CHAPTER- 5

IMPACT OF ONGC AND OIL ON RURAL LIVELIHOOD

This chapter examines the impact of oil exploration activities of ONGC and OIL on the livelihood assets in the study area. The major five livelihood assets discussed in this chapter are financial capital, physical capital, human capital, social capital and natural capital.

5.1 Impact on financial capital

Financial capitals are the financial resources that are used by the people to achieve different livelihood outcomes. It implies the availability of cash or equivalent assets which empowers people to formulate different livelihood strategies. Out of the five livelihood assets, financial capital is considered the most versatile, as it can be easily transformed into another form. Besides, it can also be used to achieve livelihood outcomes directly, for example, by purchasing food to reduce food insecurity, etc. (DFID 1999). To examine the impact of the oil industry on the rural livelihood on financial capital in Assam, the major aspects discussed in the present study are household income, per capita income, farm and non-farm income, crop and non-crop income, income source diversity, income diversity, access to financial services.

i) Household income and per capita income

Household income is an important source of the financial capital of the rural households in the study areas. The household income of the sample households comprises both farm and non-farm income.

Table 5.1 shows the mean of household income, per capita income, farm income and non-farm income for different categories of villages located in the operational areas and operational headquarters of ONGC and OIL.

Table 5.1

Mean income of the sample households

Variables	Study area	Village type	N	Mean (Rs.)	Std. Deviation	Remarks
Household income	Operational areas	Oil Villages	443	396408.07	309497.73	
		Control villages	187	366910.37	205117.73	
	Operational headquarters	Nearby Villages	125	550556.00	382956.51	*
		Control villages	219	304194.02	156281.01	
Per capita income	Operational areas	Oil Villages	443	87896.17	75005.96	
		Control villages	187	87754.96	56975.85	
	Operational headquarters	Nearby Villages	125	136337.37	97643.12	*
		Control villages	219	71752.61	39445.56	
Farm income	Operational areas	Oil Villages	443	106463.85	148459.48	*
		Control villages	187	132141.42	128689.58	
	Operational headquarters	Nearby Villages	125	104007.20	181625.38	
		Control villages	219	59135.11	70734.79	
Non-farm income	Operational areas	Oil Villages	443	291027.74	280961.45	
		Control villages	187	233119.72	179933.56	
	Operational headquarters	Nearby Villages	125	446548.80	291593.48	*
		Control villages	219	245058.90	140135.27	

Source: Field survey

Note: N=Number of households.

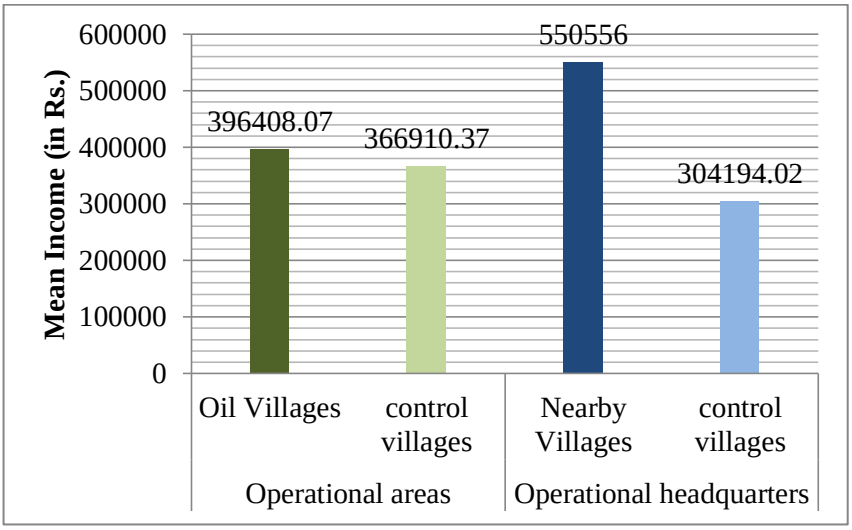
*Mean differences between oil and control villages of operational areas; and nearest and control villages of operational headquarters are statistically significant at a 5 per cent level.

The detailed results of the independent sample t-test are presented in Annexure B

In the operational areas, the average annual household income of the sample households inhabiting the oil villages is found to be a bit higher than that of the control villages. It is Rs. 396408.07 in the case of sample households of the oil villages and Rs. 366910.37 in the case of sample households of the control villages. Against this, the average annual household income in the nearest villages of operational headquarters is much higher than its control villages. It is observed that the mean household income in the nearby villages is Rs. 550556.00 annually, while the same is only Rs. 304194.02 in the control villages. This is presented in figure 5.1.

