Livelihood Dynamism in Mining Region of Odisha, India

Minati Sahoo*[1], Dharmabrata Mohapatra[2] and Dukhabandhu Sahoo[3]

[1]*Department of Economics, Central University of Orissa, India*

[2]*Reader, Ravenshaw University, India*

[3]*Indian Institute of Technology, India*

Submission: December 13, 2017; **Published:** January 03, 2018

*Corresponding author: Minati Sahoo, Department of Economics, Central University of Orissa, Landiguda, Koraput, Odisha, India, Tel: 09437106066; Email: minati.sahoo@gmail.com

Abstract

The present paper attempts to analyse the dynamism in the livelihood strategies of local population due to mining operations in Odisha, India. The study is based on primary data collected by administering a structured surveyed schedule on the 180 respondents from four villages within the periphery of an iron ore mine. Techniques like F-test; t-test and regression analysis has been used in the present paper. Mining do influence the livelihood strategies of local population. This dynamism in livelihood system has resulted in net monetary economic gain to the local population. Further, proximity of village to the mine site plays an important role in determining these net monetary economic gains due to mining. But, it would be difficult to continue those benefits since the life span of a mine is fixed. Hence, this calls for policy interventions that can lead to sustainable and enhancement of livelihood system for the local population.

Keywords: Economic Gain; Iron-ore; Livelihood; Local Population; Mining; Sustainable

Introduction

Does mining influence the existing livelihood system of local population and ensure them sustainable livelihood? Mining can be a positive force for the development of regions endowed with rich mineral deposits [1-3]. It not only creates direct and indirect employment opportunities for the local population but also generates prospect for starting new business and expansion of existing ones [2;4-9]. Besides mining project also provides and develops basic infrastructure facilities in the regions [10-12].

However, mining operations also brings considerable disturbances in the region as these activities cannot be done without disturbing and interfering environment [13]. It takes away large tracks agricultural land from the farmer [11] contributes to land degradation by destroying the soil surface and structure as well as declining the nutrient status of agricultural land [15-17] and also involves deforestation [18]. These transformations leads to the loss of ecosystem services and environmental degradation [17,19,20] thereby results in the livelihood loss of those dependent on those resources. Thus local communities also face impoverishment when their basic sources of livelihood are lost to bigger commercial interest or for the public good either forcibly or voluntarily. When there is loss of livelihood, access to activities and assets that determine the standard of living is denied. Consequently, there is the risk of total alienation from sources of income [21]. Mineral explorations on one hand creates livelihood opportunities through jobs and business activities, on the other hand erodes the local livelihoods through environmental degradation. Hence it is pertinent to understand the dynamics of livelihood system due to intervention like mining activities without which the sustainability of livelihoods will be at stake. Odisha, mineral rich state, has earned the distinction of one of the leading mining states of India [22]. Thus, an endeavour has been made in the present study to examine the dynamism in the livelihood strategies of local population due to mining operations in the Keonjhar district, the mining hub of Odisha. Further what is the economic impact of these changes on the local population is also assessed in the present study?

Research Design

Analytical Framework

Mining is a highly significant livelihood activity in a mineral rich region [23]. Livelihood is defined as the activities, the assets, and the access that jointly determine the standard of living gained by an individual or household [24]. Further, it is sustainable when it can cope with and recover from stresses and shocks maintain or enhance its capabilities and assets, while not undermining the natural resource base [25]. Dynamics in livelihood system is here defined as changes in the livelihood strategies of the locals. The present study has adopted Sustainable Livelihood Framework that views people as operating in context of vulnerability. Within

this context, they have access to certain assets or poverty reducing factors. These factors help them to gain their meaning and value through the prevailing social, institutional and organisational environment. These environments also influence the livelihood strategies 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 [25].

Profile of the Study Area

Keonjhar is one of the premier mineral producing districts in Odisha [27] and has been taken up as the study area for present research. Its main mineral production activity is iron ore. The district contributes 567.83 lakh tones of iron ore which is 37 percent of the countries production and 75 percent of the states production during 2013-14 [22]. It has also minerals like manganese, chromite, limestone, dolomite, quartz, asbestos, pyroxenite, china clay, pynophyllite and quartzite [28].

