

Bauxite Mining in Koraput Region of Odisha: A Socio-Economic Impact Analysis

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Foreword

The Centre for Economic and Social Studies (CESS) was established in 1980 to undertake research in the field of economic and social development in India. The Centre recognizes that a comprehensive study of economic and social development issues requires an interdisciplinary approach and tries to involve researchers from various disciplines. The Centre's focus has been on policy relevant research through empirical investigation with sound methodology. Being a Hyderabad based think tank, it has focused on, among other things, several distinctive features of the development process of Andhra Pradesh, though its sphere of research activities has expanded to other states as well as to issues at the nation level.

The Research Unit for Livelihoods and Natural Resources (RULNR) was established in the CESS in the year 2008 with financial support of Jamsetji Tata Trust. The core objectives of the RULNR are to conduct theoretical and applied research on policy relevant issues on human livelihoods and natural resource management, especially in areas related to river basins, forest and dryland ecosystems and to provide an effective platform for debates on policy relevant aspects for academicians, policy makers, civil society organizations and development practitioners. RULNR intends to adopt a multidisciplinary approach drawing on various disciplines such as ecology, political science, and social anthropology.

The present monograph titled "Bauxite Mining in Koraput Region of Odisha: A Socio-Economic Impact Analysis" by M. Gopinath Reddy, Prajna Paramita Mishra, Ch. Nagaraju and S.V. Ramana (MSSRF), undertaken under RULNR, CESS Research Programme, attempted to understand the affects of the Bauxite Mining implemented by NALCO (National Aluminum Company, a Public Sector Undertaking of the Government of India)) interms of socio, economic and livelihoods of the communities living in the Koraput region of Odisha. The study looked at benefits/costs of the project. Further, the environment issues such as air, water pollution and access to common property resources such as forest, grazing lands and water bodies etc were dealt in the study. In addition, the study analysed the employment and income details of the project affected population by social category. The study also analysed the infrastructure development facilities promised and executed by NALCO for the project affected areas. It concluded that on many counts the NALCO resettlement and rehabilitation programme was far from satisfactory

The authors mention in the 'way forward' section thus: Though NALCO has undertaken some initiatives for the affected people in terms of providing jobs, shelter,

free education, and free health and infrastructure including community hall, school building, roads and drainages, etc., there is still a feeling among the affected population that problems such as job security to all, shelter, access to free health and education facilities, basic amenities, and other infrastructure facilities, remain. It is time for the NALCO to rethink about the affected people's problems and conduct some welfare activities for them in terms of livelihoods promotion, health and education, skill development activities, infrastructure facilities, etc.

I hope that the recommendations mentioned in the monograph will be taken in right earnest by NALCO authorities to improve the livelihoods of the project affected population in general and adivasis in particular. Further, I hope that the issues raised in the present monograph will find place in the ongoing debate of the large scale mining and its affect on the local communities.

S.Galab
Director, CESS

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Abbreviations

ARMP	-	Ash and Red Mud Pond
CBA	-	Cost Benefit Analysis
CPR	-	Common Property Resource
CSR	-	Corporate Social Responsibility
EIRR	-	Economic Internal Rate of Return
EPW	-	Economic and Political Weekly
FGD	-	Focus Group Discussion
GSi	-	Geological Survey of India
HH	-	Household
HINDALCO	-	Hindustan Aluminium Company
IIED	-	International Institute for Environment and Development
ICDS	-	Integrated Child Development Scheme
IGA	-	Income Generating Activitiy
ITDA	-	Integrated Tribal Development Agency
ITI	-	Industrial Training Institute
LAP	-	Land Affected People
LDP	-	Land Displaced Person
MMDR	-	Mining and Mineral Development and Regulation
MT	-	Million Tones
NALCO	-	National Aluminium Company
OBC	-	Other Backward Caste
OC	-	Other Caste
OMC	-	Odisha Mining Corporation
OTFDs	-	Other Traditional Forest Dwellers
PAFs	-	Project Affected Families
PDS	-	Public Distribution System
PHC	-	Primary Health Centre
R&R	-	Rehabilitation and Resettlement
SC	-	Scheduled Caste
ST	-	Scheduled Tribe
TB	-	Tuberculosis, a chronic infectious disease
WBCSD	-	World Business Council for Sustainable Development

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Executive Summary

Odisha is endowed with a variety of vast mineral deposits and therefore occupies a prominent place in the mineral map of India. Among all the minerals Bauxite is an important one having 51 percent of all India deposit. Koraput is the major bauxite mining district in Odisha and produces 98.82 percent of the state's total production. National Aluminium Company (NALCO), a company fully owned by the Government of India is mining the bauxite reserves. The NALCO project called as the pride of Odisha, was started in 1981. NALCO has declared huge profits and also have won award for its contribution to wasteland development. On the other hand, displacement of tribals and pollution of water and air have also been documented. Therefore, the impacts of NALCO's Odisha operation need proper analysis.

The main research questions addressed in this study are: How does mining influence the livelihoods of the local people? What exactly are the benefits/costs of the mining projects? How can the benefits and potential negative outcomes be assessed? The objective is to assess the socio-economic and environmental challenges of bauxite mining. It uses both primary and secondary sources of information. The report has been accomplished in five chapters including introduction and conclusion.

The introductory chapter is an introduction to the study. It presents the bauxite mining scenario in Odisha and discusses the positive and negative impacts of mining. Chapter Two gives a historical view of bauxite mining in south Odisha. It discusses the displacement and compensation scenario. The result shows that affected people were not able to get back their livelihoods as a result of cash compensation policy. As the job allocations were confined to one member per family, reducing others as mere dependents. Other infrastructural facilities promised by NALCO were also not adequately provided. As there was no scarcity of land in the 80s, NALCO should have adopted a land to land policy.

Chapter Three gives profiles of the sample villages and its important characteristic. A large majority of the sample households belong to the Scheduled Tribe (49 percent). Majority of them are small and marginal farmers. Most facilities like electricity, road, school, health centre, drinking water etc, have been provided by either NALCO or Government of Odisha. However, access to them is not universal. Common Property Resources available in the sample villages are affected by the refinery and ash and red mud pond zone. Due to the refinery activities, the streams have been logged and forest access to the community is very much restricted. In their development needs, villagers rank drinking water as one followed by internal road works and irrigation.

Chapter Four does a household analysis of affects of bauxite mining. The data on educational status of the sample households shows that literacy rate is still very low in the study area. The various economic activities of individuals show that agriculture is still the most prominent economic activity in the mining areas. However, in the refinery areas though agriculture is an important source but many of them have permanent employment with NALCO. As a result average household income in the refinery zone is quite high compared to other areas. Majority of the households expressed that they have food security for 9-12 months in a year. Majority of them also expressed their health status as good. However, a substantial section did mention health problems like asthma, skin rashes, breathing problems, joint pains etc. The expectations of sample households are mostly job regularization for those who are in contract.

The last chapter provides a summary of the main findings of the study. Though NALCO has taken some initiatives for the affected people, still there is a feeling like the problem of job security, access to free health and education and other basic facilities remain. NALCO should provide some training to the affected people for creation of alternative livelihoods. The Scheduled Tribes and other traditional forest dwellers should not be restricted from using forest resource of that particular area (Forest Rights Act, 2006). Free health care should be provided not only to employee but to affected households as a whole. NALCO must think of basic services like providing free education, drinking water facilities in all the villages and basic transport facilities. This is time to strengthen their corporate social responsibility towards the affected population.

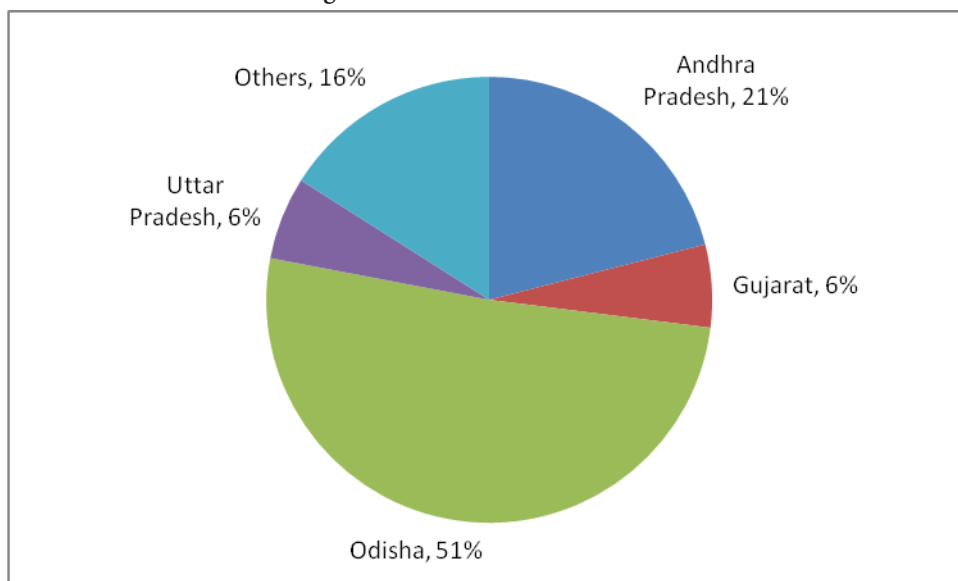
Chapter - 1

INTRODUCTION

1.1. Introduction

Odisha is endowed with a variety of mineral resources and occupies an important position in India's mineral map. Among all the minerals, bauxite is prominent. The state accounts for 51 percent of the Indian bauxite reserve, followed by Andhra Pradesh (21 percent). According to the Indian Bureau of Mines (2005), India has 2,926 Million Tons (MT) of bauxite resources and these include 524 MT of reserves¹.

Figure 1: Bauxite Reserves in India



¹ The British Geological Society defined mineral resources as natural concentration of minerals, which are or may be of potential economic interest due to their inherent properties. On the other hand, mineral reserves are that part of a mineral resource, which have been fully evaluated, are commercially viable, and have a valid planning permission for extraction. http://www.bgs.ac.uk/planning4minerals/Resources_5.htm

According to the production data of 2009-10, India produced 13,95,2002 tons of bauxite. Odisha is the highest producer of bauxite (35 percent), followed by Gujarat (19 percent), Maharashtra (14 percent), Chhattisgarh (12 percent), and Jharkhand (12 percent)²; bauxite mining is yet to begin in the State of Andhra Pradesh. Deposits of bauxite ore are mined and refined into alumina - one of the feed stocks for aluminium metal. At the refinery, alumina is extracted from the bauxite ore; and at the smelter, aluminium is extracted from its oxide, alumina.

The states of Odisha and Andhra Pradesh have the largest amount of bauxite reserves in the country. According to the Geological Survey of India (GSI, 1979), these reserves, referred to as the East Coast Bauxite Deposits, have brought an outstanding boost to the bauxite resources in the country from 350 MT (1971) to 2,000 MT (1978)³. The bauxite deposits of Odisha are broadly described under the Southern, Central and Northern groups (Table 1.1).

Table 1.1
Bauxite Deposits of Odisha

Group	Estimated Reserves (Million Tons)	Mine Area (Hectares)
Southern Group		
Ballada	12.41	86
Maliparbat	9.80	109
Pottangi	69.03	265
Total Southern	91.24	460
Central Group		
Panchpatmali	316.98	1445
Kodingamali	91.4	533
Karnapadikonda	17.2	193
Total Central	425.58	2171
Northern Group		
Baphlimali	195.73	960
Sijimali	86	1300
Karlapat	59	973
Lanjigarh	53	564
Total Northern	393.73	3797
Total Odisha	910.55	6428

Source: Geological Survey of India (1979).

² <http://www.indiastat.com/table/minesandminerals/23/bauxite/19204/617982/data.aspx>.

³ Unfortunately, we do not have very recent data on group-wise bauxite reserves in Odisha.

Out of the ten deposits, mining leases have been granted to two deposits: Panchpatmali deposit in Koraput District, which is under the operation of the National Aluminium Company (NALCO), a Government of India undertaking since 1986; and Maliparbat deposit in the same district, which has been granted to the Hindusthan Aluminium Company (HINDALCO). Approval for mining lease has been granted for the Lanjigarh deposit by the Government of India under the Mining and Mineral Development and Regulation (MMDR) Act in favour of the Odisha Mining Corporation (OMC). This project has been tied up with Vedanta Alumina Limited. Similarly, for the Kodingamali deposit, OMC has tied up with Aditya Alumina. Utkal alumina's plan to mine Baphlimali has been delayed due to people's movement. Larsen and Toubro is planning to mine Sijimali, while NALCO is trying to acquire mining lease over Pottangi deposit as a part of its expansion. This shows that all the bauxite mines of Odisha are already acquired, or waiting to be acquired, by different companies. This raises a big question regarding the positive and negative consequences of mining. The following section discusses the same.

1.2 Debate on the Positive and Negative Impacts of Mining

The conventional view on mining looks at mineral reserves that can be mined profitably as part of a country's stock of natural capital, along with agricultural land, forests, and other natural resources (Davis and Tilton 2005). It was widely assumed that countries that possess rich mineral deposits are fortunate. However, over the last few decades, a more negative view of mining has emerged that questions the positive relationship between mineral extraction and economic development (Davis and Tilton 2005). Mining profoundly impacts local communities in the form of jobs, migrant workers, land, water, air and noise, loss of wildlife habitat, increased tax revenue, etc.

Yirenkyi (2008) studied the socio-economic impacts and challenges of surface mining by using Gold Fields Ghana Ltd., Tarkwa, Ghana, as a case study. The effects identified are relocation/resettlement of host communities and its negative effects, which include disturbance of flora and fauna, disturbance to sacred places, land degradation, noise, air, and water pollution. Further, Bury (2005) examined how mining activities are affecting land-tenure patterns and livelihoods in the Cajamarca gold region of Peru. Gold mining activities have contributed to significant shifts in land-tenure patterns, land-tenure institutions, and land use values throughout the region. Livelihoods are being transformed as household access to economic, human, natural, and social resources are rapidly changing in the areas surrounding mining operations. Bury (2004) argued that while access to human capital resources has increased in the past decade, albeit unevenly, access to natural and social capital resources has declined in the Cajamarca gold region of Peru.

Adjei's (2007) study showed that livelihoods of households in the rural communities in the catchments of the mines in Ghana are threatened by the expansion of concession to

the mining companies. The immediate repercussion is the taking over of farmlands by the miners, which affects livelihood in its entirety. The study found both positive and negative outcomes for the rural households following the operation of mines in the communities. Kitula (2006) reported the socio-economic and environmental impacts of mining in Geita District, Tanzania. These impacts include land degradation, damage to water quality, pollution, and harm to livestock and wildlife biodiversity.

Krishnaswamy et al. (2006) compared historic data with recent data and found out that mining and associated activities in Kudremukh National Park are the greatest sources of sediment entering the Bhadra River, which now carries considerably more sediment than before the mining activity started damaging the river ecosystem and disrupting downstream water resources. Sinha, Bhattacharya and Banerjee (2007) studied the problem of local level sustainability of iron ore mining in eastern India. They tested the sustainability of iron ore mining in this region using household survey data. According to them, substitution of depleting natural capital with other forms of capital can promote long-term sustainability of the local economy. This necessitates certain policy interventions to induce mine operators to reinvest some part of their resource rent in the natural capital of the region.

Maponga and Ruzive (2002) discussed how chromite mining is primarily responsible for environmental problems on the Zimbabwe Great Dyke. McMahon and Remy (2001) investigated the economic, social, cultural, health and environmental impacts of medium and large-scale mining operations on local communities. They compared the developed countries (Canada and Spain) with the developing countries (Latin American countries of Bolivia, Chile, and Peru). They concluded that the relationship between mining operations and local communities is undergoing a largely positive evolution. The International Institute for Environment and Development (IIED) and the World Business Council for Sustainable Development (WBCSD), 2002, brought the first in-depth review of the mining sectors from the perspective of sustainable development, undertaken with the support and engagement of mining companies, mining communities, labour, the research community, and a broad range of other stakeholders. The World Bank also conducted an independent critique - The Extractive Industries Review - of its activities in the mineral sector (Salim 2003).

Bebbington et al. (2008) examined how social movement is protesting contemporary forms of mining in Latin America. Taking cases from Peru and Ecuador, their paper argues that the presence and nature of social movements has significant influence both on the form of the mining industries, and on the effects of this extraction on rural livelihoods. Bury (2002) argued that rural development is co-produced by movements, mining companies, and other actors, in particular the state.

Kitula (2006) suggested that marked environmental and socio-economic improvements can be achieved if the government provides technical support to local operators, regulations are improved, and illegal mining activity is reduced. Sweeting and Clark (2000) offered ways in which the mining industry and governments that regulate that industry can minimise the mining sector's negative environmental and social impacts that increase its overall positive contribution to conservation and community development. McMahon and Remy (2001) suggested that the three major stakeholders (the local community, the mining company, and the government-central or state) should work together to ensure long term sustainable benefits to the local economy.

Maconachie and Binns (2007) explained how diamond mining makes an important contribution to the national economy of Sierra Leone. They argued that if meaningful rural development is to be achieved among desperately poor communities, development strategies must be based on a detailed understanding of the nature of inter-locking livelihoods in the agricultural and mining sectors. Aroca's (2001) study shows that mining is the most important sector of the Chilean II region. The main linkages of the mining sectors are with the three sectors with the highest backward and forward linkages; when these linkages are considered along with the level of production from mining, mining emerges as the most important sector.