Figure 5.1

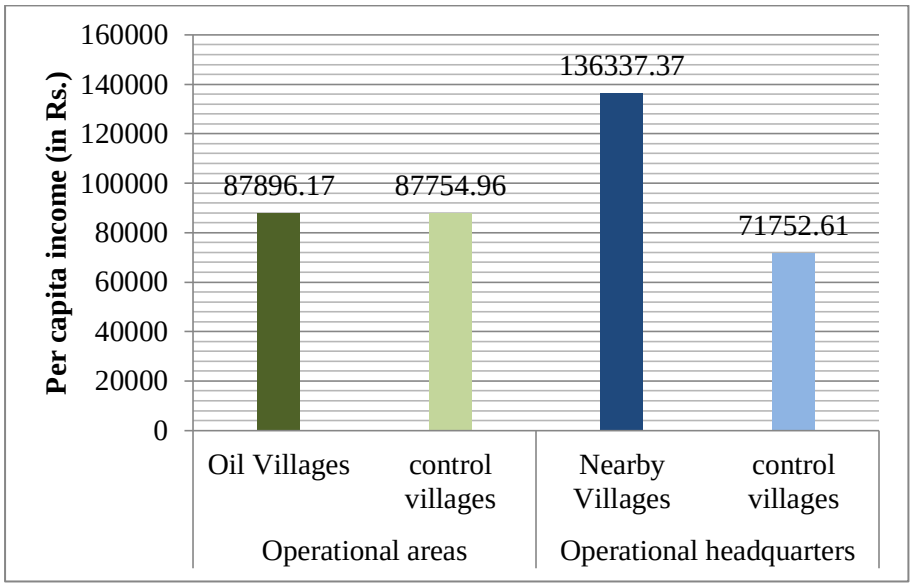
Mean household income of the sample households



Similarly, the difference in the mean annual per capita income between the two categories of villages in the operational areas is also observed to be less. The average per capita income of the oil villages is Rs. 87896.17; the same is Rs. 87754.96 in the case of control villages of the operational areas, i.e., the difference is Rs. 141 only. But, the per capita income in the nearby villages (Rs. 136337.37) of operational headquarters is seemed to be quite high as compared to its control villages (Rs. 71752.61). This is shown in figure 5.2.

Figure 5.2

Average per capita income of the sample households



An independent sample t-test is conducted by considering mean household income and per capita income as the test variables to check the statistical significance of the mean difference between the two categories of villages of operational areas and operational headquarters. The result of the independent sample t-test suggests that there is no significant difference in the mean household income between oil villages and control villages of operational areas of ONGC and OIL at a 5 per cent level of significance. Similarly, the difference in average per capita income between the same two categories of villages is not found to be statistically significant. This implies that the oil industries fail to bring a significant increase in income to the sample households of the oil villages.

On the contrary, in the case of operational headquarters, Nazira and Duliajan, the difference in average household income between nearby and control villages are statistically significant at 5 per cent level. Moreover, the per capita income of the sample populations of nearby villages is also significantly different from the sample population of control villages in those areas. One of the reasons for such differences in the operational headquarters can be attributed to the field observations that the operational headquarters and its adjacent growth centres (i.e., Nazira and Duliajan towns) diffuse more forward effect to the nearby villages in terms of diverse and high-income earning

opportunities, whereas such forward effects are found to be comparatively less in the oil villages.

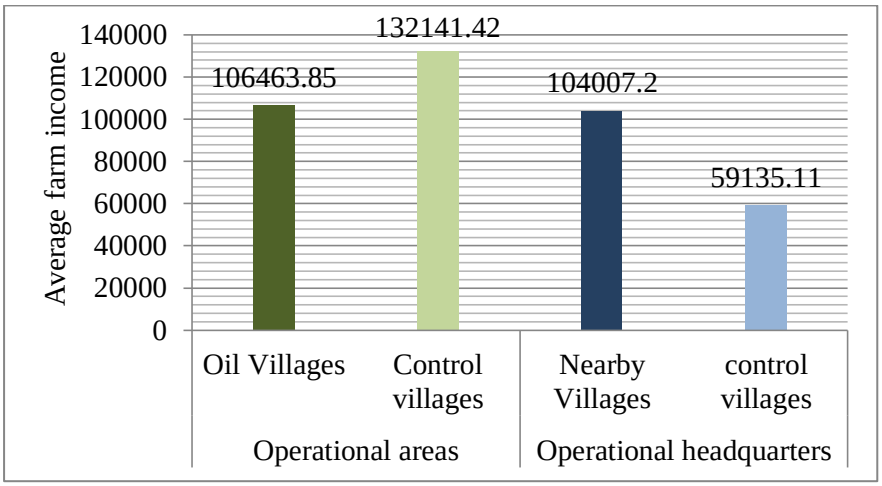
ii) Farm and non-farm income

The industry may affect the farm and non-farm income of the households of the neighbouring rural areas through the occupational shift from farm to the non-farm sector. In the study area, it is observed that the average farm income of sample households of the control villages is higher than that of the oil villages. It is Rs. 132141.42 for the control villages as against Rs. 106463.85 for the oil villages located in the operational areas. This mean difference is found to be statistically significant. It is to be noted that a higher percentage of working people are associated with farming as their primary occupation in the control villages (35.86%) as compared to the oil villages (26.66%) of operational areas, which is shown in table 4.3 of Chapter 4. A large percentage of the population of oil villages is associated with non-farm occupations such as workers in ONGC and OIL, and workers in private companies which have a contractual agreement with ONGC and OIL. These non-farm workers create demand for the farm produces, which may be one of the reasons for getting higher farm income from the farmers of the control villages.

But, in the operational headquarters, the mean farm income is estimated to be higher in the nearby villages than in the control villages. The urban centres create higher demand for agricultural products and therefore the farmers of the nearby villages fetch higher prices by selling their products in the urban centres. Figure 5.3 represents the average farm income of the sample households in a different category of villages under study.