Sampling Design and Methodology

Keonjhar district has thirteen administrative blocks out of which seven are mining and six are non-mining blocks. Existence of mining activity in a region is used as a criterion in the present study to designate a block to be a mining block. Joda block has been selected out of seven mining blocks; namely Hatadihi, Jhumpura, Joda, Harichandanpur, Banspal, Champua, Keonjhar Sadar, by simple random sampling technique. There were six operational iron ore mines namely, Adhunik Metallic Ltd, Chamakpur Iron mine of K C Pradhan, SAIL Bolani Iron, Serajuddin and Co., Tarini Minerals Private Ltd and Joda East Iron Mine of Tata Steel Limited as on April 2014 in Joda block. Using the same technique, Balda Block Iron Mine of M/s Serajuddin & Co. has been selected for assessing its influence on livelihood strategies and consequently its economic impact on local population. A socio-economic profile of this mining company is shown in (Table 1). Four villages; namely Balda, Kundaposi, Kalimati and Uchaballi have been selected from this block and would be called as mining villages in the present study. Some important features of these villages

Table 1: Socio-economic profiles of Balda Block Iron-ore mine of Serajuddin & Co.

Year of Incorporation		1962
Lease period	1st lease period	1/11/1946 to 2/12/77
	2nd lease period	3/12/77 to 3/12/1997
	3rd lease period	3/12/1997 to 2/12/2017
Mining lease area (in hectares)	Non-forest area	77.461
	Forest area	258.133
Mineable reserve (in million mt)	Proved category	233.193
	Probable category	45.368
Proved mineral reserve (in million mt)	Marketable ore(+58% fe)	201.136
	Sub grade ore(+45 to -58% fe)	32.057
Total employees (in nos.)	Serajuddin & co (on-roll employees)	126
	Contractors (off-roll employees)	952
Source: Data collected from office of serajuddin & co., 2015		

Table 2: Some important features of mining villages.

Features	Balda	Kundaposi	Kalimati	Uchaballi
Distance from balda block iron ore mine (in km)	Less than 1km	1km	2km	4 km
Total population	680	550	1150	2230
Social composition	Mixed	Mixed	Mixed	Mixed
Total households (nos.)	130	100	250	450
Livelihoods strategies	Mine employee, mine workers, trading of forest product, country liquor business, transport business, other business, casual industrial workers, private service, government service	Mine employee ,mine workers, farming, trading of forest product, country liquor business, transport business, other business, casual industrial workers, private service, government service	Mine employee ,mine workers, farming, trading of forest product, country liquor business, transport business, casual industrial workers, private service	Mine employee ,mine workers, farming, trading of forest product, country liquor business, transport business, other business, casual industrial workers, private service, government service
Source: primary data collected from field survey during june-december, 2014				
Note: social composition includes scheduled caste (sc), scheduled tribe (st), other backward classes (obc) and general				

With regard to selection of households from mining villages, proportionate stratified simple random sampling technique has

been adopted so that selected households are the proper representatives of entire population. The strata were constructed according to the level of income of households. The present study has constructed following five strata according to the level of annual income (in Rs): Less than 50000 (Strata 1), 50000-1Lakh (Strata 2), 1-3 Lakhs (Strata 3), 3-5 Lakhs (Strata 4) and more than 5 lakhs (Strata 5). Since the number of households according to their level of income is different, the number of households included in each stratum is also different. The sample size of the present study consists of 180 households from mining villages 50 households each from Balda and Kundaposi village and 40 households each from Kalimati and Uchaballi village. Since the

villages closer to mines are affected more by the mining activities, a greater number of households have been chosen from villages like Balda and Kundaposi which are closer to mines. The sample units of the present study are individuals/respondents. The age and gender of the respondents is shown in (Table 3). Data have been collected and analyzed from the primary sources. Primary data were collected by administering a structured surveyed schedule on the households of mining villages from June to December 2014. Data collected from survey then were summarized and portrayed in tables. Beside this, mathematical and statistical techniques, such as average, percentage, F-test, t-test and regression analysis have also been used in the present study.