Khatua and Stanley (2006) studied the lifestyle and livelihoods of affected communities, land use patterns, impact on natural resources, and climate change in the context of mining. They focused on NALCO and its relationship with resource exploitation. However, the study is based only on secondary data. Patra and Murthy (Year not known) came up with a fact-finding report on NALCO, which shows that the local tribal communities are complaining about air and dust pollution, noise emissions, unpleasant odour, and discharge of effluent without treatment. Stanley (1996) explained how displacement in the NALCO area changed the occupational pattern of the local people and led to the division of society into social groups based on class, caste, tribe and sex. According to the study, mining added to the process of marginalisation. Women's economic status deteriorated as they were forced to stay at home and were no longer considered as an economic asset.

Irawan (2005) conducted a cost-benefit analysis of mining in Indonesia. The study examined the net social benefits of the mining activity by analysing the environmental costs that have to be borne by the society in order to obtain the benefits of the mining activity. The net present value is estimated at US\$220.1 million. It compares the benefits with that of forest preservation. The benefits of forest are US\$12.32 million, which will last for an infinite time; but mining will only last for 20 years. Therefore, the study concluded that forest preservation is more desirable than mining.

Venkatesan and Wadhwa (2007) took up a social CBA of the POSCO steel project in Odisha. They measured the Economic Internal Rate of Return (EIRR), which measures the profitability of a project from the perspective of the whole economy rather than the project itself. The sensitivity analysis indicated that EIRR is 16.6 percent for the base case scenario and 13.9 percent at the world case scenario, which is significantly above the hurdle rate of 12 percent discount rate.

1.3 Research Gap

There is little analytical research that focuses on the socio-economic or regional effects of mining. Therefore, this study is primarily concerned with whether or not bauxite mining operations can produce sustainable benefits to local communities, and, if so, whether there are policies or processes that can increase the positive impact and reduce the negative impact. In order to determine sustainable benefits, it is necessary to analyse all relevant impacts - economic, social, cultural, health and environmental. The project is evaluated to see whether livelihood status has deteriorated, improved, or remains the same with the project. The main idea is to study the scenario holistically beyond the economic cost. Again, changes in human well being will also be looked at, beyond just livelihoods (income, security, health and social relations). As it is difficult to study the changes over time, the present study will concentrate on a particular time taking a control group.

1.4 Research Questions and Objectives

The main research questions addressed in this study are:

- (a) How does mining influence the livelihoods of the local people? What exactly are the benefits/costs of the mining projects?
- (b) How can the benefits and potential negative outcomes be assessed?

The objectives of the study are:

- (a) To assess the socio-economic and environmental impacts and challenges of bauxite mining, i.e., the possible impacts of mining on financial capital (household income), physical capital (land, house, livestock, and other physical assets), human capital (health and literacy), social capital (displacement and social network), and natural capital (water, air and noise).

1.5 The Methodology, Study Area, and Sample Selection

This study has used both secondary and primary data. Secondary data are collected from the Indian Bureau of Mines, Economic Survey of Odisha, Statistical Abstract of Odisha, and from the websites of the Ministry of Environment and Forests and the

Ministry of Tribal Affairs, Government of India, and Odisha Mining Corporation, etc. To assess the positive and negative impacts of mining, Social Impact Assessment (SIA, also called Social Impact Analysis) has been used in addition to the sustainable rural livelihoods framework. It refers to the processes and procedures for understanding and managing the social consequences of development activities (Lahiri-Dutt, Nair and Dowling 2008). This includes people's way of life, their culture, community, political and institutional systems, environment, health and well being, personal and property rights, and their fears and aspirations.

To study the micro impact of mining in general and bauxite mining in Odisha in particular, primary data has been collected. This study concentrates on Koraput District of Odisha because this district produces more than 98 percent of the bauxite in Odisha. Bauxite mines in the Panchpatmali Hills of Koraput District have been considered for the study because this is the largest single bauxite deposit in the world.

The NALCO was established in 1981 with the aim of producing aluminium from the vast bauxite deposits available in Koraput District of Odisha. It has three operations in Odisha (Stanley 1996):

- (a) Bauxite mines in the Panchpatmali Hills of Koraput District with deposits of 112.8 MT;
- (b) Alumina refinery complex in Damanjodi, Koraput District, 11 km from the mines. It has an installed capacity of eight lakh tons of alumina annually;
- (c) Smelter plant at Anugul District; 4.25 lakh tons are transported here. The plant has a captive power plant with a capacity of 55.5 MW as against its actual need of 32 MW.

Our study concentrates on the first two areas. It also includes villages near the Ash and Red Mud Pond (ARMP) areas. The NALCO has divided the surrounding areas into two zones: core zones (area within a radius of 5 km either from the plant or the refinery) and buffer zones (area within a radius of 6 to 15 km either from the plant or the refinery). This has been decided by the NALCO in view of the severity of pollution effects. Villages have been selected from each zone for the study. As bauxite mining and the aluminium refinery were started long back, it is difficult to make a before-after comparison. Therefore, we have used with-without method by taking control villages. These control villages have the same socio-economic and geographical features. They are selected from the same district with same agro-climatic zone and same political situation, but not affected by the mining and the refinery. There are 12 villages from three blocks surrounded by the refinery and nearly 40 villages from four Gram Panchayat surrounded by the mines.

The criteria for selection of villages are more tribal population, pollution, crop loss, approachable, low compensation, health hazards, etc. There are about five to six villages under each area and the villages were selected using the above criteria besides taking the views of people's representatives. Amalabadi Village was selected purposively as people from 13 displaced villages were resettled here.

Table 1.2: Sample Villages

Area	Zone	Village	Total No of Households	No. of Sample Households
Mining Area	Core Zone	Kapsiput	142	38
	Buffer Zone	Kardiguda	79	21
		Putraghati	201	53
Refinery Area	Core Zone	Amalabadi	607	175
		Ambogam	133	36
	Buffer Zone	Mujanga	259	67
		Marichamal	77	21
Ash and Red Mud Ponds	Core Zone	Goudaguda	73	24
		Khoraguda	34	8
		Champapodar	84	10
	Buffer Zone	Charangaguda	72	23
Total			1761	476

1.6 Report Structure

The present chapter is an introduction to this work. It presents the bauxite mining scenario in Odisha and discusses the positive and negative impacts of mining. Chapter two discusses the displacement and compensation policy adopted by the NALCO for the bauxite mining project. Chapter three discusses the profile of the sample villages and their important characteristics in the bauxite mining region. Chapter four analyses the household data from the sample villages. Chapter five concludes the study.

Chapter - 2

PROJECT AFFECTED PEOPLE: AN INITIAL ANALYSIS

2.1 Bauxite Mining in South Odisha: A Look at the Past

In the early 80s, it was clear that the bauxite deposits of South Odisha will be exploited with the help of a western transnational, and the Andhra deposits with the help of a soviet-aided project. NALCO was set up for exploiting the vast bauxite deposits of South Odisha, in collaboration with a French aluminium international company (Srinivasan, Vyasulu and Rajagopalan 1981). There was a public debate on this huge public investment and papers were published in the leading journal, *Economic and Political Weekly (EPW)*, raising a number of questions about the ongoing debate (Srinivasan, Vyasulu and Rajagopalan 1981; Subrahmanyam 1982).

Researchers mentioned that the financial viability and foreign exchange earnings of the project depend on world alumina prices. Further, there are questions regarding the interest rate on the Eurocurrency loan (Srinivasan, Vyasulu and Rajagopalan 1981). Babani and Srinivasan (1981) also supported the former authors' argument that world alumina prices have never arrived at 15 percent of the aluminium price; this was against the NALCO assumptions, and Subrahmanyam (1982) further supported the argument. There are also questions regarding why this plant was taken up when resources to finance the projects and programmes covered by the sixth plan (EPW 1982) are lacking. However, another review work of EPW (1986) argued that this is a major development in the aluminium industry during the sixth plan.

In the 1950s, Odisha did not have any industry except a few saw mills and some ice factories near Cuttack (Stanley 1996). Exploitation of the state's resources started with the building of the Hirakud Dam and the Rourkela Steel Plant in the 1950s. Since the 1970s, resource exploitation increased with more dams and more mining (Stanley 1996). Stanley gives a clear account of the displacement, compensation and rehabilitation in the NALCO Bauxite Mine and Plant at Damanjodi. According to him, 597 families in 254 villages got displaced, out of which 42.55 percent are tribal (Table 2.1). Out of the total acquired land of 10,058.76 crores, 69.52 percent was used for the construction of the plant followed by the township.

Table 2.1: Displacement Scenario of NALCO

Affected Villages	26	
Affected Families	Tribal	254 (42.55)
	Dalit	56 (9.38)
	Others	287 (48.07)
	Total	597 (100)
Land Acquired (acres)	Mines	427.30 (4.25)
	Township	2638.96 (26.24)
	Plant	6992.50 (69.52)
	Total	10058.76 (100)

Source: Stanley (1996).

Stanley (1996) also examined the compensation package given by NALCO. Out of the displaced families, 74 percent were rehabilitated and 59 percent received jobs in compensation. Compensation per acre of land was Rs.2000 and compensation per tree was Rs.100. However, there was no compensation for the Common Property Resources (CPRs).

Table 2.2: Compensation Scenario of NALCO

Families Displaced	597
Families Rehabilitated	441 (73.87)
Jobs Received	352 (58.96)
Compensation per one acre of land (Rs.)	2000
Compensation per Tree (Rs.)	100
Compensation for CPRs	No

Source: Stanley (1996).

Samal (1996) undertook another study in the same year, which covered the NALCO Anugul sector (smelter). He mentioned that the NALCO rehabilitation and resettlement policy is regarded as one of the best in India. According to Khatua and Stanley (2006), NALCO paid compensation for *patta* land alone; there was no compensation for CPRs or government and village lands, which are a good source of income for the landless villagers. All these studies encouraged meeting with the displaced people and studying their situations nearly after three decades. With this background, the objective of our study is to compare the situation of the displaced people before and after mining.

Before starting the final survey, we made a preliminary visit to the study area to find our sample villages and to have an idea of the extent of displacement. We visited 11 villages and conducted a census survey to understand the extent of displacement. We interviewed all household heads of these villages. Finally we collected information from 1,483 households. A demographic feature of the villages is given in Table 2.3. In the mining core zone, Kapsiput is our sample village. It has 142 households, out of which 141 households belong to the Scheduled Tribe category. In the mining buffer zone, Kardiguda and Putraghati are two sample villages. Kardiguda has 79 households and all belong to the Scheduled Tribe category. Putraghati has 201 households with mixed population.

Table 2.3: Demographic Features of Affected Villages

Study Zone	Village	Panchayat	Block	Household Category				
				SC	ST	OBC	OC	Total
Mining Core	Kapsiput	Bhifaarguda	Lakhimpur	1	141	0	0	142
Mining Buffer	Kardiguda	Littiguda	Koraput	0	79	0	0	79
	Putraghati	Littiguda	Koraput	26	95	79	1	201
Refinery Core	Analabadi	Matalput	Koraput	68	267	144	128	607
	Ambogam	Littiguda	Koraput	2	131	0	0	133
Refinery Buffer	Mujanga	Mujanga	Dasamanthapur	143	93	0	23	259
	Marchimal	Matalput	Koraput	21	0	15	41	77
ARMP Core	Goudaguda	Charangul	Semiliguda	0	0	0	73	73
	Khoraguda	Podampur	Koraput	4	2	14	13	33
	Champapodar	Mujanga	Dasamanthapur	11	1	9	64	85
ARMP Buffer	Charangaguda	Podampur	Koraput	30	42	0	0	72

Source: Field survey (2011).

In the refinery core zone, Analabadi has 607 households. This is a rehabilitation colony consisting of 11 displaced hamlets of the refinery. It also has a mixed population. The second village in the refinery core zone, Ambogam, consists of 133 households, mostly tribal. This village is almost located in the refinery premises (1.2 km); this village was supposed to be displaced, but NALCO delayed the process and later on gave up the idea. These villagers are the victims of all immediate environmental impacts. In the refinery buffer zone, Mujanga Village has 259 households, dominated by Scheduled Castes and Scheduled Tribes. Marchimal is another village in this area having 77 households with a mixed population but no tribals.

In the ARMP core zone, Goudaguda is a village with 73 households. All the households belong to the *Gouda* caste, whose main occupation is livestock rearing. Both Khoraguda and Champapodar are displaced villages in this area. They are now resettled in one place but they still maintain different identities. Khoraguda has 33 households with a mixed population and Champapodar has 85 households, dominated by other castes. In the ARMP buffer zone, Charangaguda is a village with 72 households, dominated by Scheduled Caste and Scheduled Tribe population. Most of them have lost land because of the railway track constructed by NALCO. The next section shows the displacement scenario of the affected villagers.

2.2 Displacement and Compensation Scenario

In the mining core zone, 51 percent of the households lost their agricultural land, and none of the households received any compensation for this. These villagers were practicing *podu* on the top of the hills and on hill slopes. After getting permission to mine the area, NALCO evicted these villagers and disallowed them from cultivating those patches of land. As these displaced households do not have *patta* for their agricultural lands, they did not receive any compensation for that. In the mining buffer zone, 49 percent of the households lost their agricultural land to the rehabilitation colony, conveyor belt, and another road, which connects the mining area to the refinery site. Almost all the households here received compensation; only two households did not receive compensation because of unclear documentation. The compensation package was Rs.1000 to 1500 per acre for dry land and Rs.2500 to 5000 per acre for wet land.

Table 2.4 Displacement and Compensation Scenario

Study Zone	Total HHs	Affected HHs	Assets Lost		Compensation Received	
			Land	House	Land	House
Mining Core	142	72 (50.70)	72	0	0	NA
Mining Buffer	280	138 (49.29)	138	0	136	NA
Refinery Core	740	383 (51.76)	141	361	129	344
Refinery Buffer	336	34 (10.12)	34	0	28	NA
ARMP Core	191	128 (67.02)	86	103	85	103
ARMP Buffer	72	38 (52.78)	38	0	36	NA

Source: Field survey (2011).

In the refinery core zone, 52 percent of the households were affected by the refinery. Out of the affected households, 37 percent (141 households) lost their agricultural land; and of these, 129 households received compensation, while it is still pending for others. The compensation package is the same. On the other hand, 94 percent of the affected

households (361 households) lost their home and homestead area; of these 344 households received compensation ranging from Rs.500 to 5000 depending on the type of home-hut, semi-*pucca*, *pucca*, etc. These households were also settled in the rehabilitation colony and provided with one job (per house) in NALCO.

On the other hand, in the refinery buffer zone only 10 percent of the total households got affected. They lost their agricultural land for the refinery, and a part of the red mud pond. Out of the 34 households, 28 received compensation, while it is pending for the others.

In the ARMP core zone, 67 percent of the households were affected; of these, 67 percent of the households lost their agricultural land. All the households received compensation except for one. Further, in this area, 80 percent of the households lost their home and homestead area. The compensation package is the same here.

In the ARMP buffer zone, 53 percent of the households were affected; of these, 38 households lost their agricultural land, and 36 were compensated. The next section compares the main occupation of the households in the pre and post-displacement scenario.

As a part of the compensation package, NALCO provided job to those households that lost their home and homestead area. Therefore, it is interesting to study how the household's main occupation was changed in the post-displacement scenario. It is to be noted here that we have only compared the main occupation of the households in the pre and post-displacement scenario, irrespective of whether or not the household's head was the same person.

In the mining core zone, the main occupation of all households was farming during the pre-displacement period (Table 2.5). However, in the post-displacement period, 36 percent are engaged in NALCO as contract/wage employees—they are not permanent employees of the company. NALCO has assigned the contract works to contractors, who in turn recruit the contract/wage labour. Therefore, there is no job security for these people, and they receive weekly payment. The work in the company has been divided into four categories: high skilled works, skilled works, semi-skilled works, and unskilled works. According to the work category, the wage rates are: high skilled worker - Rs.330 per day; skilled worker - Rs.280 per day; semi-skilled worker - Rs.220 per day; and unskilled worker - Rs.190 per day. In the mining buffer zone, farming was the main occupation (82 percent) during the pre-displacement period followed by wage labour. However, this percent was reduced in the post-displacement period and now NALCO contract/wage labour is the main occupation.