Figure 5.3

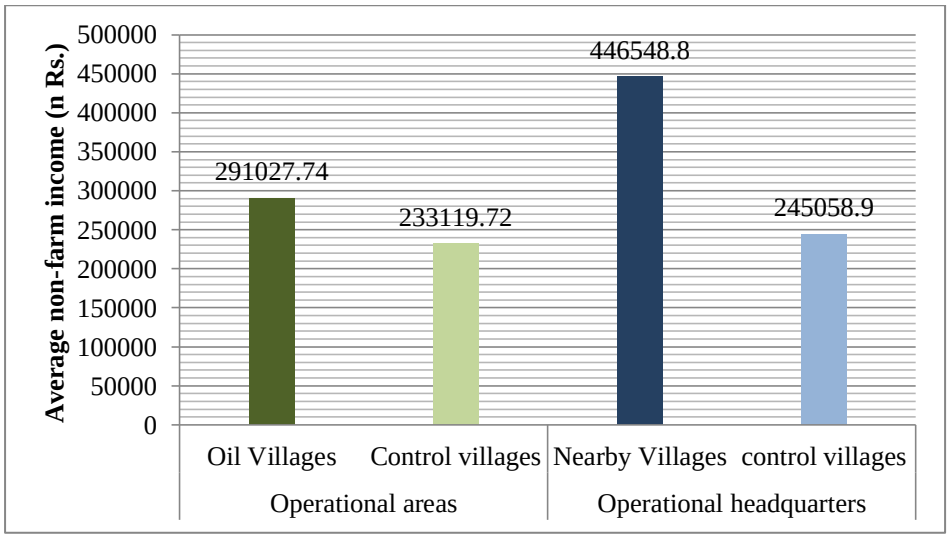
Average farm income of the sample households



On the other hand, figure 5.4 implies that the average non-farm income of the sample households of the oil villages is found to be higher in oil villages than in the control villages of operational areas. Similarly, the average non-farm income of the sample households of the operational headquarters is reported to be higher in the nearby villages. Such findings may be supported by the field observations that the oil industries and their urban centres offer several non-farm occupations to the members of the sample households inhabiting the oil villages and nearby villages.

Figure 5.4

Average non-farm income of the sample households



Many researchers have identified that industrial development affects the pattern of farming in its vicinity. Industrialization and urbanization lead to a shift of farming

activities from crop to non-crop. In the present study, to examine whether there is any evidence of shift of farming activity from crop to non-crop enterprises, the sample households are classified according to the share of crop and non-crop income in their total household farm income as shown in table 5.2. The major crops grown in the study areas are paddy, vegetables and tea; while major non-crop enterprises practised in the study areas are poultry, livestock and fishery. If $\left(\frac{CI}{NCI}\right) < 1$, then the share of non-crop income (NCI) is higher in the total farm income. On the other hand, $\left(\frac{CI}{NCI}\right) > 1$ represents the share of crop income (CI) is higher in the total farm income. Based on this ratio, the sample households of all types of villages under the study are classified. It is observed that in all categories of sample villages, the higher percentages of sample families have larger share of non-crop income in their total farm income. From the field observation it is noted that the crop sector is no longer a profitable sector in the rural areas. Many researchers have argued that the absence of proper institutional arrangements such as marketing facility, warehouse facility, minimum support price, and high cost of crop cultivation make this sector unprofitable and many rural households are shifting from crop to non-crop enterprises such as poultry, livestock and fish farming. Industrial development also creates high demand for poultry and livestock sector.

Besides, another important observation drawn from table 5.2 is that in the oil villages of operational areas and the nearby villages of the operational headquarters, the higher percentages of households have larger share of non-crop income than their respective control villages. This implies that the non-crop sector is contributing higher income than the crop sector in the total farm income of the sample households of the oil villages and nearby villages of the operational areas and headquarters. More specifically, the distance to the oil operational areas and operational headquarters plays a significant role in getting higher income from the non-crop sector.

Table 5.2

Classification of sample households by crop and non-crop income

Variable	Study area	Village type	No. of households having farm income		No. of households having only non-farm income	Total sample households
			$\left(\frac{CI}{NCI}\right) < 1$*	$\left(\frac{CI}{NCI}\right) > 1$**		
Ratio of crop income to non-crop income $\left(\frac{CI}{NCI}\right)$	Operational areas	Oil Villages	185 (41.76)	252 (56.88)	6 (1.35)	443 (100)
		control villages	58 (31.02)	129 (68.98)	0 (0.00)	187 (100)
	Operational headquarters	Nearby Villages	52 (41.60)	65 (52.00)	8 (6.40)	125 (100)
		control villages	85 (38.82)	130 (59.36)	4 (1.82)	219 (100)

$* \left(\frac{CI}{NCI}\right) < 1$ represents non-crop income is higher than the crop income.

$** \left(\frac{CI}{NCI}\right) > 1$ represents crop income is higher than the non-crop income.

Source: Researcher's calculation from the field data.

Note: Figures in the parentheses indicate percentage to total.