Table 3: Age and Gender structure of respondents of mining villages.

Village	Age(in years)	Male	Female	Total
Balda	16 & below 40	27	6	33
		81.8%	18.2%	100%
	40 & below 60	15	2	17
		88.2%	11.8%	100%
	sub-total	42	8	50
		84%	16%	100%
Kundaposi	16 & below 40	32	6	38
		84.2%	15.8%	100%
	40 & below 60	11	1	12
		91.7%	8.3%	100%
	sub-total	43	7	50
		86%	14%	100%
Kalimati	16 & below 40	18	6	24
		75%	25%	100%
	40 & below 60	10	6	16
		62.5%	37.5%	100%
	sub-total	28	12	40
		70%	30%	100%
Uchaballi	16 & below 40	17	7	24
		70.8%	29.2%	100%
	40 & below 60	12	4	16
		75%	25%	100%
	sub-total	29	11	40
		72.5%	27.5%	100%
Total		142	38	180
		79%	21%	100%
Source: Primary data collected from field survey, 2014				

Results and Discussion

Change of resource base and shifting of livelihood strategy in a society may be explained through different reasons- need or crisis or choice or relative advantage and disadvantage. Whatever may be the reasons, change of resource base definitely alter livelihood pattern of the communities [29]. Livelihood strategies are the

range and combination of activities and choices that people make In order to achieve their livelihood goals [26]. Agriculture and allied activities like selling of forest products were the main source of livelihood of inhabitants of the Keonjhar District. M/s Serajuddin & Co. started its operation from 1962 to cater the raw material in indigenous iron and steel industries as well as for exports.

Since then it is in continuous operation. Thus mining operation became a prominent intervention in the livelihood system of local population in this region. Does this intervention have influenced the changes in the livelihood strategies in the region? In order to investigate the influence of mining on livelihood strategies of local population, the study has made an analysis of previous primary livelihood strategy and present primary livelihood strategy of the respondents. Their shifting of occupation is shown in (Table 4).

Table 4: Shifting of occupation of respondents in mining villages.

Present and Previous occupation		Farming	Casual Agri. Labour	Selling of Forest Product	Liquor Business	Other Business	Mining Labour	Private Service	Casual Industrial Labour	Housewife	Unemployed	Total
Balda	Forest Product			1(100%)								1(100%)
	Other Business	2(50%)				2(50%)						4(100%)
	Mining Service	5(26.3)					6(31.6%)	5(26.3%)	3(15.8%)			19(100%)
	Mining Labour	4(36.4%)							7(63.6%)			11(100%)
	Private Service							1(100%)				1(100%)
	Casual Industrial Labour						4(80%)		1(20%)			5(100%)
	Unemployed						1(50%)			1(50%)		2(100%)
	Transport Business	3(42.9 %)					3(42.9%)	1(14.3%)				7(100%)
	Sub-total	14(28%)		1(2%)		2(4%)	14(28%)	7(14%)	11(22%)	1(2%)		50(100%)
Kundaposi	Forest Product	1(100%)										1(100%)
	Liquor Business			1(100%)								1(100%)
	Other Business							1(100%)				1(100%)
	Mining Service	7(58.3%)					5(41.7%)					12(100%)
	Mining Labour	8(29.6%)		2(7.4%)			3(11.1%)	1(3.7%)	12(44.4%)		1(3.7%)	27(100%)
	Private Service	2(66.7%)							1(33.3%)			3(100%)
	Casual Industrial Labour	1(100%)										1(100%)
	Transport Business	2(66.7%)					1(33.3%)					3(100%)
	MGNREGA	1(100%)										1(100%)
	Sub-total	22(44%)		3(6%)			9(18%)	2(4%)	13(26%)		1(2%)	50(100%)
Kalimati	Forest Product	2(66.7%)	1(33.3%)									3(100%)
	Mining Service	1(33.3%)					2(66.7%)					3(100%)
	Mining Labour	9(40.9)	4(18.2%)	7(31.8%)					2(9.1%)			22(100%)
	Private Service	1(100%)										1(100%)
	Casual Industrial Labour	1(12.5%)	2(25%)	2(25%)			3(37.5%)					8(100%)