Table 2.5: Main Occupation of the Households: Pre and Post-Displacement

Main Occupation	Mining Core Zone		Mining Buffer Zone		Refinery Core Zone		Refinery Buffer Zone		ARMP Core Zone		ARMP Buffer Zone	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Farmers	118 (100)	75 (63.6)	193 (81.8)	78 (33.1)	665 (94.5)	71 (10.1)	165 (54.8)	100 (33.2)	164 (85.9)	16 (8.4)	38 (52.8)	1 (1.4)
Wage Labourers	0 (0.0)	0 (0.0)	43 (18.2)	0 (0.0)	27 (3.8)	207 (29.4)	132 (43.9)	172 (57.1)	22 (11.5)	90 (47.1)	34 (47.2)	65 (90.3)
Others	0 (0.0)	0 (0.0)	0 (0.0)	9 (3.8)	12 (1.7)	33 (4.7)	4 (1.3)	19 (6.3)	5 (2.6)	7 (3.7)	0 (0.0)	3 (4.2)
NALCO Contract/ Wage Employee	NA	43 (36.4)	NA	149 (63.1)	NA	98 (13.8)	NA	10 (3.3)	NA	9 (4.7)	NA	3 (4.2)
NALCO Permanent Employees	NA	0 (0.0)	NA	0 (0.0)	NA	295 (41.9)	NA	0 (0.0)	NA	69 (36.1)	NA	0 (0.0)
Total	118 (100)	118 (100)	236 (100)	236 (100)	704 (100)	704 (100)	301 (100)	301 (100)	191 (100)	191 (100)	72 (100)	72 (100)

Source: Field survey (2011).

In the refinery core zone, farming was the main occupation during the pre-displacement period (94.5 percent). However, in the post-displacement period, majority of the people are permanent employees of NALCO-this job was the compensation package for the many households that lost their homestead area in this zone. This is followed by wage labour, and NALCO contract work. In the refinery buffer zone, during the pre-displacement period both farming and wage labour were the major occupations. However, post displacement, wage labour has outweighed farming. Since the extent of displacement was very less here, workers employed in NALCO as contract/wage employed was very less (only 3.3 percent).

Similarly, in the ARMP core zone also farming was the main occupation during the pre-displacement period. In the post-displacement scenario, it was wage labour and employment in NALCO. Here also the households lost their homestead land and were provided permanent employment in NALCO. In the ARMP buffer zone, the main occupation was farming and wage labour. However, in the post-displacement period it was dominantly wage labour. Because of water problem and other environmental impacts, farming is no more a profitable occupation now. As the contractors are exploiting the NALCO contract employees, these people prefer to work as wage labourers rather than as contract employees.

In the tribal and hilly habitations, CPRs play an important role in the subsistence of the livelihoods of the poor and the marginalized. Particularly in these regions, unlike in the plain areas, availability of CPRs to the village communities in terms of basic needs, such as grazing pastures, ponds, streams, and forests for minor forest produce, play an important role in their livelihoods. Access to CPRs is usually free and unrestricted.

Interaction with the affected households in these areas revealed that NALCO does not offer any access to health facilities in terms of issuing health cards and availability of medicines and other facilities. The attitude of NALCO, a profit-making public sector undertaking, towards this section of affected people was found to be totally inadequate and unsatisfactory. Further, permanent employment opportunities available to them in the plant were also very limited. Whatever employment was offered was only contractual in nature; moreover it was offered through contractors and not directly by the company. It was also observed during the survey that once an employed person got married and left the house, the others, especially the elderly became totally dependent, and had no source of regular income. Land-to-land compensation was eminently possible during the early 80s, but this option was not followed. Unfortunately, the affected households became addicted to certain social evils as a result of the cash compensation.

Many women from areas surrounding the mining activity are working as cleaners for cement works masonry and as helpers. However, they are employed through contractors and not NALCO. Their wage rates are around Rs.90 to 120 per day. The women expressed that no adequate transport facilities are provided to reach the mining site. Further, it was observed that people from surrounding villages work in the refinery, and engage in both technical and non-technical sections: People working in the technical sections are technicians, fitters, electricians; while the non-technical people work as maintenance workers, daily wage workers in the boiling section, and other works.

It was found that transport between the refinery and surrounding villages is a major problem; the men use bicycles or motor cycles for their transport, while the women have to trek long distances-this is very difficult because they have to walk about 9 to 10 km on a *kutchha* road to reach the refinery, and it time takes more than one hour of their time. Due to this, they are not able to reach home well in time to spend with their children. They hope that NALCO will provide them with the required transport facilities.

Besides the problems enlisted above, there are certain environmental and ecological problems observed in the field. Dust emanating from the conveyor belt carrying bauxite is affecting the agricultural lands and hence their productivity. Unfortunately, there is no mechanism to compensate such losses. Natural resources such as ponds and streams were adversely damaged due to mining and the conveyor belt; hence the water sources got totally diminished.

During the survey, some of the following problems were identified in Goudaguda Village: Leakage in caustic soda and septic water pipeline led to septic water flows into the agricultural fields; hence soil fertility was affected and crop production decreased. The canal water is contaminated due to caustic mud and septic water. According to the village elders, due to contaminated water affected by caustic mud and septic water, a few livestock died in 1995. For this the villagers fought against NALCO and received compensation. However, the people are facing health problems such as skin ailments, TB, and other health-related issues.

When it comes to other infrastructural facilities, most of the villages are facing water problems. They depend on well and hand pumps for both drinking and domestic usage. For agriculture they depend on streams, ponds and rainfall. NALCO gets water from the Kerandi River, which is about 8 km away from the refinery. A pipeline is connected to carry water from the river, and due to this, some villages lost their agriculture lands. During the survey, the people informed that their request to access water from the pipeline was denied by NALCO, although large amount of water is wasted due to leakages.

Interactions with associations such as the Peripheral Development Committee, LDP Welfare Association, and LAP Association show that due to NALCO many people have lost their agriculture lands and houses, but NALCO provided job opportunities only to a selected few while the rest of them received no benefits. In fact, there was no proper guideline for job recruitment. After job recruitment, NALCO conducted a minimum literacy programme for the displaced people; its duration was for nine months. During this time, some of the displaced people, who got jobs, had died due to health problems and their spouses applied for their husbands' job; but NALCO did not accede to their request. These people are still trying to get jobs with help of associations.

During the year 1984-85, NALCO started the Peripheral Development Programme-the area, which is 10 km from the refinery and mining is considered as a peripheral area. Under this programme, NALCO promised to provide all facilities including health, education, roads, drinking water, and infrastructure development (school building, etc.); but did not do so. The presidents of various associations said that as far as their knowledge goes, the peripheral development funds have been diverted to other areas. Further, all association members demand NALCO to provide jobs to all affected people, and services to the notified peripheral area. They also insist that local priority should be given for the contract works and contract jobs, and health card access to all the displaced people must be given, irrespective of whether they are directly or indirectly affected.

2.3 Conclusion

NALCO, a profit-making public sector called 'the pride of Odisha' cannot really be characterized as such from the perspective of the affected population. The data shows very clearly that the most vulnerable sections, viz. the Scheduled Tribes and Scheduled Castes, who have lost lands, houses, and other assets, were not able to get back their livelihood status as a result of the cash compensation policy. Therefore, and as we could see from the data, the above-mentioned sections were reduced from farmers to casual labourers and rendered helpless. Even the job allocations were confined to one member per family, reducing the others to mere dependents. The other infrastructural facilities promised by NALCO were not adequately provided, and there are still loose ends in the whole approach. On the whole, the resettlement and rehabilitation measures by NALCO are found to be piecemeal and ad hoc. The company, with its huge profit base, could have done much better to these marginalized people. Since there was no land scarcity in the 80s as it is now, NALCO should have adopted a land to land policy.

Chapter - 3

PROFILE OF THE SAMPLE VILLAGES AND IMPORTANT CHARACTERISTICS

3.1 Profile of the Sample Villages

In this chapter, the profile and the important characteristics of the sample villages in the bauxite mining region are presented. The analysis is presented in terms of affected areas, i.e., the core and buffer zones of the mining, refinery and ARMP areas. The basic issues covered in this chapter are: social category of households, basic infrastructure available in the villages, NALCO's role in the provision of basic facilities, and ranking of development needs by the villagers.

The caste and sub-caste particulars of the sample households have been presented in Table 3.1. A large majority of the households belong to the Scheduled Tribes (49 percent), followed by 'Others' (19.2 percent), Scheduled Castes (17.2 percent), and 'Other Backward Castes' (14.6 percent). Among the various sub-castes within the Scheduled Tribes found in the sample villages are Khonds, Parjas, Gadabas, Santhals, etc. The sub-castes found among the Scheduled Castes in the sample villages are: Dombos, Killos, Kambra, etc.; similarly, the sub-castes among the 'Other Backward Castes', are Sundi, Mali, Koslas, Kumra, Blacksmiths, etc.; and among 'Others' the sub-castes found in the sample villages are Brahmins, Madangas, Mukdas, Payikas, Goudas, Kshetriya, etc. (Table 3.1).

The data on landholding of the households reveal that in the mining area - both in the core and buffer zones - small and marginal farmers are in majority (40-45 percent), followed by landless labour (around 30 percent). In Kapsiput village the proportion of large farmers is significant (21 percent). Similarly in Kardiguda, medium farmers are considerable in proportion (20 percent). In the refinery areas, the landholding profile is quite different, particularly in the core zone (for e.g., 50.4 percent are others/salaried, and 38 percent are landless in Analabadi Village). This is because a large number of project affected households got employment in the company. However, in the buffer zone of the refinery, small and marginal farmers are predominant, followed by landless labour. In the ARMP core zone, there are hardly any medium and small farmers; a large segment of them are others/salaried (91 percent in Khoraguda and 61 percent in Champapodar), followed by landless labour (Table 3.2).

Table 3.1: Social Category of the Households in the Bauxite Mining Area

Area	Zone	Village	SC		ST		OBC		Others		Total
			Community	No. of HHs	Community	No. of HHs	Community	No. of HHs	Community	No. of HHs	
Mining Area	Core Zone	Kapsiput	Dombo	1 (0.7)	Khond	141 (99.3)	-	0	-	0	142 (100)
	Buffer Zone	Kardiguda	-	0	Khond	79 (100)	-	0	-	0	79 (100)
Refinery Area	Core Zone	Putraghati	Dombo	26 (12.9)	Parja	95 (47.3)	Sundi and Kumra	79 (39.3)	Brahmin	1 (0.5)	201 (100)
		Analabadi	Dombo and Killo	68 (11.2)	Parja, Gadaba, Khond, Santhal, etc.	266 (43.8)	Sundi, Mali, Payika, Kosla, etc.	145 (23.9)	Brahmin, Madanga, Kondayat, Mukda, Rama, etc.	128 (21.1)	607 (100)
		Ambogam	Dombo	2 (1.5)	Parja	131 (98.5)	-	0	-	0	133 (100)
Ash & Red Mud Ponds	Buffer Zone	Mujanga	Dombo	143 (55.2)	Parja	93 (35.9)	-	0	Payika, Kumbhar and Brahmin	23 (8.9)	259 (100)
		Marichamal	Dombo	21 (27.3)	-	0	Kumra and Blacksmiths	15 (19.5)	Payika	41 (53.2)	77 (100)
		Goudaguda	-	0	-	0	-	0	Gouda	73 (100)	73 (100)
Total	Core Zone	Khoraguda	Dombo	4 (12.1)	Parja	2 (6.1)	-	14 (42.4)	Payika	13 (39.4)	33 (100)
		Champapodar	Dombo	11 (12.9)	Gadaba	1 (1.2)	-	9 (10.6)	-	64 (75.3)	85 (100)
		Charangaguda	Dombo and Kamar	30 (41.7)	Parja and Gadaba	42 (58.3)	-	0	-	0	72 (100)
	Total			306	-	850	-	262	-	343	1761

Source: Field Survey (2011).

Table 3.2: Landholding Details of the Households in Sample Villages (% of Households)

Category of Occupation	Mining Area			Refinery Area			ARMP				
	Core	Buffer		Core	Mujanga	Marichamal	Core		Buffer		
		Kardiguda	Putraghati				Analabadi	Ambogam		Goudaguda	Khoraguda
Large Farmers	30 (21.1)	0 (0.0)	3 (1.5)	10 (1.6)	5 (3.8)	20 (7.7)	0 (0.0)	5 (6.8)	0 (0.0)	0 (0.0)	7 (9.7)
Medium Farmers	15 (10.6)	16 (20.3)	15 (7.5)	20 (3.3)	20 (15)	50 (19.3)	10 (13)	5 (6.8)	0 (0.0)	2 (2.4)	0 (0.0)
Small Farmers	35 (24.6)	15 (19)	25 (12.4)	20 (3.3)	16 (12)	60 (23.2)	12 (15.6)	34 (46.6)	0 (0.0)	0 (0.0)	8 (11.1)
Marginal Farmers	30 (21.1)	15 (19)	70 (34.8)	20 (3.3)	70 (52.6)	84 (32.4)	34 (44.2)	20 (27.4)	3 (9.1)	0 (0.0)	5 (6.9)
Landless Labour	30 (21.1)	33 (41.8)	58 (28.9)	231 (38.1)	20 (15)	35 (13.5)	15 (19.5)	4 (5.5)	0 (0.0)	31 (36.5)	47 (65.3)
Total HHs"	140 (98.5)	79 (100)	171 (85.1)	301 (49.6)	131 (98.5)	249 (96.1)	71 (92.3)	68 (93.1)	3 (9.1)	33 (38.9)	67 (93)

Source: Field Survey (2011).

" The total no. of households in the row does not account for cent percent as this figure does not denote 'other/salaried' households.

Creation of basic infrastructural facilities is the key for the displaced population to settle down in the new habitations cohesively without being disintegrated. In the absence of such facilities, the affected population will face severe difficulties and hence may disperse as per their choice of place. NALCO and the Government of Odisha have promised to create basic infrastructure for the project affected population when they embarked on commissioning the project. From Table 3.3, it may be interpreted that most of the facilities such as electricity, roads, schools, health centres, drinking water, community halls, irrigation facilities, etc., have been provided by either NALCO or the Government of Odisha. However, facilities such as electricity and community halls have still not been provided in some villages. During our interactions with the respondents in the field, it was observed that although facilities were provided, access to them is not universal; for e.g., in the vicinity of the mining area, although health centres were established by NALCO, all the villagers were not given health cards, even though they were all indirectly affected by the factory.

It is important for the Odisha Government as well as NALCO to ensure that the affected population is resettled satisfactorily so that disintegration of the communities does not occur. Creation of various infrastructure facilities - physical as well as social - is important for the communities to resettle as cohesive social units. From Table 3.4, it may be seen that primary schools exist in all the villages; upper primary schools are available in seven villages, higher secondary schools exist only in one village, while 'Girijan Vidya Vikas Kendra' (run by Integrated Tribal Development Agencies (ITDAs) do not exist in any of the villages - the people have to go to either Koraput or Semiliguda to avail this facility.

Further, although hospitals (territory level) do not exist in any of the sample villages, a Primary Health Centre (PHC) exists only in one village (Analabadi); two sample villages have health sub-centres; and there are no veterinary hospitals available in any of the villages. The situation regarding other infrastructure, such as metalled roads and 'all weather roads', is better in the sample villages. Further, half of the sample villages have ICDS centers and strikingly, only two villages have Fair Price Shops or PDS outlets (Tables 3.5 and 3.6).

Only two villages have bus stops, and for other villages, the nearest bus stop is one to seven kilometers away; these two villages also have post offices, while the other villagers have to cover a distance of one to five kilometers to reach the nearest post office (Table 3.6).

Table 3.3: Availability of Infrastructural Facilities in the Sample Villages

Area	Zone	Village	Elect-ricity	Providers	Roads	Providers	Educa-tion	Providers	Health	Providers	Drinking water	Providers	Irrigation	Providers	Community	Providers
Mining	Core	Kapsiput	Yes	Govt.	Yes	Govt.	Yes	Govt.	Yes	Govt.	Yes	Govt.	Yes	Govt.	No	-
		Kardignada	Yes	Govt.	Yes	Govt.	Yes	Govt.	Yes	Govt.	Yes	Govt.	Yes	Govt.	No	-
	Buffer	Putraghati	Yes	Govt.	Yes	Govt.	Yes	Govt.	Yes	Govt.	Yes	Govt.	Yes	Govt.	Yes	NALCO
Refinery	Core	Analabadi	Yes	NALCO & Govt.	Yes	NALCO	Yes	NALCO & Govt.	Yes	NALCO	Yes	NALCO	Yes	Govt.	Yes	NALCO
		Ambogam	No	-	Yes	NALCO & Govt.	Yes	Govt.	Yes	NALCO & Govt.	Yes	Govt.	Yes	Govt.	Yes	NALCO
	Buffer	Mujanga	Yes	Govt.	Yes	Govt.	Yes	Govt.	Yes	Govt.	Yes	Govt.	Yes	Govt.	No	-
Ash & Red Mud Pond	Core	Marichamal	Yes	Govt.	Yes	Govt.	Yes	Govt.	Yes	Govt.	Yes	Govt.	Yes	Govt.	Yes	Govt.
		Goudaguda	No	-	Yes	Govt.	Yes	NALCO & Govt.	Yes	NALCO & Govt.	Yes	NALCO & Govt.	Yes	Govt.	No	-
		Khoraguda	Yes	NALCO & Govt.	Yes	NALCO	Yes	NALCO & Govt.	Yes	NALCO	Yes	NALCO	No	-	No	-
	Buffer	Champa-podar	Yes	NALCO	Yes	NALCO	Yes	NALCO & Govt.	Yes	NALCO	Yes	NALCO	No	Govt.	No	-
		Charang-aguda	No	-	No	-	Yes	Govt.	Yes	Govt.	Yes	Govt.	Yes	Govt.	No	-

Source : Field Survey (2011).