5.2 Impact on physical capital

Physical capital includes the basic infrastructure and producer goods which are required to support the livelihoods of the households. The infrastructure consists of changes to the physical environment which is very necessary for the people to meet their basic needs and such infrastructure makes people more productive. Similarly, the producer goods are the tools and equipment which help people use to work in a more productively way. (DFID, 1999)

Physical asset holding, both productive and non-productive, indicates the wealth possession of the households. Here, an attempt is made to examine the wealth possessed by the sample households under different categories of villages under the study. By considering the physical assets as mentioned in table 5.3, a physical wealth index is constructed by using the principal component analysis (PCA) for the operational areas and operational headquarters separately (Annexure-C).

PCA is a 'data reduction' procedure. It is used to replace many correlated variables with a set of principal uncorrelated 'principal components' which can explain much of the variance and represent unobserved characteristics of the population. The objectives of a PCA are: i) to discover or reduce the dimensionality of the data set and ii) to identify new meaningful underlying variables. The first principal component explains the largest proportion of the total variance and it is used as the wealth index to represent the household's wealth. (WFP, 2017)

The values of the first component are ranked and these are classified into two categories as low and high. Table 5.4 shows the distribution of sample households of operational areas and operational headquarters according to their wealth index values. It is seen that in the operational areas 56.43 per cent of sample households of oil villages have possessed high physical wealth, but the percentage of sample households having high physical wealth is only 36.36 per cent in its control villages. Similarly in the operation headquarters, 48.0 per cent of sample households of nearby villages fall in the category of having high physical wealth, while in its control villages only 25.11 per cent of sample households possessed high physical wealth. This indicates that the sample households inhabiting the oil villages of operational areas and the nearby villages of the operational headquarters have higher possession of physical wealth as compared to their respective control villages. This finding is quite consistent with those of Mishra (2009), who found that families in the mining villages of Orissa's Ib Valley Coalfield had greater levels of physical assets than those in the control villages. In a similar vein, by looking at household-level physical asset holding, Das (2015) found that families in the coal mining communities in the same state held more physical capital in the post-mining stage compared to the pre-mining stage. They observed that the control village households have less physical asset holdings because of their lesser family income.

Table 5.3

Percentage of households having different types of physical assets

Type of physical assets	Operational area		Operational headquarters	
	Oil villages N=443	**Control villages N=187**	**Nearby villages N=125**	**Control villages N=219**
Television	73.36	77.54	96.00	46.12
Motorcycle	65.01	49.20	72.80	38.36
Car	27.77	17.65	19.20	5.94
Bicycle	88.94	94.12	68.00	83.11
Refrigerator	32.28	19.79	47.20	15.53
Washing Machine	13.54	4.28	17.60	1.37
Mobile Phone	93.45	97.86	94.40	89.95
LPG connection	86.00	94.65	98.40	93.15
Mixture grinder	27.99	21.39	35.20	3.20
Water pump	41.08	16.04	20.00	7.31
Inverter	15.35	12.30	38.40	12.33
Fan	91.87	91.98	100.00	98.63
Sewing machine	16.03	19.79	49.60	17.81
Tractor/power tiller	12.19	5.88	2.40	0.91

Source: Researcher's calculation from the field data

In context of the present study, one of the reasons for such findings is that ONGC and OIL have brought an opportunity for the households of the oil and nearby villages to be engaged in various non-farm works. It is also observed in figure 5.4 that the average nonfarm income of the oil and nearby villages is found to be more compared to their respective control villages, which has led to the increase in physical wealth holding and standard of living of those villages. Previous studies have also observed that employment in non-farm sectors lowers the likelihood of poverty for people living in rural areas.

Nonfarm income plays a crucial role in sustaining household livelihood and improving their standard of living (Damenaa & Habteb, 2017; Pattayat et al., 2022).

Table 5.4

Distribution of households according to physical wealth index

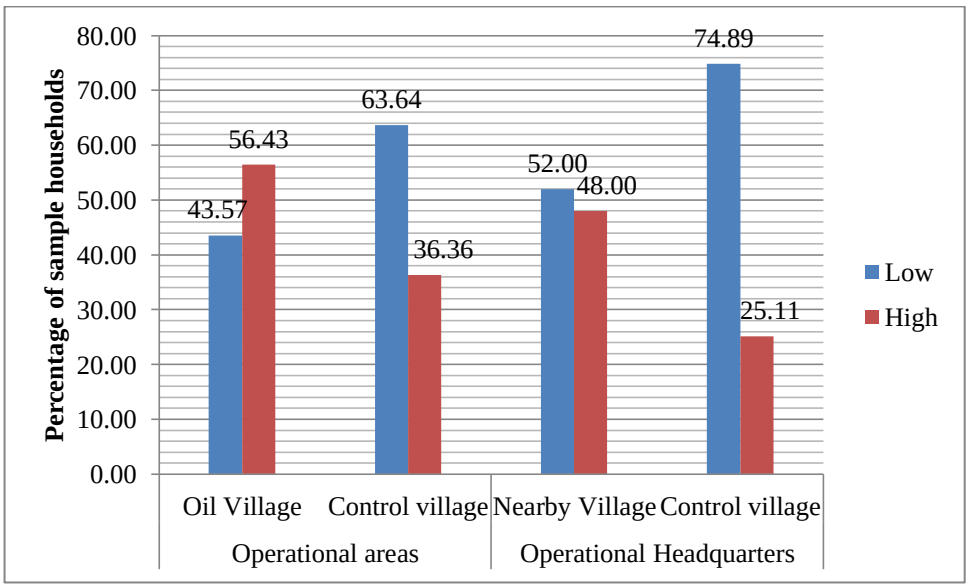
	Village type	Physical wealth index		Total
		Low	High	
Operational areas	Oil Village	193 (43.57)	250 (56.43)	443 (100)
	Control village	119 (63.64)	68 (36.36)	187 (100)
Operational Headquarters	Nearby Village	65 (52.00)	60 (48.00)	125 (100)
	Control village	164 (74.89)	55 (25.11)	219 (100)