Village	Occupation											Total
	Transport Business						3(100%)					3(100%)
	Sub-total	14(35%)	7(17.5%)	9(22.5%)			8(20%)		2(5%)			40(100%)
Uchaballi	Forest Product	1(33.3%)					2(66.7%)					3(100%)
	Liquor Business				1(100%)							1(100%)
	Other Business					1(50%)			1(50%)			2(100%)
	Mining Service	7(50%)					5(35.7%)		2(14.3%)			14(100%)
	Mining Labour	3(23.1%)					1(7.7%)		9(69.2%)			13(100%)
	Casual Industrial Labour	1(33.3%)					2(66.7%)					3(100%)
	Transport Business	1(33.3%)					2(66.7%)					3(100%)
	MGNREGA						1(100%)					1(100%)
	Sub-total	13(32.5%)			1(2.5%)	1(2.5%)	13(32.5%)		12(30%)			40(100%)
Total		63(35%)	7(3.9%)	13(7.22%)	1(0.5%)	3(1.67%)	44(24.4%)	9(5%)	38(21.1%)	1(0.5%)	1(0.5%)	180(100%)

Source: Primary data collected from field survey, 2014

It can be seen from the table that large shifting of livelihood strategies has taken place in the mining villages. In Balda village, 28 % of the respondents were previously engaged in farming. This percentage is 44% in Kundaposi, 35% in Kalimati and 32% in Uchaballi. Next to agriculture, people were also previously working as casual industrial labourers. In Kalimati 22% of the people who were previously engaged in selling of forest products are now working as mining labor and casual industrial labor. Even in Balda many people had left farming and are working either in mining or transport business. Here, 26.5% from private service have now joined the mining service. In other mining villages also, we could see the same situation. In Kundaposi, 29% from farming, 44% from industrial sector and 8% from forest are now working as mining labor. Even in Uchaballi, we could find that shifting of people from farming, casual industrial labor to mining service, mining labor and transport business. Besides, we could also find shifting of livelihood of inhabitants from mining labor to mining service.

Table 5: F- test[#] for shifting of occupation of Respondents

Former occupation	Observed frequency	Expected frequency	F-value
Farming	63	18	3.3*
Casual agricultural labour	7	18	0.4
Selling of forest product	13	18	0.7
Liquor business	1	18	0.1
Other business	3	18	0.2
Mining labour	44	18	2.3**
Private service	9	18	0.5
Casual industrial labour	38	18	2.0**
Housewife	1	18	0.1
Unemployed	1	18	0.1

Source: Compiled by author from primary data

Note: Denotes F-value significant at 1% level of significance and ** at 5% level of significance

It's a test to Compare two counts Poisson distribution, where $F = N_1/((N_2+1))$, N_1 and N_2 are two counts [30].

Thus, we find that the shifting of livelihood strategy mostly takes place from farming (35%) followed by mining labour (24%), casual labor (21%), forest product selling (7%), private service (5%) and casual agricultural labour (4%). And, this has been mostly towards service in mining office, mining labor and transportation business. In order to know whether these shifting are significant or not, F-test is carried out and the result is shown in (Table 5). It is found that shifting of people from farming is found to be significantly different at 1% level of significance from its expected value. Even, shifting from mining labour and

private service are also found to be significantly different from its expected value but at 5% level of significance.

It is seen from above analysis that the shifting has been mostly towards service in mining office, mining labor and transportation business. The proportionate of respondents engaged in these occupations are shown in (Table 6). It can be seen from the table that more than 70 percent of respondents in mining villages are directly/indirectly engaged in mines. Directly they are working in mining offices or are mining worker. Some of the respondents are also involved in the business of transportation of iron ore, thus are indirectly engaged in mines. Very few respondents adopt selling of forest product (4%), casual industrial labor (9%), selling of local alcohol/liquor (1%), private service (3%) and business other than local liquor (4%) as their livelihood strategies. Few respondents also works under an employment generating government programme i.e. Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) to supplement their income. The act provides at least 100 days of guaranteed wage employment in a financial year to every household whose adult member volunteer to do unskilled manual work. Thus mining has prominently influenced the livelihood system of local population towards mining related works. The reason for the shifting of livelihood toward mining related activities in these villages has been shown in (Table 7).