Table 3.4: Educational Facilities in the Sample Villages

Area	Zone	Village	Primary school			Upper Primary school			Higher Secondary School			Girijan Vidya Vikas Kendra			Tribal Ashram Schools		
			Avai-labil-ity	Dista-nce	Place	Avai-labil-ity	Dista-nce	Place	Avai-labil-ity	Dista-nce	Place	Avai-labil-ity	Dista-nce	Place	Avai-labil-ity	Dista-nce	Place
Mining	Core	Kapsiput	Yes	0	0	No	13	Purhoda	No	13	Purhoda	No	3	Birharaguda	No	13	Purhoda
		Kardiguda	Yes	0	0	No	7	Mathalput	No	7	Mathalput	No	34	Koraput	No	3	Putraghati
			Putraghati	Yes	0	0	Yes	0	0	Damanjodi	No	5	Koraput	Yes	0	0	
Refinery	Core	Analabadi	Yes	0	0	Yes	0	0	Yes	0	0	No	25	Koraput	Yes	0	0
		Ambogam	Yes	0	0	Yes	0	0	No	3	Mathalput	No	28	Koraput	No	10	Pudaguda
			Mujanga	Yes	0	0	No	5	Runjaguda	No	8	Pudaguda	No	5	Runjaguda	No	6
Ash & Red Mud Ponds	Core	Marichamal	Yes	0	0	Yes	0	0	No	4	Mathalput	No	10	Semiliguda	No	4	Mathalut
		Goudaguda	Yes	0	0	Yes	0	0	No	4	Mathalput	No	10	Semiliguda	No	4	Mathalut
		Khoragda	Yes	0	0	Yes	0	0	No	5	Damanjodi	No	22	Koraput	No	7	Sunnabeda
Ponds	Buffer	Champapodar	Yes	0	0	Yes	0	0	No	5	Damanjodi	No	22	Koraput	No	7	Sunnabeda
		Charangaguda	Yes	0	0	No	5	Sunnabeda	No	5	Sunnabeda	No	18	Koraput	No	5	Sunnabeda

Source : Field Survey (2011).

Table 3.5: Health Facilities in Sample Villages

Area	Zone	Village	Hospital			PHC			Primary Health Sub-Centre			Veterinary Hospital		
			Availability	Distance (km)	Place	Availability	Distance (km)	Place	Availability	Distance (km)	Place	Availability	Distance (km)	Place
Mining	Core	Kapsiput	No	3	Bitharaguda	No	3	Bitharaguda	No	3	Bitharaguda	No	7	Kakrigumma
		Kardiguda	No	7	Damanjodi	No	7	Mathalput	No	7	Mathalput	No	7	Mathalput
		Putraghati	No	5	Damanjodi	No	5	Littiguda	No	5	Mathalput	No	5	Mathalput
Refinery Area	Core	Analabadi	Yes	0	0	Yes	0	0	Yes	0	0	Yes	0	0
		Ambogam	No	3	Mathalput	No	3	Mathalput	No	3	Mathalput	No	3	Mathalput
		Mujanga	No	8	Pudaguda	No	8	Pudaguda	No	8	Pudaguda	No	8	Pudaguda
Ash & Red Mud Ponds	Core	Manichamal	No	4	Damanjodi	No	4	Mathalput	No	4	Mathalput	No	4	Mathalput
		Goudaguda	No	4	Damanjodi	No	4	Mathalput	No	4	Mathalput	No	4	Mathalput
		Khoraguda	Yes	5	Damanjodi	No	5	Mathalput	No	5	Mathalput	No	5	Mathalput
		Champapodar	Yes	5	Damanjodi	No	5	Mathalput	No	5	Mathalput	No	5	Mathalput
	Buffer	Charangaguda	No	5	Sunnabeda	No	5	Sunnabeda	No	5	Sunnabeda	No	10	Dumbriput

Source : Field Survey (2011).

Table 3.6: Other Infrastructure Facilities in the Sample Villages

Area	Zone	Village	Metalled Road			All Weather Road			Bus Stop			Post Office			PHC Sub-Center			ICDS			PDS/Fair Price			
			Availability	Distance (km)	Place	Availability	Distance (km)	Place	Availability	Distance (km)	Place	Availability	Distance (km)	Place	Availability	Distance (km)	Place	Availability	Distance (km)	Place	Availability	Distance (km)	Place	
Mining	Core	Kapsiput	Yes	0	0	Yes	0	0	No	3	Bitharaguda	No	3	Bitharaguda	Yes	0	0	No	3	Giriliput	No	3	Giriliput	
		Kardiguda	Yes	0	0	Yes	0	0	No	2	Putraghati	No	3	Litriguda	Yes	0	0	No	2	Litriguda	No	2	Litriguda	
Refinery	Core	Putraghati	Yes	0	0	Yes	0	0	No	1	Putraghati	No	5	Litriguda	Yes	0	0	No	5	Litriguda	No	5	Litriguda	
		Analabadi	Yes	0	0	Yes	0	0	Yes	0	0	Yes	0	0	Yes	0	0	Yes	0	0	Yes	0	0	
	Buffer	Amboagam	Yes	0	0	Yes	0	0	No	3	Mathalput	No	5	Litriguda	No	3	Mathalput	Yes	0	0	No	5	Litriguda	
		Mujanga	Yes	0	0	Yes	0	0	No	7	Damanjodi	Yes	0	0	Yes	0	0	Yes	0	0	Yes	0	0	
Ash & Red		Marichamal	Yes	0	0	Yes	0	0	Yes	0	0	Yes	0	0	Mathalput	No	4	Mathalput	Yes	0	0	Yes	0	0
		Goudaguda	Yes	0	0	No	2	Benjidi	No	4	Mathalput	No	3	Charangul	No	4	Mathalput	No	0.5	Goudaguda II	No	3	Charangul	
Mud Pond	Core	Khoraguda	Yes	0	0	Yes	0	0	No	5	Damanjodi	No	5	Damanjodi	No	5	Mathalput	No	5	Boduguda	No	7	Ghattuguda	
		Champapodar	Yes	0	0	Yes	0	0	No	5	Damanjodi	No	5	Damanjodi	No	5	Mathalput	No	5	Boduguda	No	7	Ghattuguda	
	Buffer	Charanguguda	No	2	Chogamgan	No	2	Chogamgan	No	5	Sunnabeda	No	5	Sunnabeda	No	5	Sunnabeda	Yes	0	0	No	4	Ghattuguda	

Source : Field Survey (2011).

Table 3.7: Details of the Livestock Possessed by the Households in the Bauxite Mining Area

Social Category		Buffaloes	Cows	Sheep	Goats	Bullocks	Pigs	Total
SC	No. of HHs	3	117	21	20	22	23	206
	No. of Livestock	12 (1.5)	409 (52.4)	168 (21.5)	44 (10.6)	83 (4.9)	65 (8.3)	781 (100)
ST	No. of HHs	20	331	122	176	142	74	865
	No. of Livestock	81 (2.3)	1547 (43.9)	520 (14.7)	995 (28.2)	173 (4.9)	210 (6)	3526 (100)
OBC	No. of HHs	8	24	5	15	12	0	64
	No. of Livestock	23 (8)	74 (25.9)	100 (35)	60 (21)	29 (10.1)	0 (0.0)	286 (100)
Others	No. of HHs	15	128	0	6	4	0	153
	No. of Livestock	150 (18.6)	635 (78.6)	0 (0.0)	15 (1.9)	8 (1)	0 (0.0)	808 (100)
All	Total No. of HHs	46	600	148	217	180	97	1288
	Total No. of Livestock	266 (4.9)	2665 (49.3)	788 (14.6)	1153 (21.3)	254 (4.7)	275 (5.1)	5401 (100)

Source: Field Survey (2011).

The data on the livestock possessed by different categories among the sample HHs, reveals clearly that out of the total 1761 sample HHs, 1288 HHs (73.1 percent), possessed various livestock. It is interesting to note that the sample HHs mostly possessed cows (49.3 percent); unlike in plain areas where bullocks are in large majority, followed by goats (21.3 percent), and sheep (14.6 percent). This may be because tribal households largely use cows for cultivation besides for milk production (Table 3.7).

The village wise details of the livestock indicate that cows, sheep and goat are the largest livestock assets that a majority of the households possessed and the rest i.e., buffaloes, bullocks and pigs are not possessed in a big way in the sample villages. A large number livestock assets are held in Ambogam village (1216 nos) and Mujanga village (1365 nos) of refinery areas. Analabadi village which is core area of refinery, where settlement colonies are developed, the extent of livestock assets is meager (220 nos). This may due to the fact that most of the households have permanent/contract employees of the NALCO and hence do not keep livestock to sustain their livelihoods (Table no.3.7.1).

In tribal and hilly habitations, CPRs play an important role in the subsistence of the livelihoods of the poor and the marginalized. In particular, these regions, unlike in the plain areas, access and availability of CPRs to the village communities in terms of basic needs, such as grazing pastures, ponds, streams, and minor forest produce (from forests)

Table 3.7.1: Village-wise Details of the Livestock in the Bauxite Mining Area

Area	Zone	Village	Buffaloes	Cows	Sheep	Goats	Bullocks	Pigs	Total
Mining	Core	Kapsiput	16 (2.8)	350 (60.2)	30 (5.2)	90 (15.5)	80 (13.8)	15 (2.6)	581 (100)
		Kardiguda	0 (0.0)	200 (43.4)	3 (0.7)	200 (43.4)	8 (1.7)	50 (10.8)	461 (100)
	Buffer	Putraghati	10 (3.2)	86 (27.3)	160 (50.8)	28 (8.9)	31 (9.8)	0 (0.0)	315 (100)
Refinery	Core	Analabadi	0 (0.0)	77 (35.0)	30 (13.6)	30 (13.6)	68 (30.9)	15 (6.8)	220 (100)
		Ambogam	6 (0.5)	600 (49.3)	300 (24.7)	250 (20.6)	30 (2.5)	30 (2.5)	1216 (100)
	Buffer	Mujanga	50 (3.7)	600 (44.0)	100 (7.3)	430 (31.5)	25 (1.8)	160 (11.7)	1365 (100)
		Marichamal	32 (6.0)	300 (56.7)	150 (28.4)	30 (5.7)	12 (2.3)	5 (0.9)	259 (100)
Ash & Red Mud Pond	Core	Goudaguda	150 (33.3)	300 (66.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	450 (100)
		Khoraguda	0 (0.0)	3 (20.6)	5 (7.9)	45 (71.4)	0 (0.0)	0 (0.0)	63 (100)
		Champa- podar	2 (2.5)	39 (48.1)	10 (12.3)	30 (37.0)	0 (0.0)	0 (0.0)	81 (100)
	Buffer	Charanga- guda	0 (0.0)	100 (83.3)	0 (0.0)	20 (16.7)	0 (0.0)	0 (0.0)	120 (100)
Total No. of Livestock			266 (4.9)	2665 (49.3)	788 (14.6)	1153 (21.3)	254 (4.7)	275 (5.1)	5401 (100)

Source: Field Survey (2011).

plays an important role for their livelihoods. Access to these is usually free and unrestricted, since CPRs are open access resources. However, from Table 3.8, it may be observed that though various CPRs are available in the sample villages, most of them have been affected by the refinery and ARMP areas. NALCO acquired most of the CPRs such as common lands, streams and grazing land for laying roads, constructing the conveyor belt, and building colonies, particularly in the refinery (core) areas. Due to the factory activities, the streams have been logged and forest access to the community is very much restricted. In some villages, the streams and canals are contaminated due to emissions from the plant.

Table 3.8: Details of the Common Property Resources (CPRs)

Area	Zone	Village	Availability of CPRs	Impact on CPRs	Details
Mining	Core	Kapsiput	Streams, forest, and common lands	Yes	Streams are logged, forest is restricted, and common land totally acquired
	Buffer	Kardiguda	Streams, forest lands, ponds, etc.	Yes	Streams destroyed, water logged
		Putraghati	Canal, streams, village forest, grazing lands, and graveyard	Yes	NALCO occupied all the common land streams and grazing lands for the roads, conveyor belt, and R&R colony
Refinery	Core	Analabadi	Canal, streams, village forest, grazing lands, and graveyard	Yes	NALCO occupied all the common land streams and grazing lands for the roads, conveyor belt, and R&R colony
		Ambogam	Forest and streams	Yes	NALCO occupied all the common land, streams, and grazing lands for the roads and conveyor belt
	Buffer	Mujanga	Forest, streams, ponds, tamarind trees, and other forest products	Yes	Due to red mud pond the CPRs are disturbed
		Marichamal	Canal and forest	Yes	Canal water declined due to water logging
Ash & Red Mud Ponds	Core	Goudaguda	Canal, stream, and forest	Yes	Stream and canal are contaminated due to caustic water and septic water
		Khoraguda	Forest	Yes	Restricted
		Champapodar	Forest	Yes	Restricted
	Buffer	Charangaguda	Hill forest and stream	Yes	NALCO acquired some of the land

Source: Field Survey (2011).

Table 3.9: Details of Out-Migration in the Sample Villages

Area	Zone	Village	Migration (1=Yes, 2=No)	Type of Work	Social Category of those Migrating	No. of people	Place of Migration	Age Group (years)	Nature of Migration	Terms of Migration
Mining	Core	Kapsiput	No	-	-	-	-	-	-	-
	Buffer	Kardiguda	No	-	-	-	-	-	-	-
		Putraghati	Yes	Gold selling & repairs	BC	12	Urban	26-50	Seasonal/ temporary	-
Refinery	Core	Analabadi	No	-	-	-	-	-	-	-
		Ambogam	Yes	Construction & other non-agriculture works	ST	15	Urban	15-50	Seasonal/ temporary	Daily wage and contracts
	Buffer	Mujanga	Yes	Construction & other non-agriculture works	SC/ST	30	Urban	15-50	Seasonal/ temporary	Daily wage and contracts
		Marichamal	No	-	-	-	-	-	-	-
Ash & Red Mud Pond	Core	Goudaguda	Yes	Construction & other non-agriculture works	Others	15	Urban	15-50	Seasonal/ temporary	Daily wage and contracts
		Khoraguda	No	-	-	-	-	-	-	-
	Buffer	Champapodar	No	-	-	-	-	-	-	-
		Charangaguda	Yes	Construction & other non-agriculture works	SC/ST	30	Urban	15-50	Seasonal/ temporary	Daily wage and contracts

Source: Field Survey (2011).

The households usually migrate out in search of employment when opportunities are not found on a regular basis in their village. Out migration may be seasonal (short term), medium term, or long term. In the sample villages, out of the 12 villages, the incidence of out-migration mostly for construction and non-agriculture works was observed in seven villages. The caste-wise details of the HHs indulging in out-migration reveal that those who migrate out are mostly dalits, STs, and backward communities; and the nature of payments received is daily wage (Table 3.9).

As already mentioned, CPRs significantly enhance the livelihood of the poor in the villages. Mostly their access is open to all sections of the society. It was observed that NALCO acquired village common land in eight out of the twelve sample villages. Unfortunately no compensation was paid by NALCO to the village communities and the reason offered is that these are forest lands, which do not have 'pattas'. Even in case of grazing land, the same scenario was observed. The loss of these important resources has huge bearing on the livestock holding capacity of the communities (Table 3.10).

The data on job benefits offered to HHs by NALCO show that except in three villages (one village, namely Analabadi, in the core zone of refinery and two villages, namely Khoraguda and Champapodar in the core zone of ARMP), where 389 affected persons out of the total 600¹ affected persons were given permanent employment. In other villages, no permanent jobs were offered by NALCO. According to NALCO, jobs were offered only to those villages whose lands and homesteads were lost. In the process, partially or indirectly affected villages were not benefitted by NALCO jobs even though they lost employment opportunities in their native villages. The nature of jobs offered was also mostly unskilled - like messengers, peons, helpers, operators, etc. However, since it is government employment, the monthly income (salaries) given to these job holders is substantial (Table 3.11).

Although NALCO did not offer large scale permanent employment, it is offering contract employment in all the villages. However, the number of HHs getting contract employment varies across the sample villages. In refinery core zone village, Analabadi, as many as 220 HHs were given contract employment. However, there are a few villages, where very few households (as low as 3, 12 and 20 HHs) have got contract employment. This may be due to the vicinity factor of these villages to the refinery location. The type of jobs offered, as in the case of permanent employment, are skilled, semi-skilled, and unskilled, and the wages offered are uniform across all the villages - ranging between Rs.197-290 per day while their monthly income works out around Rs.5000 to 6000 (Table 3.12).

¹The total number of displaced households was 600, out of which 598 households have received permanent jobs given by NALCO; the remaining 2 households are yet to be employed.