Note: A physical wealth index is constructed by using principal component analysis for operational areas and operational headquarters separately. The sample households are divided based on the index value of the 1st component (Annexure-C).

Source: Researcher's calculation from the field data

Figure 5.5

Percentage of households according to physical wealth index



5.3 Impact on human capital

Human capital represents skills, knowledge, labour ability, and good health. It helps people to formulate various livelihood strategies and achieve different livelihood goals. By examining the education level of the sample villages of the study area it is observed that there is no vast difference in educational attainment between the oil villages and control villages of operational headquarters as well as nearest villages and control villages of operational headquarters of ONGC and OIL (table 4.2 in chapter 4).

There are a few important CSR initiatives undertaken by the ONGC and OIL which aim at human resource development in their oil operational districts. Some of such CSR initiatives of OIL are *Project Super 30* which provides 11 months of free residential coaching to students of BPL families for the IIT / Engineering entrance examination for admission to IITs and other prestigious institutions in the country, *Dikhya* which aims at the promotion of computer education and school intervention programs for students of remote schools in OIL's operational areas, assistance for development of educational infrastructure of School/college/university/technical institutions etc. for promoting education, OIL Awards & OIL Merit Scholarships for the meritorious school students of operational areas, and the *OIL Shikshya Ratna Puraskar* for recognizing the all-round contribution of the teaching fraternity from provincialized schools and colleges of Assam. Similarly, the major CSR initiatives of ONGC include the provision of healthcare infrastructure, mobile medical check-up programmes, *Project Sakhi* for promoting menstrual hygiene through the installation of sanitary pad vending machines at educational institutions, *ONGC Super 30* project to train 30 students belonging to economically weaker families to get admission in premier engineering institutes of the country. Moreover, they have taken several programmes for empowering the local women and youths through various skill development programmes. During the field survey, it is observed that the coverage of CSR benefits for human capital formation is very limited in the study area. It is reported that a limited number of people in the study area are covered by such CSR programmes.

Though ONGC and OIL provide skill-based training for empowering local women and youths, it is reported that there is no permanent establishments for giving technical education to the local youths and women. Technical education adds more value to a person in terms of productive efficiency and hence increases his or her employability. From the field survey, it is found that only 5.38 per cent population of the

oil villages under operational areas have technical education, while the same is 4.07 per cent in the control villages. On the other hand, persons with technical education are found to be very less in the nearby (2.5 per cent) and control villages (1.31 per cent) of operational headquarters. The ongoing skill-based programmes lack regularity, and many deserving women and youths have been found deprived of such training because of information lag.

Human health is one of the important sub-components of human capital. The oil exploration activity of ONGC and OIL has generated lots of bad impacts on the human health of neighbouring people. According to the neighbouring people, due to release of waste in the water sources causes drinking water source pollution. Okandan & Zcan (2004) stated that if the formation water produced along with oil, is not properly processed or injected back into underground formations, it can cause harm to the environment and thereby human health. Oil companies are sometimes penalized by the Pollution Control Board of Assam (PCBA) for failing to maintain proper waste management. In the year 2019, the PCBA fined ONGC Rs. 2.04 crore for operating six oil wells in the Gelakey and Lakwa areas of Sivasagar district without installing any effluent plants ("ONGC fined", 2019). Locals in many oil villages in the study area have been left with no choice but to use contaminated water for drinking and irrigation.

It is observed that mechanical shovels and earthmovers are used by the oil companies for vegetation clearance, cut and fill, and other site levelling activities during the drilling site preparation period. These activities cause dust particles that get mixed with air and mobilized by the wind to the neighbouring areas, which results in deterioration of the ambient air quality. Furthermore, it has been observed that the drilling operations at the well sites have caused noise pollution to the surrounding residents. Drilling works, mud pumps, power generators, vehicular movement, cranes, and material handling equipment are the main sources of noise pollution. Some respondents stated that they are suffering from sleep disturbances, stress, and hearing loss as a result of their exposure to noise pollution. Besides, their risk of developing high blood pressure and heart disease increases.