Table 6: Present Livelihood strategies of the respondents in the mining villages.

Livelihood Strategies / Villages	Farming	Casual Agriculture Labour	Forest Product	Liquor Business	Other Business	Mining Service	Mining Labour	Private Service	Casual Industrial Labour	Unemployed	Transport Business	MGNREGA	Total
Balda	0	0	1	0	4	19	11	1	5	2	7	0	50
	0%	0%	2%	0%	8%	38%	22%	2%	10%	4%	14%	0%	100%
Kundaposi	0	0	1	1	1	12	27	3	1	0	3	1	50
	0%	0%	2%	2%	2%	24%	54%	6%	2%	0%	6%	2%	100%
Kalimati	0	0	3	0	0	3	22	1	8	0	3	0	40
	0%	0%	8%	0%	0%	8%	55%	3%	20%	0%	8%	0%	100%
Uchaballi	0	0	3	1	2	14	13	0	3	0	3	1	40
	0%	0%	8%	3%	5%	35%	33%	0%	8%	0%	8%	3%	100%
Total	0	0	8	2	7	48	73	5	17	2	16	2	180
	0%	0%	4%	1%	4%	27%	41%	3%	9%	1%	9%	1%	100%

Table 7: Reason for shifting of occupation in mining villages.

Mining Villages	No shifting	Higher income	More satisfaction	Assured income	Destruction of crops by elephants	Mechanisation of mining	Total
Balda	6	23	0	11	5	5	50
	12%	46%	0%	22%	10%	10%	100%
Kundaposi	3	31	2	9	5	0	50
	6%	62%	4%	18%	10%	0%	100%
Kalimati	0	29	0	3	4	4	40
	0%	72.50%	0%	7.50%	10%	10%	100%
Uchaballi	2	21	0	9	3	5	40
	5%	52.50%	0%	22.50%	7.50%	12.50%	100%
Total	11	104	2	32	17	14	180
	6.10%	57.80%	1.10%	17.80%	9.40%	7.80%	100%
Source: Primary data collected from field survey, 2014							

There are both positive as well as negative reasons for shifting mostly towards mining related activities. The positive reasons are higher income, assured jobs, more satisfaction. But to some, unemployment due to mechanization of mining company in 2009, destruction of crops by elephants are other reasons for leaving their previous livelihood. In Balda, 12% of respondents have not shifted whereas 46 % have changed for earning higher income. Similarly in other mining villages, higher income is found to be the vital reason followed by assured income from mining sector. Those who were doing farming earlier have cited the destruction of crops by elephants to be the reason for leaving cultivation and shifting to another occupation. It is found that more than 50% of

respondents have cited higher income to be the reason behind the shifting of their occupation. Even, F-test also shows higher income to be the only significant reason at 1% level of significance (Table 8).

Table 8: F- test for reason of shifting of occupation in mining villages.

Reasons	Observed frequency	Expected frequency	F-value
No shifting	11	30	0.6
Higher income	104	30	5.5*
More satisfaction	2	30	0.1
Assured income	32	30	1.7
Destruction of crops by elephants	17	30	0.9
Mechanisation of mining	14	30	0.7
Total	180	180	

Source: Compiled by author from primary data

Note:* denotes F- value is significant at 1% level of significance

Thus, it is seen that shifting of livelihood strategies among the local population has been mostly towards mining jobs and its related work. On the one hand mining leads to livelihood gain through creation of employment opportunities in the region. On the other hand, erodes livelihood foundations like forest and agricultural land, thereby results in livelihood loss and shifting. So in order to assess the economic impact of these dynamisms in the livelihood strategies due to mining on local population, net economic loss/gain in monetary terms has been estimated. Here, net economic loss/gain is defined as the net monetary loss/gain due to shifting in their livelihood strategy is given in the following equation (1).