Table 3.10: Details of the Common Property Resource (CPR) Acquisition

Area	Zone	Village	CPR Acquired	Village Common Land				Village Grazing Land				Common Forest Land					
				Acquired (in acres)	Pos-sessed (in acres)	Land Lost (in acres)	Amount Offered	Reasons for not Receiving	Acquired	Pos-sessed (in acres)	Land Lost (in acres)	Amount Offered	Reasons for not Receiving	Acquired	Pos-sessed (in acres)	Land Lost (in acres)	Amount Offered
Mining	Core	Kapsiput	Yes	Not Known	Not known	-	Not offered because it is forest land and there is no patta	Yes	Not known	Not known	-	Not offered because it is forest land and there is no patta	Yes	Not known	-	Not offered because it is forest land and there is no patta	
			Yes	Not Known	Not known	-	Not offered because it is forest land and there is no patta	Yes	Not known	Not known	-	Not offered because it is forest land and there is no patta	Yes	Not known	-	Not offered because it is forest land and there is no patta	
	Yes	4	-	-	Reason not known, but no amount was offered	Yes	3	3	-	Reason not known, but no amount was offered	Yes	300	300	-	Reason not known, but no amount was offered		
Refinery	Core	Analabadi	Yes	-	-	-	Reason not known, but no amount was offered	Yes	Not known	Not known	-	Reason not known, but no amount was offered	Yes	Not known	Not known	-	Reason not known, but no amount was offered
			Yes	-	-	-	Reason not known, but no amount was offered	Yes	Not known	Not known	-	Reason not known, but no amount was offered	Yes	Not known	Not known	-	Reason not known, but no amount was offered

contd...

Table 3.10. contd....

Area	Zone	Village	Village Common Land				Village Grazing Land				Common Forest Land						
			CPR Acquired	Acquired	Land Possessed (in acres)	Amount Offered and Lost (in acres)	Reasons for not Receiving	Acquired	Land Possessed (in acres)	Land Lost (in acres)	Amount Offered	Reasons for not Receiving	Acquired	Land Possessed (in acres)	Land Lost (in acres)	Amount Offered	Reasons for not Receiving
Refinery	Core	Ambogam	Yes	Yes	-	-	Reason not known, but no amount was offered	Yes	Not known	Not known	-	Not offered because it is forest land and there is no pattatt	Yes	Not known	-	Not offered because it is forest land and there is no pattatt	
			No	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ash & Red Mud Pond	Core	Mujanga	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			No	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Yes	-	-	-	Not offered because it is forest land and there is not pattatt	Yes	Not known	Not known	Not known	-	Not offered because it is forest land and there is not pattatt	Yes	Not known	Not known	-	Not offered because it is forest land and there is not pattatt
Champa podar	Core	Champa podar	Yes	-	-	-	Not offered because it is forest land and there is not pattatt	Yes	Not known	Not known	-	Not offered because it is forest land and there is not pattatt	Yes	Not known	-	Not offered because it is forest land and there is not pattatt	
			Yes	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Charangaguda	Buffer	Charangaguda	Yes	No	-	-	-	-	-	-	-	-	-	-	-	-	-
			Yes	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Source: Field Survey (2011).

Table 3.11: Job Benefits Offered by NALCO

Area	Zone	Village	Permanent Job in NALCO	If 'No' State Reason given by NALCO	If 'Yes' How many HHs got Permanent Employment	Nature of Job	Type of Job	Monthly Income
Mining	Core	Kapsiput	No	Jobs were offered only to those who have lost home and homestead	0	-	-	0
	Buffer	Kardiguda	No	Jobs were offered only to those who have lost home and homestead	0	-	-	0
		Putraghati	No	Still pending	0	-	-	0
Refinery	Core	Analabadi	Yes	-	317	Messengers, peons, operators, helpers, etc	Semi-skilled & un-skilled	30000 to 60000
	Buffer	Ambogam	No	Jobs were offered only to those who have lost home and homestead	0	-	-	0
		Mujanga	No	Jobs were offered only to those who have lost home and homestead	0	-	-	0
Ash & Red Mud Pond	Core	Marichamal	No	Jobs were offered only to those who have lost home and homestead	0	-	-	0
		Goudaguda	No	Jobs were offered only to those who have lost home and homestead	0	-	-	0
		Khoraguda	Yes	-	20	Messengers, peons, operators, helpers, etc	Semi-skilled & un-skilled	30000 to 60000
	Buffer	Champapodar	Yes	-	52	Messengers, peons, operators, helpers, etc	Semi-skilled & un-skilled	30000 to 60000
		Charangaguda	No	Jobs were offered only to those who have lost home and homestead	0	-	-	0

Source: Field Survey (2011)

During the Focus Group Discussions (FGDs), the important village development needs were elicited from the communities and were then ranked accordingly. It can be seen from Table 3.13 that drinking water was accorded number one rank in most sample villages. This means that drinking water is still scarce in these villages. Some sample villages have accorded top rank to ICDS centers as well. Further, it is observed that second rank was given to internal road works (in four villages), irrigation (three villages), additional water tank (one village), high school (one village), etc. Facilities such as more educational facilities (two villages) adequate drinking water (two villages), and medical/health facilities (two villages) were accorded third rank by the communities (Table 3.13).

This section gives a picture of the area that is hosting the national aluminium company of India. However, the people of nearby villages still do not have the basic necessities such as drinking water, schooling, and medical facilities. The Government of Odisha and NALCO should work in unison to improve these areas, which possess a rich mineral resource.

Table 3.12: Details of the Contract/Seasonal Employment Offered by NALCO

Area	Zone	Village	NALCO Provided Contract/Daily Wage Employment	If 'No' State Reason	If 'Yes' How many HHs are engaged	Nature of Employment	Total Working Days in a Month	Type of Job	Average Wage Rate (Rs.)	Monthly Income (Rs.)
Mining	Core	Kapsiput	Yes	0	55	Contract employment/ daily wage labour	26	Skilled, semi-skilled & un-skilled works	197 to 290	5000 to 6000
	Buffer	Kardiguda	Yes	0	30	Contract employment/ daily wage labour	26	Skilled, semi-skilled & un-skilled works	197 to 290	5000 to 6000
		Putraghati	Yes	0	100	Contract employment/ daily wage labour	26	Skilled, semi-skilled & un-skilled works	197 to 290	5000 to 6000
Refinery	Core	Analabadi	Yes	0	220	Contract employment/ daily wage labour	26	Skilled, semi-skilled & un-skilled works	197 to 290	5000 to 6000
		Ambogam	Yes	0	50	Contract employment/ daily wage labour	26	Skilled, semi-skilled & un-skilled works	197 to 290	5000 to 6000
	Buffer	Mujanga	Yes	0	180	Contract employment/ daily wage labour	26	Skilled, semi-skilled & un-skilled works	197 to 290	5000 to 6000
Ash & Red Mud Pond		Marichamal	Yes	0	20	Contract employment/ daily wage labour	26	Skilled, semi-skilled & un-skilled works	197 to 290	5000 to 6000
	Core	Goudaguda	Yes	0	40	Contract employment /daily wage labour	26	Skilled, semi-skilled & un-skilled works	197 to 290	5000 to 6000
		Khoraguda	Yes	0	12	Contract employment/ daily wage labour	26	Skilled, semi-skilled & un-skilled works	197 to 290	5000 to 6000
		Champapodar	Yes	0	25	Contract employment/ daily wage labour	26	Skilled, semi-skilled & un-skilled works	197 to 290	5000 to 6000
	Buffer	Charangaguda	Yes	0	3	Contract employment/ daily wage labour	26	Skilled, semi-skilled & un-skilled works	197 to 290	5000 to 6000

Source: Field Survey (2011).

Table 3.13: Rank-wise List of Village Development Needs

Area	Zone	Village	Development Need	Rank	Development Need	Rank	Development Need	Rank	Development Need	Rank
Mining	Core	Kapsiput	Drinking water	1	High school	2	Health Centre	3	-	0
		Kardiguda	Drinking water	1	Irrigation	2	Access to more educational facilities	3	-	0
	Putraghati		Drinking water	1	Irrigation	2	Access to more educational facilities	3	Bus stop	4
Refinery	Core	Analabadi	Jobs to all displaced families	1	Additional water tank	2	Internal roads	3	-	0
		Ambogam	Drinking water	1	Roads	2	Employment opportunities	3	Electricity	4
			Mujanga	Educational facilities	1	Drinking water	2	Medical	3	Roads
Ash & Red Mud Pond	Core	Marichamal	Drinking water	1	Internal roads	2	-	0	-	0
		Goudaguda	Drinking water	1	Irrigation	2	Roads	3	-	0
		Khoraguda	ICDS centre	1	Internal roads	2	Adequate drinking water	3	-	0
	Buffer	Champapodar	ICDS centre	2	Internal roads	2	Adequate drinking water	3	-	0
		Charangaguda	Drinking water	1	Roads	2	Electricity	3	Health centre	4

Source: Field Survey (2011).

CHAPTER - 4

BAUXITE MINING BY NALCO AND ITS EFFECTS: A HOUSEHOLD ANALYSIS

In this section, household-level analysis of the various issues, namely demographic features, housing particulars, asset structure, income and expenditure particulars, and access to common property resources, are presented. This analysis is useful to understand the effects of the NALCO Project on the communities. Further it will be clearer to know whether or not the project has made significant contribution to the livelihoods of the people affected by the mining.

Table 4.1: Demographic Features of Sample Households

Area	Zone	Population			Community				
		Male	Female	Total	SC	ST	OBC	Others	Total
Mining	Core Zone	89 (51.1)	85 (48.9)	174 (100)	1 (2.6)	37 (97.4)	0 (0.0)	0 (0.0)	38 (100)
	Buffer Zone	155 (49.4)	159 (50.6)	314 (100)	6 (8.1)	45 (60.8)	21 (28.4)	2 (2.7)	74 (100)
Refinery	Core Zone	553 (51.7)	517 (48.3)	1070 (100)	27 (12.8)	105 (49.8)	31 (14.7)	48 (22.7)	211 (100)
	Buffer Zone	202 (50.1)	201 (49.9)	403 (100)	44 (50.0)	23 (26.1)	5 (5.7)	16 (18.2)	88 (100)
ARMP	Core Zone	123 (51.5)	116 (48.5)	239 (100)	4 (10.0)	1 (2.5)	8 (20.0)	27 (67.5)	40 (100)
	Buffer Zone	63 (48.5)	67 (51.5)	130 (100)	16 (64)	9 (36.0)	0 (0.0)	0 (0.0)	25 (100)

Source: Field Survey (2011).

Note: Villages falling in the mining core zone: Kapsiput; mining buffer zone: Kardiguda and Putraghati; refinery core zone: Analabadi and Ambogam; refinery buffer zone: Mujanga and Marchimal; ARMP core zone: Goudaguda, Khoraguda and Champapodar; ARMP buffer zone: Charagaguda; and control area: Kadamguda.

A total of 2330 people live in the NALCO area, i.e., in the mining (core and buffer zones), refinery (core and buffer zones), and ARMP (core and buffer zones) areas. The concentration of population is more in the refinery core (1070), and buffer (403) zones, followed by mining buffer zone (314). In terms of the social composition of the households in the mining area, ST households are predominant (97.4 percent in the core zone and 60.8 percent in the buffer zone), followed by OBCs (28.4 percent in the buffer zone). Similarly, in the refinery area also ST HHs are predominant (49.8 percent in the core zone), followed by 'Others' (22.7 percent), while in the buffer zone the proportion of SC HHs is significant (50 percent), followed by ST HHs (26 percent), and 'Others' (18.2 percent). In the ARMP core zone, the proportion of HHs in the 'Others' category (67.5 percent) is predominant, while in the buffer zone it is the SC HHs (64 percent) that are predominant (Table 4.1).

Table 4.2: Housing Particulars of the Sample HHs (By Type)

Type of House	Mining		Refinery		ARMP	
	Core Zone	Buffer zone	Core Zone	Buffer zone	Core Zone	Buffer zone
Thatched	0 (0.0)	2 (2.7)	1 (0.5)	5 (5.7)	3 (7.5)	2 (2.0)
Semi-Pucca	38 (100)	70 (94.6)	176 (83.4)	83 (94.3)	35 (87.5)	21 (84.0)
Pucca	0 (0.0)	2 (2.7)	34 (16.1)	0 (0.0)	2 (5.0)	2 (8.0)
Grand Total	38 (100)	74 (100)	211 (100)	88 (100)	40 (100)	25 (100)

Source: Field Survey (2011).

The data on the housing particulars show that in the mining core zone, all the 38 HHs (100 percent) live in semi-*pucca* houses; in the buffer zone also, a majority of them (94.6 percent) live in semi-*pucca* houses. It is significant to know that very few HHs in the mining area have *pucca* houses. In the refinery area core zone, a large majority (83.4 percent) of the HHs live in semi-*pucca* houses, while a small number of HHs (16.1 percent) live in *pucca* houses; similarly, in the buffer zone a large majority of the HHs (94.3 percent) live in semi-*pucca* houses, while a small number of HHs (5.7 percent) live in thatched houses. The ARMP area is also dominated by semi-*pucca* houses. On the whole, it may be observed that in all project areas, a large majority live in semi-*pucca* houses, while very few HHs live either in *pucca* or thatched houses (Table 4.2).

Table 4.3: Households having Ration Cards (By Type)

Area	Zone	No card	White	Pink	Anthyodaya	Total
Mining	Core Zone	4 (10.5)	2 (5.3)	32 (84.2)	0 (0.0)	38 (100)
	Buffer Zone	23 (31.1)	2 (2.7)	47 (63.5)	2 (2.7)	74 (100)
Refinery	Core Zone	124 (58.4)	27 (12.8)	54 (25.6)	6 (2.8)	211 (100)
	Buffer Zone	25 (28.4)	2 (2.3)	60 (68.2)	1 (1.1)	88 (100)
ARMP	Core Zone	8 (20.0)	2 (5.0)	29 (72.5)	1 (2.5)	40 (100)
	Buffer Zone	6 (24.0)	0 (0.0)	19 (76.0)	0 (0.0)	25 (100)

Source: Field Survey (2011).

Ration cards give poor households a sense of food security, for they ensure a minimum quantum of basic food items at subsidized rates. The data regarding the HHs possessing ration cards reveal that a substantial number of HHs possess pink cards (84.2 percent in the mining core zone; 63.5 percent in the mining buffer zone; 68.2 percent in the refinery buffer zone; 72.5 percent in the ARMP core zone; and 76 percent in the ARMP buffer zone). It is surprising that a good number of HHs (31 percent in the mining buffer zone; 58.4 percent in the refinery core zone; 28.4 percent in the refinery buffer zone; 20 percent in the ARMP core zone; and 24 percent in the ARMP buffer zone) do not have ration cards at all. Further, only a small proportion of the HHs possesses white cards, which give poor households most subsidized provisions (Table 4.3).

The data on educational status of the sample households indicate that illiterates are still large in number among both males and females. As compared to males, female illiterates are much more in number in all regions of the bauxite project (62.4 percent in the mining core zone; 56 percent in the mining buffer zone; 50.9 percent in the refinery core zone; 54.7 percent in the refinery buffer zone; 61.2 percent in the ARMP core zone; and 47.8 percent in the ARMP buffer zone). However, a smaller number of households in the region do possess primary and below primary literate status. Middle school literacy is slightly better among males than females (15.7 percent in the mining core zone; 21.9 percent in the mining buffer zone; 30.2 percent in the refinery core zone; 16.8 percent in the refinery buffer zone; 19.5 percent in the ARMP core zone; and 30.2 percent in the ARMP buffer zone). It is further observed that literacy achievement up to ITI and graduation level is extremely poor. In the absence of the necessary literacy skills, employment opportunities in the factory are scarce. Hence, most households are engaged in non-skilled, casual, and contract jobs (Table 4.4).

Table 4.4: Educational Status of the Sample Households

Educational Status	Mining				Refinery				ARMP			
	Core		Buffer		Core		Buffer		Core		Buffer	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Illiterates	34 (38.2)	53 (62.4)	26 (16.8)	89 (56.0)	117 (21.2)	263 (50.9)	74 (36.6)	110 (54.7)	30 (24.4)	71 (61.2)	12 (19)	32 (47.8)
No Schooling	11 (12.4)	13 (15.3)	17 (11.0)	15 (9.4)	60 (10.8)	55 (10.6)	29 (14.4)	27 (13.4)	9 (7.3)	15 (12.9)	5 (7.9)	11 (16.4)
Literate Below Primary	14 (15.7)	8 (9.4)	21 (13.5)	4 (2.5)	46 (8.3)	23 (4.4)	9 (4.5)	10 (5.0)	13 (10.6)	5 (4.3)	5 (7.9)	6 (9.0)
Primary	13 (14.6)	7 (8.2)	28 (18.1)	17 (10.7)	80 (14.5)	68 (13.2)	29 (14.4)	17 (8.5)	30 (24.4)	15 (12.9)	7 (11.1)	7 (10.4)
Middle	14 (15.7)	4 (4.7)	34 (21.9)	24 (15.1)	167 (30.2)	79 (15.2)	34 (16.8)	20 (10.0)	24 (19.5)	5 (4.3)	19 (30.2)	8 (11.9)
Secondary	1 (1.1)	0 (0.0)	25 (16.1)	8 (5.0)	54 (9.8)	19 (3.7)	15 (7.4)	12 (6.0)	9 (7.3)	3 (2.6)	10 (15.9)	0 (0.0)
ITI	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	6 (1.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Graduation and Above	2 (2.2)	0 (0.0)	3 (1.9)	1 (0.6)	13 (2.4)	2 (0.4)	7 (3.5)	0 (0.0)	2 (1.6)	0 (0.0)	1 (1.6)	1 (1.5)
Total	89 (100)	85 (100)	155 (100)	159 (100)	553 (100)	517 (100)	202 (100)	201 (100)	123 (100)	116 (100)	63 (100)	67 (100)

Source: Field Survey (2011).