5.4 Impact on natural capital

Natural capital and the vulnerability context have a particularly close relationship within the framework of sustainable livelihoods (DFID, 1999). Natural capital is the stock of natural resources and environmental assets such as water, soils, air, flora and fauna, minerals, and other natural resources. Natural capital is important to rural people because farming, fishing, and collecting forest products provide all or part of their income (Mishra, 2009). The present study has revealed several impacts of oil exploration on the natural assets from which rural people earn their livelihoods. Land acquisition, pollution of agricultural land by crude oil spillage, contamination of sources of water such as rivers etc. by industrial wastage, pollution of wetlands that harms the water habitats, and air and noise pollution that affects all living beings etc. are some major problems caused by oil exploration of ONGC and OIL in the study area. These impacts are discussed below:

i) Land holding & land use

Land is one of the important natural assets in rural areas as agriculture is the primary source of livelihood for many households in the study area (table 4.3 in Chapter 4). So, the possession of land assets helps them in the formulation of different livelihood strategies. Table 5.5 shows the pattern of possession of land by the sample households in the study areas. It is observed from this table that most of the sample households have land assets of less than 1 hectare in all the categories of villages in the study areas.

In the operational areas, the average land holding of the sample households in the oil villages is 0.89 hectares only, against 1.25 hectares in the control villages. But, in the operational headquarters, the average land holding is almost similar in nearby and control villages. It is 0.72 hectares in the nearby villages and 0.73 hectares in the control villages.

Similarly, there is a difference between the oil and control villages of the operational areas regarding the average land used for agricultural work. The average land under agriculture in the oil villages is estimated to be 0.44 hectares which are lesser than 0.69 hectares in the control villages. But such statistics are almost similar in the nearby and control villages of the operational headquarters. These are shown in table 5.6. Besides, by estimating the average percentage of land used for agriculture it is observed that the sample households of oil villages under operational areas use 45.24 per cent of

the land on average for agriculture, which is much below the average percentage of land used for agriculture (59.44 %) in the control villages of the operational areas. However, such difference is less between the sample households of nearby and control villages under the operational headquarters of the ONGC and OIL.

One of the reasons for lesser land possession and lesser land used for agriculture works by the sample households of the oil villages is the land acquisition by the ONGC and OIL in those villages for different operational activities. Moreover, it is reported by many sample households inhabiting oil villages that their agricultural land has been affected by the leakages of crude oil and wastages from oil pipelines, oil collection stations or group gathering stations and oil drill sites. Again, the availability of non-farm occupations such as casual job opportunities in the oil villages also encourages many households to shift from agriculture to non-agricultural work.

Table 5.5

Number of sample households under different land holding categories

Category of land holding (in hectare)	**Operational area**		**Operational headquarters**	
	Oil villages	**Control villages**	**Nearby villages**	**Control villages**
Marginal (Below 1.0)	295 (66.59)	102 (54.55)	88 (70.40)	175 (79.91)
Small (1.0-2.0)	113 (25.51)	60 (32.09)	33 (26.40)	37 (16.89)
Semi-Medium (2.0-4.0)	34 (7.67)	20 (10.70)	4 (3.20)	3 (1.36)
Medium (4.0-10.0)	1 (0.23)	5 (2.66)	0 (0)	4 (1.82)
Large (10.0 & above)	0 (0)	0 (0)	0 (0)	0 (0)
Total sample households	**443** (100)	**187** (100)	**125** (100)	**219** (100)

Source: Researcher's calculation from the field data

Note: Figures in the parentheses indicate the percentage of the total.

Table 5.6

Average land holding in the study areas

Study areas	**Village type**	Total land	The total land under agriculture	**Average land holding (in hectares)**	**Average land under agriculture (in hectares)**	**Average Percentage of land under agriculture**
Operational areas	Oil Villages	393.79	195.10	**0.89**	**0.44**	**45.24**
	Control villages	233.94	129.44	**1.25**	**0.69**	**59.44**
Operational headquarters	Nearby Villages	89.25	62.39	**0.72**	**0.51**	**56.14**
	Control villages	160.22	108.53	**0.73**	**0.50**	**51.50**

Source: Researcher's calculation from the field data

ii) Land acquisition

Since land is one of the important livelihood sources for many households, the acquisition of land by ONGC and OIL for their exploration works has created shocks to the livelihood of the households inhabiting the oil villages. A total of 229 sample households of the oil villages have confronted land acquisitions by these oil companies in different years, which is 51.69 per cent of the total sample households of the oil villages. The main reasons for land acquisitions as reported by the sample households during the field survey were the establishment of group gathering stations (GGS) or oil collection stations (OCS), drilling of oil wells, and installation of oil pipelines. The main impact of such land acquisition is the decrease in average land holding of the sample families in the oil villages. Before the land acquisition, the average land holding of the sample families was 1.32 hectares which have got reduced to 1.07 hectares after acquiring their lands by the oil companies. ONGC and OIL acquired on an average 0.26 hectares of land from 229 sample households of the oil villages. The total land

acquisition as a percentage of total land owned before the acquisition is 19.29 per cent. These are portrayed in table 5.7.

Table 5.7

Land acquisition in oil villages of operational areas

Descriptions	**Values**
Total number of households who confronted land acquisition	229
Total land holding before the acquisition (in hectare)	303.43
The average land holding before the acquisition (in hectare)	1.32
Land acquired (in hectare)	58.52
Land acquisition as a percentage of total land owned before the acquisition (in %)	19.29
Average Land acquired (in hectare)	0.26
Current total land holding (in hectare)	245.33
Current average land holding (in hectare)	1.07

Source: Researcher's calculation from the field data

The most affected sample households due to land acquisitions by ONGC and OIL are the marginal and the small landholders. From table 5.8, it is found that out of the total 229 sample households who confronted land acquisition, 55.02 per cent are marginal land owners whose land possession is below 1 hectare only, and 34.50 per cent are small landholders who fall in the category of 1.0-2.0 hectare. It also observed that the number of sample households under marginal landholders has increased in the oil villages after the land acquisition by the oil companies.

