water. The water level in the open wells is going down. Though MCL provides water in summer, it is not sufficient. All the village ponds are filled with coal dust and they get all kinds of diseases by drawing on this polluted water.

Another major impact of mining on these villages is air pollution. The temperature of this area is rising over the years because of the coal belt. Coal-loaded trucks cause great deal of pollution in the form of dust. The villagers have abandoned left cultivation since MCL had occupied all their agricultural lands, and also because of the scarcity of labour, as people earn more wages in the mines than from agricultural activities. The villagers say, "seasonal vegetables are now our dream. For everything we have to depend on market". Presently, they do not have access to fresh vegetables, and livestock graze on contaminated grass, and there is therefore a decline in numbers.

According to the villagers, now even for a day they cannot wear white clothes. All their utensils and clothes get dirty with coal dust. The villagers say that they are inhaling more of coal dust than fresh air. Blasting and vibration are other important problems in the mining villages. Machines in mines and coal-loaded trucks and dumpers make huge noise pollution. High blastings make cracks in the walls and roofs of even the new buildings with strong foundation. Collection of tendu leaves was an important source of livelihood for the tribal people. But most of their land is now filled with coal. They were also collecting mahua⁴ in summer, but now mahua trees on the road sides are filled with coal dust and they do not yield goo fruit. The villagers have observed that both the quality and quantity of the fruit have decreased. The situation is different in the control villages. They have both pure water and fresh air. Agriculture is their main source of livelihood, and they also have livestock and grazing land. There is no fear of blasting, and the natural capital of their village is rich. Of all the five forms of capital the most severe impact of mining on these villages has been on the natural capital.

4 Livelihood Outcomes: Is This Sustainable?

The sustainable livelihood approach supposes that people need a range of assets. Being rich in one form of capital, while having inadequate access to others is unlikely to lead to sustainable livelihood outcomes. In the case of coal mining, which is a form of physical capital, there is no contribution towards the enhancement of human and natural capital, even though it has a positive impact on financial capital, and to some extent, on social capital. Mining alone is not likely to provide sufficient physical capital to ensure development. Though coal mining seems to have a positive impact on the livelihood of the neighbourhood, people in the area incur costs, socially and environmentally. With the advent of coal mines, the economy and the standard of living of the community has considerably risen. However, this benefit is at the cost of their environment. Sometimes, it is seen that facilities are also distributed in an inequitable manner. When employees of the mines are getting all the benefits but other people are only incurring costs, a social imbalance is created.

Institutions provide the social context within which livelihoods are constructed. Both formal and informal institutions mediate the attainment of sustainable livelihood (Carswell 2000). Institutions provide the infrastructure and the means to support livelihood strategies. Katona-Apte (1988) shows the vital role of Grameen Bank in Bangladesh in providing credit to women which enables them to carry out different activities.

Conflict in and around mining operations usually stems from poor governance. Sometimes the distribution of benefits is unjust and sometimes the community opposes any mining activity on their land. In case of the Ib valley, mining started years ago. Not a single person wants mining to be stopped. The villagers acknowledge that MCL is providing employment at a wage higher than agriculture. They have received compensation for their displaced lands. Still, they have some demands, that MCL needs to pay attention to. These demands vary from village to village. In Bundia, the villagers demand water, as they are facing acute water shortage. In Lajkura, Chharla and Ubuda rehabilitation is more important. Ainalpali villagers ask for employment. Their main demands are that they be provided with sufficient water and that the blasting and dust be reduced. According to the villagers, the company attends to some of their complaints, while the others are ignored.

The villagers also want MCL to hire them as casual labour instead of taking labourers through contractors, as the contractors pay the labourers only Rs 50 a day, while MCL pays its casual labour Rs 90 a day. The opportunities for women are declining day by day due to the destruction of forests on which most of them were dependent. They bear a disproportionate share of the social costs and receive an inadequate share of the benefits. The government does not play any role here. The pollution control board does not visit any of the villages, the villagers are not even aware of the existence of such a board.

One important advantage of using the sustainable livelihoods framework is that it tries to understand rural livelihoods from the perspective of the poor. This framework gives a clear picture of mining and its impact on rural livelihoods. Another reason for taking this approach is that it stresses the need to think how development activity affects people's livelihoods and not only about the outcome of the project. According to the approach, a project is evaluated according to the contribution it makes towards achieving beneficial livelihood outcomes. A development project like coal mining in Ib valley coalfield helps to be rich in one form of capital, while lagging behind in the others. With coal mining the country is becoming resource-rich and the government is earning good revenue. But the negative impacts in the form of water, air and noise pollution, degradation in health and loss in agricultural production and displacement which affect the communities are not being taken into account.

Finally, the important question: is this moving towards sustainable livelihood? The benefits from mining are only short-term. Once mining stops, what will happen to these villages? They will not have their jobs and their agricultural lands will not be in a cultivable condition. Therefore, MCL should try to develop the area, taking into account the above perspectives. Benefits should be distributed in an equitable manner so that there is a positive effect on the livelihoods of the poor people. It should make an attempt to minimise environmental degradation by introducing new technology. Healthcare and other infrastructural facilities should be provided to all the nearby communities in addition to the employees' families. Lastly, the government should take the responsibility to ensure that the local communities too gain from the development that is taking place on their land.

NOTES

- 1 This approach is also used by other organisations like the International Fund for Agricultural Development and Food and Agriculture Organisation.
- 2 In total five mining villages are selected. They are: one village near underground mines (Bundia), two villages near opencast (OC) mines (Chharla and Ubuda) and two villages which are near to both UG and OC mines (Ainalpali and Lajkura). The control villages are Saletikra and Tangarpali.
- 3 Official land record.
- 4 This study analyses the diverse positive and negative impacts that coal mining has on the livelihoods of local communities of Ib valley coalfield in Orissa. Using the Sustainable Livelihoods framework, it shows that coal mining, which is a form of physical capital, contributes to the enhancement of financial capital. It has a mixed impact on physical and social capital and

a negative impact on human and natural capital. In this situation while the benefits seem to be for the short-term, the costs are borne over the long run.

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