Table 4.5: Particulars of the Working Status of the Households in the Mining Areas

Working	Mining		Refinery		ARMP	
	Core Zone	Buffer Zone	Core Zone	Buffer Zone	Core Zone	Buffer Zone
Yes	94 (54.0)	175 (55.7)	385 (36.0)	224 (55.6)	99 (41.4)	63 (48.5)
No	80 (56.0)	139 (44.3)	685 (64.0)	179 (44.4)	140 (58.6)	67 (51.5)
Total	174 (100)	314 (100)	1070 (100)	403 (100)	239 (100)	130 (100)

Source: Field Survey (2011).

The data on the working status of the sample households show that in the mining zone, more than 50 percent are working (54 percent in the core zone and 55.7 percent in the buffer zone); while in the refinery area, a slightly lesser number in the core zone (36 percent) compared to the buffer zone (55.6 percent) are working; further, 41.4 percent in the ARMP core zone and 48.5 percent in the buffer zone are working; while the remaining population does not work. This may be because the household members are unemployed, dependent, or attending school (Table 4.5).

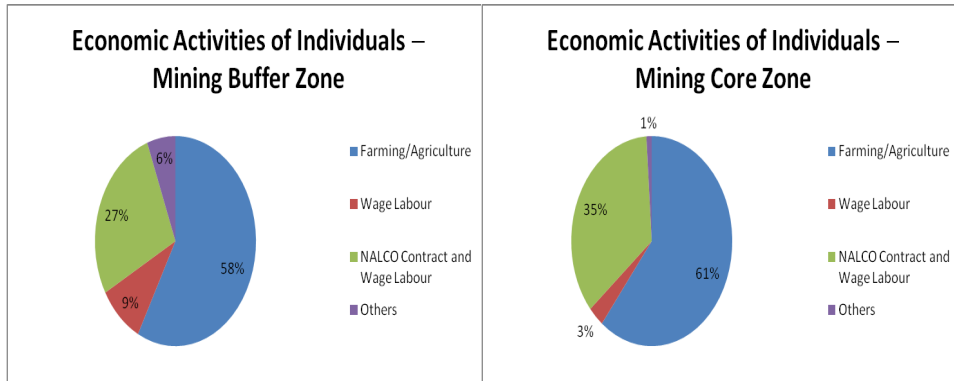
The various economic activities of the individuals of the sample households reveal that the members are engaged in diverse occupations in all the regions. Usually people have two types of occupations - primary and secondary. Primary occupations are the chief sources of income, while the secondary occupations give incremental/supporting income to the households. The analysis of primary economic activities of the persons reveals that agriculture is still the most predominant activity among the population in all the regions of the bauxite project (in the mining core zone, 60.6 percent of the people have agriculture as their main occupation, followed by contract wage labour under NALCO at 35.1 percent. This position is more or less similar in the buffer zone also). However, in the refinery areas, although agriculture is a significant economic occupation for 62.1 percent of the people in the buffer zone, permanent employment with NALCO is considerable as it is the main occupation for 27.5 percent of the members in the refinery core area, followed by NALCO wage/contract employment for 22.3 percent of the population. This picture is more or less similar also in the ARMP area, except that there is a slight decline in the proportion of permanent employment with NALCO (16.2 percent) and NALCO contract employment (15.2 percent in the core zone and 11.1 percent in buffer zone), as shown in Table 4.6.

Table 4.6: Economic Activities of the Individuals (Primary)

Occupation	Mining						Refinery						ARMP					
	Core Zone			Buffer Zone			Core Zone			Buffer Zone			Core Zone			Buffer Zone		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Agriculture	20 (21.3)	37 (39.4)	57 (60.6)	35 (20.0)	66 (37.7)	1 (57.7)	56 (14.5)	86 (22.3)	142 (36.9)	64 (28.6)	75 (33.5)	39 (62.1)	23 (23.2)	35 (35.4)	58 (58.6)	19 (30.2)	23 (36.5)	42 (66.7)
Wage Labour	1 (1.1)	2 (2.1)	3 (3.2)	4 (2.3)	12 (6.9)	16 (9.1)	12 (3.1)	10 (2.6)	22 (5.71)	17 (3.1)	8 (3.6)	15 (6.7)	4 (4.0)	5 (5.1)	9 (9.1)	5 (7.9)	4 (6.3)	9 (14.3)
NALCO Employment	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	100 (26.0)	6 (1.6)	106 (27.5)	1 (0.4)	0 (0.0)	1 (0.4)	16 (16.2)	0 (0.0)	16 (16.2)	0 (0.0)	0 (0.0)	0 (0.0)
NALCO Contract/ Wage Labour	29 (30.9)	4 (4.3)	33 (35.1)	42 (24.0)	6 (3.4)	48 (27.4)	72 (18.7)	14 (3.6)	86 (22.3)	42 (18.8)	17 (7.6)	59 (26.3)	14 (14.1)	1 (1.0)	15 (15.2)	6 (9.5)	1 (1.6)	7 (11.1)
Others	1 (1.1)	0 (0.0)	1 (1.1)	7 (4.0)	3 (1.7)	10 (5.7)	24 (6.2)	5 (1.3)	29 (7.53)	8 (3.6)	2 (0.9)	10 (4.5)	0 (0.0)	1 (1.0)	1 (1.0)	4 (6.3)	1 (1.6)	5 (7.9)
Total	51 (54.3)	43 (45.7)	94 (100)	88 (50.3)	87 (49.7)	175 (100)	264 (68.6)	21 (31.4)	385 (100)	122 (54.5)	102 (45.5)	224 (100)	57 (57.6)	42 (42.4)	99 (100)	34 (54.0)	29 (46.0)	63 (100)

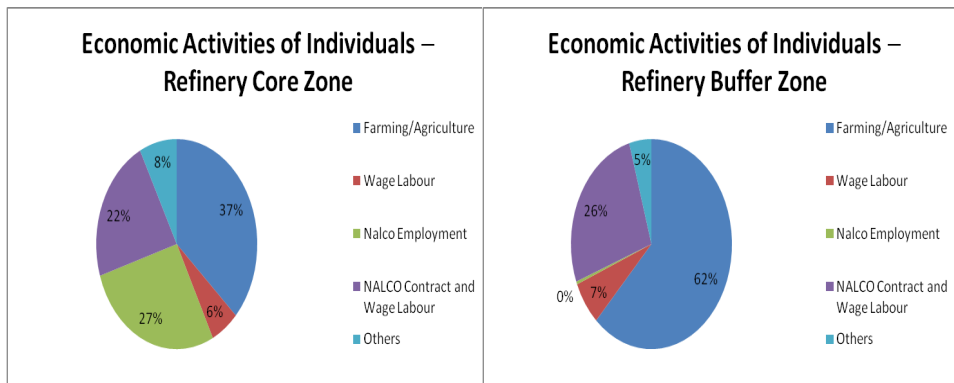
Source: Field Survey (2011).

Figure 2: Economic Activities of Individuals in Mining Core and Buffer Zones



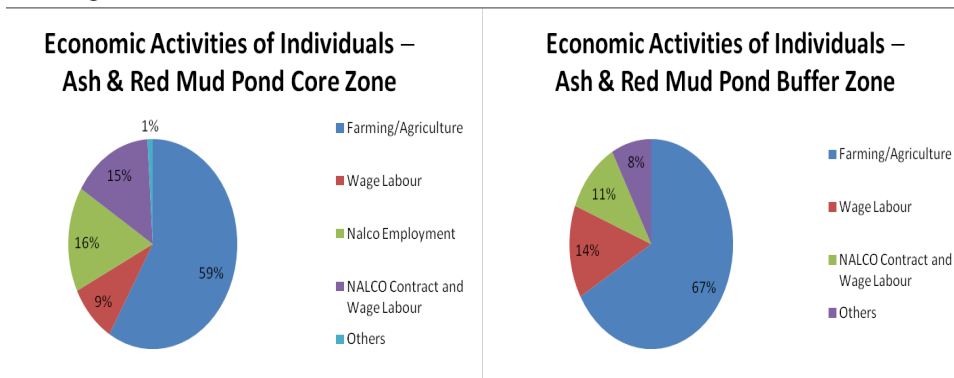
Source: Field Survey (2011).

Figure 2.1: Economic Activities of Individuals in Refinery Core and Buffer Zones



Source: Field Survey (2011).

Figure 2.2: Economic Activities of Individuals in ARMP Core and Buffer Zones



Source: Field Survey (2011).

Table 4.6.1: Economic Activities of the Individuals (Secondary)

Occupation	Mining						Refinery						ARMP								
	Core Zone		Buffer Zone		Total		Core Zone		Buffer Zone		Total		Core Zone		Buffer Zone		Total				
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female			
Agriculture	17 (35.4)	2 (4.2)	19 (39.6)	22 (28.2)	7 (9.0)	29 (37.2)	42 (42.2)	6 (6.1)	20 (21.7)	3 (3.3)	23 (25)	48 (48.5)	20 (21.7)	3 (3.3)	23 (25)	10 (40)	1 (4)	11 (44)	4 (14.8)	2 (7.4)	6 (22.2)
Wage Labour	5 (10.4)	4 (8.3)	9 (18.6)	8 (10.3)	14 (17.9)	22 (28.2)	12 (12.1)	13 (13.1)	15 (16.3)	9 (9.8)	14 (15.2)	25 (25.3)	12 (12.1)	9 (9.8)	25 (25.3)	2 (8)	3 (12)	5 (20)	1 (40.7)	7 (25.9)	18 (66.7)
NALCO Contract/ Wage Labour	9 (18.8)	4 (8.3)	13 (27.1)	14 (17.9)	4 (5.1)	18 (23.1)	12 (12.1)	5 (5.1)	19 (20.7)	7 (7.6)	26 (28.3)	17 (17.2)	5 (5.1)	19 (20.7)	7 (7.6)	6 (24)	1 (4)	7 (28)	0 (0.0)	0 (0.0)	0 (0.0)
Others	3 (6.3)	4 (8.3)	7 (14.6)	6 (7.7)	3 (3.8)	9 (11.5)	6 (6.1)	3 (3.0)	10 (10.9)	9 (9.8)	19 (20.7)	9 (9.1)	3 (3.0)	10 (10.9)	9 (9.8)	0 (0.0)	2 (8)	2 (8)	2 (7.4)	1 (3.7)	3 (11.1)
Total	34 (70.8)	14 (29.2)	48 (100)	50 (64.1)	28 (35.9)	78 (100)	72 (72.7)	17 (27.3)	64 (69.6)	28 (30.4)	92 (100)	99 (100)	17 (27.3)	64 (69.6)	28 (30.4)	18 (72)	7 (28)	25 (100)	17 (63.0)	10 (37.0)	27 (100)

Source: Field Survey (2011).

The analysis of the secondary economic activities of the persons indicates that agriculture is secondary occupation for 37.2 percent in the mining buffer zone, 48.5 percent in the refinery core zone, 44 percent in the ARMP core zone, and 22.2 percent in the buffer zone. This is followed by NALCO wage/contract labour and casual wage labour. It can be seen from Table 4.6.1 that 'Others' also forms a considerable secondary employment (14.6 percent in the mining core zone; 11.5 percent in the mining buffer zone; 10.9 percent in the refinery core zone; and 20.7 percent in buffer zone). This may be due to the number of settlements that developed in and around the factory giving rise additional employment avenues (Table 4.6.1).

Table 4.7: Mean Household Income in the Sample Villages

Area	Zone	Mean HH Income (Rs.)	Mean per Capita Income (Rs.)	Mean HH size (No.)
Mining	Core Zone	55472.6	12114.7	4.6
	Buffer Zone	57219.6	13484.9	4.2
Refinery	Core Zone	225875.2	44541.7	5.1
	Buffer Zone	57874.7	12637.6	4.6
ARMP	Core Zone	117291	19630.3	6
	Buffer Zone	58148	11182.3	5.2

Source: Field Survey (2011).

Household per capita income is a good indicator to check whether or not the project has made positive contribution to the income of the project affected communities. The data on the mean income of the households in the mining area is not significant (Rs.55,473 in the core zone and Rs.57,220 in the buffer zone). On the contrary, the HH income in the refinery area, particularly in the core zone, is quite high (Rs.2,25,875). This is due to fact that households have permanent employment in the NALCO factory, which gives high salaries. This is not true in the buffer zone, where most HHs are contract/wage employees of the NALCO. Similarly, in the case of ARMP core zone, the HH income is relatively high as the sample households here are permanent employees of NALCO. More or less, the same picture emerges from the mean per capita income data as well (Table 4.7).

Table 4.8: Landholding Details of the Households in the Sample Villages
(% of Households)

Category of Occupation	Mining Area		Refinery Area		ARMP	
	Core	Buffer	Core	Buffer	Core	Buffer
Large Farmers	0 (0.0)	1 (1.4)	5 (2.4)	7 (8.0)	1 (2.5)	1 (4)
Medium Farmers	6 (15.8)	2 (2.7)	7 (3.3)	6 (6.8)	4 (10.0)	5 (20.0)
Small & Marginal Farmers	22 (57.9)	43 (58.1)	38 (18.0)	49 (55.7)	12 (30.0)	13 (52.0)
Farm & Non-Farm Labour	10 (26.3)	28 (37.8)	60 (28.4)	25 (28.4)	7 (17.5)	6 (24.0)
Others (Salaried)	0 (0.0)	0 (0.0)	101 (47.9)	1 (1.1)	16 (40.0)	0 (0.0)
Total HHs	38 (100.0)	74 (100.0)	211 (100.0)	88 (100.0)	40 (100.0)	25 (100.0)

Source: Field Survey (2011).

The data on the landholding status of the sample households show that small and marginal farmers are predominant in the mining core and buffer zones (57.9 percent and 58.1 percent respectively) followed by farm and non-farm labour (26.3 percent and 37.8 percent respectively). In the refinery core zone, a significant proportion of the households are 'others/salaried' (47.9 percent) followed by farm and non-farm labour (28.4 percent), and small and marginal farmers (18 percent). This is because a large number of households that got employment in the company live in the core zone (mostly in two resettled colonies developed by the company). In the refinery buffer zone small and marginal farmers are dominant (55.7 percent), followed by farm and non-farm labour (28.4 percent). In the ARMP area again a sizeable number of households in the core zone (40 percent) are others/salaried, followed by small and marginal farmers (30 percent), and farm and non-farm labour (17.5 percent). On the contrary, in the buffer zone of the ARMP, a significant number of the households (52 percent) are small and marginal farmers, followed by farm and non-farm labour (24 percent), and medium farmers (20 percent). Clearly, in all the regions of the factory, there is minimum presence of large farmers (Table 4.8).

Table 4.9: Households having Agriculture Land (% of Households)

Area	Zone	HHs having Agriculture Land (%)
Mining	Core	73.7
	Buffer	62.2
Refinery	Core	35.1
	Buffer	71.6
Ash & Red Mud Pond	Core	45.0
	Buffer	76.0

Source: Field Survey (2011).

The data on households having agriculture land show that except in the refinery core zone (35 percent) and ARMP core zone (45 percent), nearly two-thirds of the households in the rest of the areas still have agriculture land in varying degrees, as shown in Table 4.8. Since regular employment was provided in the refinery core zone and ARMP areas, their dependence on agriculture is less (Table 4.9).

Table 4.10: Households having Livestock in the Study Area

Livestock	Mining		Refinery		ARMP	
	Core Zone	Buffer Zone	Core Zone	Buffer Zone	Core Zone	Buffer Zone
Yes	22 (57.9)	33 (44.6)	64 (30.3)	47 (53.4)	22 (55.0)	13 (52.0)
No	16 (42.1)	41 (55.4)	147 (69.7)	41 (46.6)	18 (45.0)	12 (48.0)
Total	38 (100)	74 (100)	211 (100)	88 (100)	40 (100)	25 (100)

Source: Field Survey (2011).

Possession of livestock gives incremental and additional income to the rural families, which is very common. Out of the total 476 households, 201 possess livestock, while the remaining (275) do not have any livestock assets. In the mining core and buffer zones, nearly half of the households (57.9 percent and 44.6 percent respectively) own livestock and the rest (42.1 percent and 55.4 percent respectively) do not possess any livestock. In the refinery core and buffer zones a slightly lesser number of households own livestock (30.3 percent and 53.4 percent respectively), while the remaining (69.7 percent and 46.6 percent respectively) do not have any livestock. In the ARMP region, about 50 percent of the households own livestock, while the remaining do not own livestock (Table 4.10).