Net economic loss/gain due to loss of livelihood (in Rs.) = EP – EF   Equation 1

Where, EP is earning from present primary occupation (in Rs.)EF is earning from former primary occupation at current wage rate (in Rs.) In order to compare and adjust with regard to inflation, the earning of respondents from previous occupation were estimated by using current market wage rate i.e. wage rate at 2014-2015. The respondents of Balda earn an annual average income of Rs.115284 from their present primary occupation. But the respondents would be earning Rs.61280 at current wage rate if they would have been continuing in their former primary occupation. Thus as a result of operation of mines and shifting of occupation of inhabitants towards mining work has resulted in higher income now. The economic impact due to these shifting in livelihoods has resulted in the economic gain of Rs.54003 annually on an average. Similarly in other mining villages, we could see the net economic gain due to shifting of livelihood towards mining in

the region. In Kundaposi, there is a net annual economic gain of Rs.51718 on average. This gain is Rs. 46288 in Kalimati and Rs. 38373 in Uchaballi (Table 9).

Table 9: Net economic gain/loss due to loss of livelihood of respondents in mining villages.

Mining villages	Annual Average from Present occupation (at current wage rate)	Annual Average from Former occupation (at current wage rate)	Net Economic Gain/Loss
Balda	115284	61281	54003
Kundaposi	105917	54199	51718
Bada Kalimati	82517	36229	46288
Uchaballi	89866	51493	38373
Average	99752	51572	48181

Source: Compiled by author from primary data

Further, in order to see whether the differences in the income from present and the previous livelihood in mining villages are significant or not, t-test has been carried out (Table 10). It can be seen from the table that these differences are significant for all the mining villages. Hence mining has significantly enhanced the income of inhabitants in comparison to their previous occupation in the mining villages. Thus, it can be seen that Balda village has been mostly benefitted due to the operation of mining company. This may be because of proximity of this village to the mine site. In order to know whether proximity of the village to the mine site has any impact on the economic gain/loss to the households, a dummy variable regression technique is used in the present study. The households that are within 1 km radius of the mine site are assigned value 1 and other households of the mine site are assigned value 0. Therefore households from the two sample villages namely Balda and Kundaposi which are within 1 km radius of the mine site are assigned 1. The regression Equation (2) will be as follows:

Annual average net economic gain $= \beta_1 D_1 + \varepsilon$ Equation 2

Table 10: Paired sample test for income from present and former occupation at current market wage rate in mining villages.

Mining Villages	Paired differences (Present income- Former income)		t-value	df	Significance (2-tailed)
	Mean	Std Error mean			
Balda	54003.4	11064.2	4.88*	49	0
Kundaposi	51717.6	6444.96	8.02*	49	0
Kalimati	46288.2	7450.53	6.21*	39	0
Uchaballi	38373	9159.9	4.19*	39	0

Source: Compiled by author from primary data

Note:* denotes t- value is significant at 1% level of significance

Where D1=1 for Balda and Kundaposi and 0 otherwise ε is the random error term that satisfies all the assumption of the classical linear regression model. It can be seen from Table 11 that proximity of the village to the mining site plays an important role in determining the net economic gain due to mining. This implies that the nearer the village is to the mine site, the higher will be the net economic gain from mining. Thus villages nearer to mine site gain more economically from mining activities.

Table 11: Regression result of the dummy variable equation.

Dependent variable : Annual Average Net Economic Gain	
Independent variable (Distance from mine site)	Coefficient
	52860*
	(-8.09)
Source: Compiled by author from primary sources	
Note:* implies coefficient is significant at 1% level.	
Figure in the parenthesis shows 't' value	

Conclusion and Policy Implications

From the above discussion, it is evident that iron ore mine in the study area has influenced and caused changes in the livelihood strategies of local population. Higher income has been found to be the only significant reason for these changes. The study has also found income earned from mining is significantly higher than the community's previous occupations. Thus mining has provided economic gain in monetary terms to the local community. Additionally, proximity of the village to the mine site plays an important role in determining the net economic gain due to mining. This implies that the nearer the village is to the mine site, the higher will be the net economic gain from mining. Findings of the present study extend its support to those studies that conclude mining activities has caused changes in the livelihood strategies of local community [31,32] and has enhanced their financial capital [33-35].