Table 5.8

No. of sample households of the operational area who confronted land acquisition

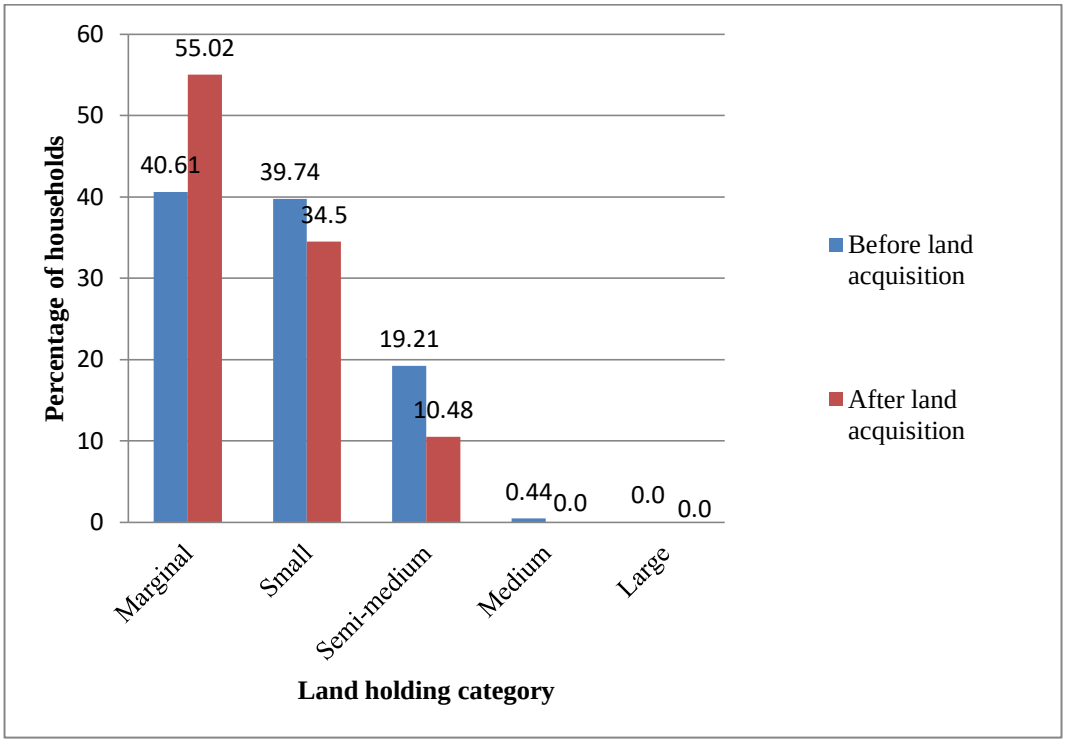
Category land holding (in hectare)	**No. and percentage of sample households of operational area**	
	Before land acquisition	**After land acquisition**
Marginal (Below 1.0)	93 (40.61)	126 (55.02)
Small (1.0-2.0)	91 (39.74)	79 (34.50)
Semi-Medium (2.0-4.0)	44 (19.21)	24 (10.48)
Medium (4.0-10.0)	01 (0.44)	0 (0.00)
Large (10.0 & above)	0 (0.00)	0 (0.00)
Total sample households who confronted land acquisition	229 (100)	229 (100)

Source: Researcher's calculation from the field data.

Note: Figures in the parentheses indicate the percentage of the total.

Figure 5.6

Percentage of households in different land holding categories before and after land acquisition



Land acquisition in the oil villages has caused a shift of sample households from one land holding category to a lower land holding category. From table 5.9, it is observed that out of 229 land acquisition-affected sample households, 13.54 per cent of households has shifted from small to marginal landholders, and 8.30 per cent has shifted from semi-medium to smallholder. Thus, the land acquisition has affected the sample households of the oil villages by reducing the average land holding.

A similar situation has been observed in many previous studies that the land acquisition by the state for the development projects created several impacts on the affected households. Some of the negative effects of the land acquisition process include pressure on agricultural land, a decline in agricultural productivity, suffering from various forms of pollution brought on by development projects, and societal conflict among the impacted populations. In a research on the effects of an Aerocity Extension Project in Punjab, Reuter et al. (2021) noted a fast shift in the land use pattern of the concerned study area. They observed that the state's demography has also been affected, and the locals without adequate skills have been pushed to the margins. Such trends

resulted in growing economic and social disparities, environmental worsening, the loss of forest and arable land, and the deterioration of society's architectural heritage. In several earlier investigations carried out in West Bengal, the same occurrences were noted. Land purchase for development in this state has increased the number of landless, small and marginal farmers, and forced some people out of their traditional livelihoods (Paul & Sarma, 2013; Sarkar, 2007; Guha, 2004; Guha, 2007).