Table 4.11: Distribution of Livestock Ownership among Households

Livestock	Mining		Refinery		ARMP	
	Core	Buffer	Core	Buffer	Core	Buffer
Cows						
0	33 (86.8)	57 (77.0)	178 (84.4)	71 (80.7)	36 (90.0)	19 (76)
1-5	5 (13.2)	15 (20.3)	26 (12.3)	15 (17.0)	4 (10.0)	4 (16.0)
more than 5	0 (0.0)	2 (2.7)	7 (3.3)	2 (2.3)	0 (0.0)	2 (8.0)
High-Breed Cows						
0	38 (100)	74 (100)	208 (98.6)	88 (100)	37 (92.5)	24 (96.0)
1-5	0 (0.0)	0 (0.0)	3 (1.4)	0 (0.0)	2 (5.0)	1 (4.0)
more than 5	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (2.5)	0 (0.0)
Buffaloes						
0	36 (94.7)	73 (98.6)	202 (95.7)	83 (94.3)	32 (80.0)	23 (92.0)
1-5	2 (5.3)	1 (1.4)	8 (3.8)	4 (4.5)	6 (15)	2
more than 5	0 (0.0)	0 (0.0)	1 (0.5)	1 (1.1)	2 (5)	0 (0.0)
Bullocks						
0	21 (55.3)	56 (75.7)	182 (86.3)	61 (69.3)	27 (67.5)	17 (68.0)
1-5	17 (44.7)	18 (24.3)	27 (12.8)	26 (29.5)	13 (32.5)	8 (32.0)
more than 5	0 (0.0)	0 (0.0)	2 (0.9)	1 (1.1)	0 (0.0)	0 (0.0)
Goats						
0	33 (86.8)	66 (89.2)	197 (93.4)	81 (92.0)	39 (97.5)	24 (96.0)
1-5	5 (13.2)	5 (6.8)	12 (5.7)	4 (4.5)	0 (0.0)	1 (4.0)
more than 5	0 (0.0)	3 (4.1)	2 (0.9)	3 (3.4)	1 (2.5)	0 (0.0)
Sheep						
0	36 (94.7)	73 (98.6)	201 (95.3)	80 (90.9)	39 (97.5)	25 (100)
1-5	2 (5.3)	1 (1.4)	6 (2.4)	5 (5.7)	1 (2.5)	0 (0.0)
more than 5	0 (0.0)	0 (0.0)	4 (1.9)	3 (3.4)	0 (0.0)	0 (0.0)
Pigs						
0	35 (92.1)	74 (100)	209 (99.1)	86 (97.7)	40 (100)	25 (100)
1-5	3 (7.9)	00 (0.0)	1 (0.5)	2 (2.3)	0 (0.0)	0 (0.0)
more than 5	0 (0.0)	0 (0.0)	1 (0.5)	0 (0.0)	0 (0.0)	0 (0.0)
Poultry						
0	30 (78.9)	64 (86.5)	190 (90)	87 (98.9)	36 (90.0)	20 (80.0)
1-58 (21.1)	7 (9.5)	16 (7.6)	1 (1.1)	3(7.5)	3 (12.0)	
more than 5	0 (0.0)	3 (4.1)	5 (2.4)	0 (0.0)	1 (2.5)	2 (8.0)

Source: Field Survey (2011).

A disaggregated analysis of the livestock ownership (by type of animals) shows that households maintain cows, high-breed cows, buffaloes, bullocks, goats, sheep, pigs and poultry in the project area. There are also considerable households that do not possess any type of animal in the project area as indicated in Table 4.11. It is observed that a large majority of the HHs in mining core and buffer zones do not have cows (86.8 percent and 77 percent respectively), whereas a small number of households own livestock numbering between 1-5 in both mining core and buffer zones (13.2 percent and 20.3 percent respectively). The same pattern emerges in the refinery and ARMP regions as well. Further, it is observed that hardly few households maintain high-breed cows in all the regions of the project. The number of HHs owning bullocks (ranging from 1-5) is considerable (44.7 percent and 24.3 percent respectively in the mining core and buffer zones). The situation with regard to possession of small ruminants such as goats, sheep, pigs and poultry is no different, as only few households have these assets (Table 4.11).

As already mentioned, the income generated from the livestock assets adds significantly to the family income. The data on the livestock and income of the households reveal that the total income generated from all the livestock put together in the core zone of the refinery is significantly high, i.e., Rs.3,78,690, followed by its buffer zone at Rs.2,01,700. On the other hand, in the mining and ARMP core and buffer zones the livestock income is observed to be relatively low. The analysis of livestock income by animal type indicates that in the refinery core zone, households having cows (64 out of 211 households) have the highest income (Rs.4679 on average), followed by buffer zone (Rs.1200). The income from households that own bullocks (draught animals used for agriculture) is in the mining core zone (Rs.818) followed by the mining buffer zone (Rs.696), refinery core zone (Rs.406), and buffer zone (Rs.336). The income from small ruminants, particularly goat and sheep is again high for the households in the refinery buffer and core zones respectively. However, the income from poultry is minimal (Table 4.12).

The sample households were asked about their food security during a typical year in order to estimate the extent of their food security in a year. Majority of the households (94.7 percent in the mining core zone; 93.2 percent in the mining buffer zone; 89.6 percent in the refinery core zone; 90.9 percent in the refinery buffer zone; 95 percent in the ARMP core zone; and 92 percent in the ARMP buffer zone) expressed that they have food security for 9-12 months in a year. Some households (5.3 percent in the mining core zone; 4.1 percent in the mining buffer zone; and 3.8 percent in the refinery core zone) have some surplus to sell in the market, besides meeting their domestic needs (Table 4.13).

Table 4.12: Details of Income Generated from Livestock

Area	Zone	Household Owning livestock		Milch Animals				Draught Animals		Small Ruminants						Young Stock		Total Income								
		Yes	No	Total	Cows	Cross Breed		Buffaloes		Bullocks	Goats	Sheep		Pigs		Poultry Birds	Buffaloes (Male/Female)		Cows/Bullocks							
						No	Income	No	Income			No	Income	No	Income					No	Income	No	Income	No	Income	
Mining	Core	22	16	38	21	0	0	5	0	40	18000	13	4000	3	4000	7	10000	22	0	0	0	0	0	0	0	36000
	Buffer	33	41	74	65	23640	0	2	0	43	23000	34	31000	1	0	0	0	93	8920	0	0	4	0	0	0	86560
Refinery	Core	64	147	211	129	299440	8	21600	27	4000	87	26000	45	0	78	27000	7	0	96	650	3	0	3	0	0	378690
	Buffer	47	41	88	47	56400	0	15	6000	63	15800	50	76000	65	47500	2	0	2	0	4	0	0	0	0	0	201700
ARMP	Core	22	18	40	8	36000	12	0	52	14400	29	8700	10	0	5	0	0	0	22	875	10	0	3	0	0	59975
	Buffer	13	12	25	24	0	2	0	4	0	22	0	1	0	0	0	0	0	20	1680	0	0	0	0	0	1680

Source: Field Survey (2011).

Table 4.13: Food Security

Area	Zone	< 3 months	3-6 months	6-9 months	9-12 months	Surplus to Sell	Total
Mining	Core	0 (0.0)	0 (0.0)	0 (0.0)	36 (94.7)	2 (5.3)	38 (100)
	Buffer	0 (0.0)	0 (0.0)	2 (2.7)	69 (93.2)	3 (4.1)	74 (100)
Refinery	Core	0 (0.0)	0 (0.0)	14 (6.6)	189 (89.6)	8 (3.8)	211 (100)
	Buffer	0 (0.0)	0 (0.0)	8 (9.1)	80 (90.9)	0 (0.0)	88 (100)
ARMP	Core	0 (0.0)	0 (0.0)	2 (5)	38 (95.0)	0 (0.0)	40 (100)
	Buffer	0 (0.0)	0 (0.0)	1 (4)	23 (92.0)	1 (4)	25 (100)

Source: Field Survey (2011).

Table 4.14: Monthly Expenditure of Households on Food and Non-Food items (in Rs.)

Area	Zone	Food Expenses	Educational Expenses	Travel Expenses	Health Expenses	Expenses for Recreation	Other Expenses	Total Expenditure
Mining	Core	78900 (63.2)	3480 (2.8)	200 (0.2)	2650 (2.1)	31400 (25.2)	8150 (6.5)	124780 (100)
	Buffer	157300 (60.7)	6580 (2.5)	280 (0.1)	6400 (2.5)	80700 (31.1)	8031 (3.1)	259291 (100)
Refinery	Core	848800 (46.4)	161220 (8.8)	40130 (2.2)	45120 (2.5)	615150 (33.7)	117300 (6.4)	1827720 (100)
	Buffer	216800 (62.6)	9000 (2.6)	4600 (1.3)	8150 (2.4)	98200 (28.3)	9640 (2.8)	346390 (100)
ARMP	Core	145000 (61.1)	14955 (6.3)	1900 (0.8)	4350 (1.8)	61050 (25.7)	10250 (4.3)	237505 (100)
	Buffer	67950 (65.3)	7700 (7.4)	3200 (3.1)	3100 (3.0)	20900 (20.1)	1205 (1.2)	104055 (100)

Source: Field Survey (2011).

It is a generally known fact that in rural areas, most of the households spend a large part of their income on food, and very less goes to non-food items in subsistence conditions. As the income of the rural households expands, their expenditure on non-food items - especially on health, education, recreation/entertainment, etc., will also grow. From this

perspective it is observed that in our study villages around 60-65 percent of the expenditure of the sample households across all the regions, except in the refinery core zone, is spent on food followed by expenses on recreation. In the refinery core zone, 46.4 percent is spent on food, 8.8 percent on education (highest as compared to any region of the company), and 33.7 percent on recreation. Sadly, the expenditure on health and education is not substantial across the regions of the company, except in the refinery core zone, where 2.5 percent is spent on health (Table 4.14).

Table 4.15: Details of Household Physical Assets

Particulars	Mining		Refinery		ARMP	
	Core Zone	Buffer Zone	Core Zone	Buffer Zone	Core Zone	Buffer Zone
	% of HHs	% of HHs	% of HHs	% of HHs	% of HHs	% of HHs
Cycle	23.7	55.4	66.8	55.7	52	80
Radio	2.6	4.1	7.6	9.1	10	16
Fan	0.0	13.5	66.4	18.2	37.5	0.0
Almirah	0.0	13.5	51.7	12.5	27.5	0.0
TV	0.0	24.3	63.5	18.2	37.5	0.0
Fridge	0.0	1.4	26.5	1.1	27.5	0.0
Scooter	5.3	17.6	47.9	10.2	47.5	0.0
Car	0.0	2.7	9	0.0	0.0	0.0
Watch	44.7	66.2	86.7	60.2	82.5	68.0
Agricultural Assets	71.1	68.9	23.2	78.4	52.5	64.0

Source: Field Survey (2011).

The data on the households having various physical assets such as cycle, radio, television, fan, almirah, fridge, scooter, car, watch, agricultural assets, etc. reveal that agricultural assets are dominant in most of the regions (71.1 percent in the mining core zone; 68.9 percent in the mining buffer zone; 78.4 percent in the refinery buffer zone; 52.5 percent in the ARMP core zone; and 64 percent in the ARMP buffer zone), followed by watches and cycles. It is very striking to note that only in the refinery core zone, a significant proportion have televisions (63.5 percent), fridges (26.5 percent), and scooters (47.9 percent). Similarly, in the ARMP core zone also 47.5 percent have scooters, 37.5 percent have televisions, and 27.5 percent have fridges. This is again due to their permanent employment in the factory (Table 4.15).

About 159 HHs out of the total sample of 476 households in the project area are observed to be borrowing loans from different sources. An analysis of source-wise borrowing reveals that banks are the chief lenders to the sample HHs (33.3 percent in the mining core area; 80 percent in the mining buffer zone; 69.5 percent in the refinery core zone; 60 percent in the refinery buffer zone; 93.3 percent in the ARMP core zone; and 54.5 percent in the ARMP buffer zone), followed by Self Help Groups (SHGs) (33.3 percent in the mining core area; 13.3 percent in the mining buffer zone; 23.3 percent in the refinery buffer zone; and 45.5 percent in the ARMP buffer zone). Money lenders are also found to be lending in a smaller way to the sample HHs (Table 4.16).

Table 4.16: Sources of Borrowing for Households in the Study Area

Sources	Mining		Refinery		ARMP	
	Core	Buffer	Core	Buffer	Core	Buffer
Bank	2 (33.3)	12 (80.0)	57 (69.5)	18 (60.0)	14 (93.3)	6 (54.5)
Cooperative Society	1 (16.7)	0 (0.0)	4 (4.9)	2 (6.7)	0 (0.0)	0 (0.0)
SHG	2 (33.3)	2 (13.3)	6 (7.3)	7 (23.3)	0.0	5 (45.5)
Money Lender	1 (16.7)	1 (6.7)	15 (18.3)	3 (10.0)	1 (6.7)	0 (0.0)
Total	6 (100)	15 (100)	82 (100)	30 (100)	15 (100)	11 (100)

Source: Field Survey (2011).

Table 4.17: Household Health Status

Area	Zone	Health Status				
		Excellent	Good	Fair	Partial	Grand Total
Mining	Core	0 (0.0)	32 (84.2)	5 (13.2)	1 (2.6)	38 (100)
	Buffer	0 (0.0)	47 (63.5)	26 (35.1)	1 (1.4)	74 (100)
Refinery	Core	1 (0.5)	140 (66.4)	61 (28.9)	9 (4.3)	211 (100)
	Buffer	0 (0.0)	53 (60.2)	34 (38.6)	1 (1.1)	88 (100)
ARMP	Core	0 (0.0)	21 (52.5)	18 (45.0)	1 (2.5)	40 (100)
	Buffer	0 (0.0)	10 (40.0)	15 (60.0)	0 (0.0)	25 (100)

Source: Field Survey (2011)

A qualitative assessment was made in the project area, based on which the health status was categorised as 'excellent', 'good', 'fair', and 'partial'. A large majority of them have expressed that their health status as 'good' (84.2 percent in the mining core zone; 63.5 percent in the mining buffer zone; 66.4 percent in the refinery core zone; 60.2 percent

in the refinery buffer zone; 52.5 percent in the ARMP core zone; and 40 percent in the ARMP buffer zone), followed by 'fair'. Very less number of HHs has expressed their health status as 'partial' (Table 4.17).

Table 4.18: Households Facing Health Problems

Area	Zone	No Problem	Having Problems	Grand Total
Mining	Core	24 (63.2)	14 (36.8)	38 (100)
	Buffer	62 (83.8)	12 (16.2)	74 (100)
Refinery	Core	131 (62.1)	80 (37.9)	211 (100)
	Buffer	46 (52.3)	42 (47.7)	88 (100)
ARMP	Core	16 (40.0)	24 (60.0)	40 (100)
	Buffer	17 (68.0)	8 (32.0)	25 (100)

Source: Field Survey (2011).

Note: Health Problems include asthma, skin rashes, breathing problems, BP, motions, joint pains, heart problem, gastric problem, paralysis, Diabetes, typhoid, and other seasonal diseases.

Although majority of the HHs in the project area did mention that they are not having any problems with their health (63.2 percent and 83.8 percent respectively in the core and buffer zones of the mining area; 62.1 percent and 52.3 percent respectively in the core and buffer zones of the refinery area; and 40 percent and 68 percent respectively in the core and buffer zones of ARMP), a substantial section also expressed that they did face health problems (36.8 percent and 16.2 percent respectively in the core and buffer zones of the mining area; 37.9 percent and 47.7 percent respectively in the core and buffer zones of the refinery area; and 60 percent and 32 percent respectively in the core and buffer zones of the ARMP area). These health problems include asthma, skin rashes, breathing problems, blood pressure, joint pains, heart problem, gastric problem, diabetes, typhoid, etc. These problems are general and not specific to project-related health hazards (Table 4.18).

Table 4.19: Ailments and Treatments during the Last One Year

Area	Zone	Nature of Illness & Treatment					Source of Treatment					
		Chronic	Acute	Others	Total	Treatment Received	Govt. Hospitals	Pvt. Hospitals	Traditional	NALCO	Govt. & Pvt.	Govt./Pvt./ Tradition/NALCO
Mining	Core	2	16	1	19	100%	18	0 (0.0)	1	0 (0.0)	0 (0.00)	0 (0.0)
	Buffer	2 (5.1)	34 (87.2)	3 (7.7)	39 (100)	100%	22 (56.4)	6 (15.4)	3 (7.7)	0 (0.0)	8 (20.5)	0 (0.0)
Refinery	Core	20 (17.1)	90 (76.9)	7 (6.0)	117 (100)	100%	13 (11.1)	15 (12.8)	4 (3.4)	31 (26.5)	9 (7.7)	45 (38.5)
	Buffer	4 (8.2)	44 (89.8)	1 (2.0)	49 (100)	100%	21 (42.9)	13 (26.5)	2 (4.1)	1 (2.0)	12 (24.5)	0 (0.0)
ARMP	Core	1 (4.8)	16 (76.2)	4 (19.0)	21 (100)	100%	1 (4.8)	1 (4.8)	1 (4.8)	8 (38.1)	3 (14.3)	7 (33.3)
	Buffer	4 (21.1)	15 (78.9)	0 (0.0)	19 (100)	100%	13 (68.4)	0 (0.0)	0 (0.00)	0 (0.0)	6 (31.6)	0 (0.0)

Source: Field Survey (2011).