But now the question arises, does mining will ensure sustainable livelihood to local community? What will happen when mines are closed? The life span of a mine is fixed. After its closure, it would be difficult to continue the direct benefits which a community is receiving mainly in terms of employment. So it seems that benefits arising out of mining activity are of short term. On the one hand there will be no jobs in the community and on the other hand alternative livelihood that are based on natural resources like farming, selling of forest product etc will also be not in a condition to be adopted. So mining can't provide sustainable source of livelihood to the local communities.

But it doesn't mean that mining should be stopped. Rather both Government and mining companies have to work to ensure sustainable livelihood to local population. First of all, measures should be taken by the mining company to reduce the dependence of local community on mine. Some of the measures are incorporation of preferential procurement policies towards local suppliers and distributors into mining agreements and

company policy and identification of additional economic activities. Though the company is providing training programmes for self employment like tailoring, computer learning but the market opportunities are yet to be identified. So design of the programmes should consider the need for alternative economic activities to support the community during and after the life of the mine. It could initiate vocational training centres in villages and provide training in courses which are more relevant to mining areas like electrical and motor winding, two wheeler/automobile repair courses etc. Arrangement of orientation programs for self-employment will also help a lot to achieve the above purpose. To conserve and preserve the forest, mining company should take some measures like a forestation programmes. Along with mining company, government too should intervene through some strategies for the sustainable livelihood of the community in the mining region. It should step in and support the households in various ways for adopting farming, thereby encourage the people in mining region for agriculture. It can also demonstrate appropriate agricultural practices to farmers, hold farmer mela and provide information about sustainable agriculture and organic farming, provide technical support, training to farmer community, and arrange for soil testing and technical inputs for increasing yield, distribution of horticultural sapling etc. Further, to protect and rejuvenate degraded forest areas, the government should encourage the involvement of the people living on the periphery of the forests in mining regions. At last, it could adopt some policy measures so that mining will be done in a manner that is environmentally and socially acceptable to the local communities.

References

1. Boscio ND (2010) Mining enterprises and Regional Economic development: An explanatory analysis of the sustainable development model. The London School of Economics and Political Science.

2. Ejdemo T, Soderholm P (2011) Mining investment and regional development: A scenario-based assessment for Northern Sweden. Resources Policy 36(1): 14-21.

3. Soderholm P, Svahn N (2015) Mining regional development and benefit-sharing in developed countries. Resources Policy 45: 78-91.

4. Clements KW, Ahammad H, Qiang Y (1996) New mining and mineral-processing projects in Western Australia: Effects on employment and the macro-economy. Resources Policy 22(4): 293-346.

5. Stilwell LC, Minnitt RCA, Monson TD, Kuhn G (2000) An input-output analysis of the impact of mining on the South African economy. Resources Policy 26: 17-30.

6. McMahon G, RemyF (2001) Large Mines and the Community-Socioeconomic and Environmental Effects in Latin America, Canada and Spain. Ottawa: International Development Research Centre and Washington.

7. Bogdetsky V, Karybek I, Jyldyz A (2005) Mining Industry as a Source of Economic Growth in Kyrgyzstan.

8. Ye Q (2008) Commodity booms and their impacts on the Western Australian economy: The iron ore case. Resources Policy 33(2): 83-101.

9. Brunnschweiler CN (2008) Cursing the blessings? Natural resource abundance, institutions, and economic growth. World Development 36(3): 399-419.

10. Mining Minerals and Sustainable Development (2002) Breaking New Ground Report by International Institute for Environment and Development.

11. World Bank and International Finance Corporation (2002) Large mines and local communities: Forging partnerships, building sustainability. Mining department, World Bank.

12. Mensah EAO (2011) Gold mining and the socio-economic development of Obuasi in Adanse. African Journal of History and Culture 3(4): 54-64.

13. Aswathanarayana U (2005) Mineral resources management and the environment. Netherland Balkema Publishers, Netherland.