Table 5.9

Alteration of sample households from one category to lower land holding category due to land acquisition

Alteration of sample households from one category to another category of land holding due to land acquisition	**No. of sample households**	**Percentage of sample households**
Small to marginal holding	31	13.54
Semi-medium to smallholder	19	8.30
Semi-medium to marginal holding	2	0.87
Medium to semi-medium holding	1	0.44
Remained unchanged	176	76.86
Total sample households who confronted land acquisition	**229**	**100.00**

Source: Researcher's calculation from the field data.

iii) Impact on agricultural land

ONGC and OIL had a negative impact on agricultural land in many parts of the study area. Crude oil leakage from oil rigs and pipelines passing through agricultural fields has been observed to harm crops and livestock. The magnitude of such damages rises during the summer months as crude oil spreads through water over a vast crop area. Almost 61 per cent of sample households of oil villages in the operational areas informed

that ONGC and OIL activities had a negative impact on their agricultural fields. Moreover, there is much evidence of livestock losses due to exposure to the uncovered oil well waste.

iv) Impact on the natural habitats

Contamination of water sources such as rivers, ponds, canals, wetlands etc. by industrial wastage harms the natural habitats. There is much evidence of the negative impact on natural resources by oil exploration of ONGC and OIL in the study area. For example, the gas explosion and subsequent fire outbreak at an oil well in the Baghjan oilfield under OIL destroyed 60-70 ha of the surrounding area. This has had a significant impact on the nearby Maguri-matapung wetland, which is a rich biodiversity hotspot and a source of livelihood for many rural households. Leakages of hazardous and toxic chemicals appeared to be hazardous to life in general, as they are known to persist in aquatic and soil systems for long periods, causing long-term harm to all life forms, including humans. (Wildlife Institute of India, 2020).

Similar incidents occur frequently in ONGC oilfields too. One such recent incident occurred in the Mesagarh and Molagaon areas of the Rudrasagar oilfield, affecting nearly 20 bighas of paddy fields due to oil spillage from ONGC pipelines. This resulted in significant crop loss and water contamination, which impacted the nearby river (Dutta, 2021).

Similar to the negative effects of oil exploration in Assam, various oil-exploring nations have also reported instances of natural capital degradation in the regions nearby oil exploration areas. There have been numerous instances of natural capital deterioration in the oil exploration regions of Ondo State in Nigeria as a result of oil spills and resource contamination. The health and livelihoods of the local residents, including humans and other habitats, have been endangered by the degradation of agricultural land, pollution of water sources, and obstruction of traditional occupations like fishing (Bayode et al., 2011). Aniefiok et al. (2013) and (Ukpong & Obok, 2018) also observed similar results in their research on petroleum exploration in Nigeria's Niger Delta.

5.5 Impact on social capital

In the sustainable livelihoods framework, social capital is used to refer to the social resources from which people draw in pursuit of their livelihood goals. According to DFID (1999), networks and connectedness; membership in more formalised groups; relationships of trust, reciprocity and exchanges help to build social capital, which in turn gives better livelihood outcomes. In the study area, it is observed that some CSR initiatives of ONGC and OIL have contributed to enhancing social assets in the study area. For example, livelihood training for the local youths and women increases their networks and connectedness in society. CSR grants from the ONGC and OIL to educational institutions, social organizations and local bodies help to grow social relationships among the rural households of the study area.

Some researchers believe that industrialization has created a slew of social issues that have harmed social capital. Some social issues include: industry-induced displacement (Stanely, 1996; Mishra, 2009), forced migration as a result of the loss of traditional river-based livelihoods due to industrial wastes (Fentiman, 1996), negative effects on traditional skills, knowledge, and cultural practices (Sosa & Keenam, 2001), pay disparities between male and female workers (Blue & Kahn, 1992), and gender-based social exclusion (Kholsa, 2009). During the field survey in the study area, it was discovered that, although some sample households of oil villages were confronted with the land acquisition by ONGC and OIL, very few households were forced to relocate.

However, some households in the ONGC-managed Lakwa oilfield have reported the loss of traditional occupations resulting from excessive air pollution caused by oil exploration which is discussed in detail in Chapter 8. Another significant finding is that ONGC and OIL have created gender disparities in employment in the study area. This is because oil companies primarily require male employees for operational activities.

Another negative impact in the nearby area is a conflict between the oil industry and local communities. Respondents reported numerous incidents involving such conflicts. Crop loss due to oil spillage, land acquisition, and compensation delays are some of the major causes of such conflicts. Such conflicts have a negative impact on the social environment of the surrounding area. Furthermore, during the community agitation against the oil companies, corporate officials attempted to manipulate

community leaders to stop such agitations. Such attempts erode the relationship of trust among the local population.

5.6 Summing Up

The above discussion helps to identify the impacts of oil industries on the livelihoods of the local community in the study area. A mixed impact on the five livelihood capitals of the rural households has been observed during the study. The nature of the impacts also differs in the case of the operational area and operational headquarters of ONGC and OIL under study. The major vulnerability contexts arising out of the oil exploration in the study area are land acquisition, agricultural land pollution and crop loss, water pollution, air pollution, sound pollution, loss of traditional occupation, only temporary or contractual jobs for the local people, and industry-community conflicts. These vulnerability contexts negatively affected the livelihood capitals of the rural households of the oil villages of operational areas. However, such vulnerability is not seen in the nearby villages of operational headquarters.