14. Fisher E (2007) Occupy in India, g the margins: Labour integration and social exclusion in artisanal mining in Africa. Development and Change 38(4): 735-760.

15. Tomlinson P (1982) The Environmental Impact of Opencast Coal Mining. The Town Planning Review 53(1): 5-28.

16. Assadi M (2002) Kudremukh: Of Mining and Environment. Economic and Political Weekly 37(49): 4898-4901.

17. Adetayo AK (2012) Effects of Sand Mining Activities on Land in Agrarian Communities of Ogun State, Nigeria. Continental Journal Agricultural Science 6(1): 41-49.

18. Patra HS, Sethy KM (2014) Assessment of impact of Open cast mine on surrounding Forest: A case study from Keonjhar district of Odisha, India. Journal of Environmental Research and Development 9(1): 249-254.

19. Chauhan SS (2010) Mining, Development and Environment: A Case Study of Bijolia Mining Area in Rajasthan, India. Journal of Human Ecology 31(1): 65-72.

20. Panwar S, Sinha RK, Singh G (2011) Time sequential surface change analysis of Talcher Angul region of Orissa using Remote Sensing and GIS. International Journal of Geomatics and Geosciences 1(4): 828-838.

21. Ocran LK (2010) An assessment of the level of the adequacy of paid compensation and lost livelihood in mining communities. Thesis submitted at Kwame Nkrumah University of Science and Technology.

22. Indian Bureau of Mines (2016) Indian Mineral Yearbook-2014. 53rd edition Ministry of Mines Government of India, New Delhi.

23. Mwaipopo R, Mutagwaba W, Nyange D, Fisher E (2004) Increasing the Contribution of Artisanal and small-scale mining to poverty reduction in Tanzania: Based on an analysis of mining livelihoods in Misungwi and Geita districts, Mwanza region.

24. Ellis F (1999) Rural Livelihood Diversity in developing Countries: Evidence and Policy Implications. Overseas Development Institute.

25. Scoones I (1998) Sustainable rural livelihoods: A framework for analysis. Working Paper 72 Sussex, Institute of Development Studies.

26. Department for International Development (1999) Sustainable Livelihoods Guidance Sheets. London.

27. Department of Steel and Mines (2016) Mineral based industry Government of Odisha.

28. Government of Odisha (2014) Statistical Abstract of Odisha 2012. Directorate of Economic and Statistic Cuttack: Odisha Government Press. pp. 1-484.

29. Mondal PK (2012) Change of Resource base and its impact on Landscape: A study of Rampurhat Block-I and II, Birbhum District, West Bengal. Thesis submitted to Department of Geography, University of Burdwan, West Bengal, India.

30. Kanji GK (2006) 100 statistical tests. New Delhi. Sage Publications. p. 1-60.

31. Maliganya W, Simon SM, Paul R (2013) Large scale mining activities and the livelihood of adjacent communities in Tanzania: A case of Gieta gold mine. 8th Annual research workshop Tanzania.

32. Das A (2013) Can mining provide a sustainable source of livelihood? A study in the mining regions of Keonjhar district, Odisha, India.

33. Mishra PP (2009) Coal Mining and Rural Livelihoods: Case of the Ib Valley Coalfield, Orissa. Economic and Political Weekly 44: 117-123.

34. Fisher E, Mwaipopo R, Mutagwaba W, Nyange D, Yaron G et al. (2009) The Ladder that sends us to Wealth: Artisanal Mining and Poverty Reduction in Tanzania. Resource Policy 34(1-2): 32-38.

35. Lu J, Lora Wainwright A (2014) Historicizing sustainable livelihoods: A pathways approach to lead mining in rural central china. World Development 62: 189-200.

Your next submission with Juniper Publishers will reach you the below assets

- Quality Editorial service
- Swift Peer Review
- Reprints availability
- E-prints Service
- Manuscript Podcast for convenient understanding
- Global attainment for your research
- Manuscript accessibility in different formats
  (Pdf, E-pub, Full Text, Audio)
- Unceasing customer service

Track the below URL for one-step submission
https://juniperpublishers.com/online-submission.php