The data on ailments and related treatments of the sample households show that some HHs did face acute ailments for which treatment was taken. The data on source of treatment reveal that government hospitals are the chief source (94.7 percent and 56.4 percent respectively in the core and buffer zones) in the mining area. In the refinery core zone, the hospital run by NALCO was the principal source of treatment (26.5 percent) (Table 4.19).

Table 4.20: Views on Existence of Plant/Mining and Its Influence

Area	Zone	Beneficial	Partially Helpful	No Problems	Partially Hazardous	Grand Total
Mining	Core	0 (0.0)	0 (0.0)	33 (86.8)	5 (13.2)	38 (100)
	Buffer	0 (0.0)	7 (9.5)	61 (82.4)	6 (8.1)	74 (100)
Refinery	Core	24 (11.4)	56 (26.5)	111 (52.6)	20 (9.5)	211 (100)
	Buffer	1 (1.1)	23 (26.1)	56 (63.6)	8 (9.1)	88 (100)
ARMP	Core	3 (7.5)	1 (2.5)	15 (37.5)	21 (52.5)	40 (100)
	Buffer	0 (0.0)	10 (40.0)	11 (44.0)	4 (16.0)	25 (100)

Source: Field Survey (2011).

The views of the sample households on the influence of the plant/mining in the project area shows that only a small proportion mentioned that it is beneficial (11.4 percent in the mining core area and 7.5 percent in the ARMP core area). A large majority of them expressed that there are no problems with the plant/mining (86.8 percent and 82.4 percent respectively in the mining core and buffer zones; 52.6 percent and 63.6 percent respectively in the refinery core and buffer zones; and 37.5 percent and 44 percent respectively in the ARMP core and buffer zones). There are a few households in the project area that classified the influence of the project as 'partially hazardous' (Table 4.20).

Table 4.21: Improvement in Literacy Rate after Mining

Area	Zone	Literacy Rate	
		Yes	No
Mining	Core Zone	37 (97.4)	1 (2.6)
	Buffer Zone	69 (93.2)	5 (6.8)
Refinery	Core Zone	196 (92.9)	15 (7.1)
	Buffer Zone	53 (60.2)	35 (39.8)
ARMP	Core Zone	36 (90.0)	4 (10.0)
	Buffer Zone	17 (68.0)	8 (32.0)

Source: Field Survey (2011).

With regard to the improvement in literacy level compared to the pre-mining situation, the majority of the households across all the regions expressed that there is improvement (97.4 percent and 93.2 percent respectively in the mining core and buffer zones; 92.9 percent in the refinery core zone; and 90 percent in the ARMP core zone), as better schooling infrastructure has been created both by NALCO as well as the Government of Odisha. Surprisingly a considerable number (39.8 percent in the refinery buffer zone and 32.0 percent in the ARMP buffer zone) expressed that literacy levels have still not improved (Table 4.21).

Table 4.22: Details of Household Income (in Rs.) from Various Sources

Area	Zone	Agriculture	NALCO Salaries	NALCO Wage/ Contract Salaries	Wage Works	Others	Total Annual Income	Monthly Income*	Total No. of HHs
Mining	Core	395250 (18.5)	0 (0.0)	1568180 (73.5)	73930 (3.5)	97200 (4.6)	2134560 (100)	177880 (4681)	38
	Buffer	646200 (15.1)	0 (0.0)	2708530 (63.2)	483780 (11.3)	446460 (10.4)	4284970 (100)	357080.80 (4825)	74
Refinery	Core	2318580 (5.0)	35750449 (77.4)	4996914 (10.8)	993470 (2.2)	2112740 (4.6)	46172153 (100)	3847679 (18235)	211
	Buffer	1485575 (23.6)	720000 (11.5)	2954160 (47.0)	755950 (12.0)	366210 (5.8)	6281895 (100)	523491.30 (5949)	88
ARMP	Core	389800 (8.0)	3171300 (65.0)	1059960 (21.7)	184300 (3.8)	72275 (1.5)	4877635 (100)	406469.60 (10162)	40
	Buffer	386500 (26.4)	0 (0.0)	276000 (18.9)	405400 (27.7)	393520 (26.9)	1461420 (100)	121785 (5114)	25

Source: Field Survey (2011).

Note: *The figures in brackets indicate average monthly income of the household.

The income details of the sample households from various sources clearly show that NALCO salaries constitute the chief source (77.4 percent in case of refinery core zone and 65 percent in case of ARMP core zone), followed by NALCO wage/contract salaries (73.5 percent and 63.2 percent respectively in the mining core and buffer zones; 47 percent in the refinery buffer zone; and 21.7 percent and 18.9 percent respectively in the ARMP core and buffer zones). Income from agriculture, wage works, and other sources is not very significant. The average monthly income of the sample households reveals that those in the refinery core zone have highest income at Rs.18,235, followed by ARMP core zone (Rs.10,162), refinery buffer zone (Rs.5949), ARMP buffer zone (Rs.5114), mining core zone (Rs.4825), and mining buffer zone (Rs.4681) (Table 4.22).

Table 4.23: Details of Housing Provided by the NALCO

Area	Zone	New House Received by Respondents				If "Yes", New House Constru- cted by Whom	Type of House	If "No", Reason for not Receiving				
		NA	Yes	No	Total			Tinned Roof	Not Affected House- hold	Family Member Received House	Pending	Did Not Lose Home and Homestead
						NALCO						
Mining	Core	0 (0.0)	0 (0.0)	38 (100)	38 (100)	0 (0.0)	0 (0.0)	20 (52.6)	0 (0.0)	0 (0.0)	18 (47.4)	
	Buffer	0 (0.0)	0 (0.0)	74 (100)	74 (100)	0 (0.0)	0 (0.0)	34 (45.9)	0 (0.0)	0 (0.0)	40 (54.1)	
Refinery	Core	0 (0.0)	154 (73.0)	57 (27)	211 (100)	154 (100)	154 (100)	14 (24.6)	5 (8.8)	2 (3.5)	36 (63.2)	
	Buffer	0 (0.0)	0 (0.0)	88 (100)	88 (100)	0 (0.0)	0 (0.0)	45 (51.1)	0 (0.0)	0 (0.0)	43 (48.9)	
Ash & Red	Core	0 (0.0)	16 (40.0)	24 (60)	40 (100)	16 (100)	16 (100)	5 (20.8)	0 (0.0)	1 (4.2)	18 (75.0)	
Mud Pond	Buffer	0 (0.0)	0 (0.0)	25 (100)	25 (100)	0 (0.0)	0 (0.0)	3 (12.0)	0 (0.0)	0 (0.0)	22 (88.0)	

Source: Field Survey (2011).

The data on the houses allotted to the sample households by NALCO clearly show that only in the refinery core zone (73 percent) and ARMP core zone (40 percent) a significant portion of the households received new houses from NALCO. These houses were constructed by NALCO and are semi-pucca (tinned roof) houses. Regarding the reason why a significant number of households in other regions did not receive the houses, the data shows that they were not affected by the factory in terms of losing home and homestead. The NALCO constructed houses only for those who lost their houses for the factory (Table 4.23).

Table 4.24: Details of HHs having Individual Toilets

Area	Zone	HHs having Toilet Facility			Provided by Whom	
		Yes	No	Grand Total	Self	NALCO
Mining	Core	0 (0.0)	38 (100)	38 (100)	0 (0.0)	0 (0.0)
	Buffer	0 (0.0)	74 (100)	74 (100)	0 (0.0)	0 (0.0)
Refinery	Core	43 (20.4)	168 (79.6)	211 (100)	27 (62.8)	16 (37.2)
	Buffer	0 (0.0)	88 (100)	88 (100)	0 (0.0)	0 (0.0)
Ash & Red Mud Pond	Core	16 (40.0)	24 (60.0)	40 (100)	0 (0.0)	16 (100)
	Buffer	0 (0.0)	25 (100)	25 (100)	0 (0.0)	0 (0.0)

Source: Field Survey (2011).

The data on the households having individual toilets reveal that majority of them in all the regions do not possess individual toilets, except for a small proportion of the households (20.4 in the refinery core zone and 40 percent in the ARMP core zone), and these have mostly been constructed by the households themselves (Table 4.24).

The data of various sources of drinking water for the sample households in the project area indicate that among surface water sources, stream and ponds (cent percent in the mining core zone and refinery core zone), followed by canals and stream, are the chief sources of water supply. Among the ground water sources, and well and water supply system (90.5 percent in the refinery core zone; 77.3 percent in the refinery buffer zone; and 45 percent in the ARMP core zone) are the principal sources of water, followed by hand pumps (71.6 percent in the mining buffer zone). In terms of impact of pollution due to mining on the water sources, the data reveal that water is very polluted in some zones (cent percent in the mining core and buffer zones; 79.5 percent in the refinery buffer zone; and 55 percent in the ARMP core zone), while the rest is not polluted. Basically, wherever water is available through streams and ponds, it is polluted and if the source is through the water supply system it is not polluted (Table 4.25).

Table 4.25: Source of Drinking Water

Area	Zone	Surface				Ground Water						Impact of Pollution		
		Canal	Streams & Pond	Canal & Stream	Total	Well	Well & Water Supply System	Leakage Water from NALCO Pipeline	Hand Pump	Water Supply from Stream	Total	Not Polluted	Polluted	Total
Mining	Core	0 (0.0)	38 (100)	0 (0.0)	38 (100)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	38 (100)	38 (100)
	Buffer	0 (0.0)	0 (0.0)	22 (100)	22 (100)	0 (0.0)	0 (0.0)	0 (0.0)	53 (71.6)	21 (28.4)	74 (100)	0 (0.0)	74 (100)	74 (100)
Refinery	Core	0 (0.0)	20 (100)	0 (0.0)	20 (100)	20 (9.5)	191 (90.5)	0 (0.0)	0 (0.0)	0 (0.0)	211 (100)	175 (82.9)	36 (17.1)	211 (100)
	Buffer	14 (100)	0 (0.0)	0 (0.0)	14 (100)	20 (22.7)	67 (77.3)	0 (0.0)	0 (0.0)	0 (0.0)	88 (100)	18 (20.5)	70 (79.5)	88 (100)
Ash & Red Mud Pond	Core	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	22 (55.0)	18 (45.0)	0 (0.0)	0 (0.0)	0 (0.0)	40 (100)	18 (45.0)	22 (55.0)	40 (100)
	Buffer	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	25 (100)	0 (0.0)	0 (0.0)	25 (100)	25 (100)	0 (0.0)	25 (100)

Source: Field Survey (2011).

Table 4.26: Households' Expectations from NALCO

Area	Zone	Expectation								
		NA	Hered- itary Jobs	Job Offer For All Affected People	Access to Health Card For All	Job Regular- ization	Expecting Husband's /Father's Job	Local Priority For All Works	Others	Grand Total
Mining	Core	0 (0.0)	0 (0.0)	5 (13.2)	8 (21.1)	25 (65.8)	0 (0.0)	0 (0.0)	0 (0.0)	38 (100)
	Buffer	0 (0.0)	0 (0.0)	23 (31.1)	2 (2.7)	40 (54.1)	0 (0.0)	8 (10.8)	1 (1.4)	74 (100)
Refinery	Core	0 (0.0)	94 (44.5)	47 (22.3)	2 (0.9)	11 (5.2)	23 (10.9)	16 (7.6)	18 (8.5)	211 (100)
	Buffer	0 (0.0)	0 (0.0)	7 (8.0)	6 (6.8)	44 (50.0)	0 (0.0)	14 (15.9)	17 (19.3)	88 (100)
ARMP	Core	0 (0.0)	10 (25)	11 (27.5)	0 (0.0)	11 (27.5)	0 (0.0)	4 (10.0)	4 (10.0)	40 (100)
	Buffer	0 (0.0)	0 (0.0)	3 (12.0)	19 (76.0)	1 (4.0)	0 (0.0)	0 (0.0)	2 (8.0)	15 (100)

Source: Field Survey (2011)

Note: Others include adequate water facility, monitoring for drainage and roads, access to free education, pension, new house at R&R colony, free electricity, quality education, another school at R&R, and drinking water supply

The expectations of the affected households from the NALCO are mostly 'job regularization' for those who are on contract (65.8 percent and 54.1 percent in the mining core and buffer zones; 50 percent in the refinery core zone; and 27.5 percent in the ARMP core zone), followed by 'job offer for all affected people' and 'others', that include adequate water facility, access to free education, new houses for R&R colony, free electricity, monitoring of drainage, cleanliness of the roads, etc. (Table 4.26).

Table 4.27: Households' Opinions on the Affects of Mining

Area	Zone	Opinion 1		Opinion 2		Opinion 3		Opinion 4		
		No opinion	Degrading soil fertility due to smoke and dust	No opinion	Due to leakages of red mud pond and septic water pipelines villagers are facing health problems and also crop are getting damaged	No opinion	Air and sound pollution	No opinion	Due to mining streams are destroyed and people are facing water shortage	Due to mining and deforestation wild life population has totally decreased
Mining	Core	28 (73.7)	10 (26.3)	38 (100)	0 (0.0)	0 (0.0)	38 (100)	0 (0.0)	24 (63.2)	14 (36.8)
	Buffer	51 (68.9)	23 (31.1)	74 (100)	0 (0.0)	0 (0.0)	74 (100)	33 (44.6)	30 (40.5)	11 (14.9)
Refinery	Core	173 (82.0)	38 (18.0)	211 (100)	0 (0.0)	24 (11.4)	187 (88.6)	162 (76.8)	0 (0.0)	49 (23.2)
	Buffer	70 (79.5)	18 (20.5)	88 (100)	0 (0.0)	4 (4.5)	84 (95.5)	65 (73.9)	0 (0.0)	23 (26.1)
Ash & Red	Core	18 (45.0)	22 (55.0)	20 (50.0)	20 (50.0)	10 (25.0)	30 (75.0)	11 (27.5)	0 (0.0)	29 (72.5)
Mud Pond	Buffer	14 (56.0)	11 (44.0)	25 (100)	0 (0.0)	1 (4.0)	24 (96.0)	11 (44.0)	0 (0.0)	14 (56.0)

Source: Field Survey (2011).

The analysis of the households' opinions of the various effects of mining reveals that they are experiencing air and sound pollution (cent percent in mining core and buffer zones; 88.6 percent and 95.5 percent respectively in the refinery core and buffer zones; and 75 percent and 96 percent respectively in the ARMP core and buffer zones). This is followed by other effects such as deforestation and consequent decline in wild life population in the project area (36.8 percent and 14.9 percent respectively in the mining core and buffer zones; 23.2 percent and 26.1 percent respectively in the refinery core and buffer zones; and 72.5 percent and 56 percent respectively in the ARMP core and buffer zones). Some households in the mining area mentioned that streams have been destroyed and as a result, they are facing water shortage (63.2 percent in the core zone and 40.5 percent in the buffer zone) (Table 4.27).

Chapter - 5

CONCLUSION AND WAY FORWARD

5.1 Introduction

NALCO, a profit-making public sector undertaking and a Navaratna Company called 'the pride of Odisha' shall not really be characterized as such from the perspective of the affected population. It is evident from the preceding chapters that the most vulnerable sections, viz. the Scheduled Tribes and Scheduled Castes who have lost lands, houses, and other assets could not get back their livelihood status as a result of NALCO's cash compensation policy. Since land scarcity was not there in the 80s as it is felt now, NALCO should have adopted a land-for-land policy. We could see from the data in the above sections that the people were reduced from farmers to casual labourers in farm and non-farm sectors.

5.2 *The Findings*

With the emergence of the NALCO mining industry, the occupational profile of the households has changed from predominantly farming to NALCO contract/wage employment. Even though permanent employment in NALCO gives good income in terms of assured salaries, the contract/wage employment and the income accrued from it is far from satisfactory. Further, the households have lost self esteem in the process of displacement as majority of them whose main occupation was farming are now working as contract/wage labour, as mentioned above.

During 1984-85, NALCO started the Peripheral Development Programme-the area, which is 10 km from the refinery and mining areas, is considered as a peripheral area. Under this programme, NALCO promised to provide all facilities including health, education, roads, drinking water, and infrastructure development (school building, etc.); but in practice, NALCO failed to provide the above services satisfactorily to the peripheral area. The other major lacunae observed with the NALCO's employment policy are that once the displaced persons who were provided with employment happened to die due to ill health, their spouses were not provided with jobs even on humanitarian grounds. We observed during our field study that these unfortunate persons are still trying for jobs with the help of displaced associations. We feel that NALCO can deal with such problems more sympathetically.

Another issue of concern is that NALCO is getting water from the Kerandi River, which is 8 km away from the refinery, through a pipeline. Because of the water pipeline, some of the villages have lost their agriculture lands. It was found that during the pilot survey the people requested the NALCO to provide access to drinking water from the pipeline but NALCO simply denied; Further, the people have said that there is a lot of water being wasted due to leakages.

Besides the problems enlisted above, there are certain environmental and ecological problems observed in the field. Let us consider a few problems observed during the main study in Goudaguda Village. There are two pipelines here adjacent to this village: one is a caustic soda pipeline and another is a septic water pipeline. Due leakages in these pipelines, the caustic mud and septic water flows into the agriculture fields; and as a result, the fertility of the agriculture fields is affected and in turn the crop production decreased. Further, the leakages also contaminated the canal water. According to the village elders, a few (nine in number) livestock also died in 1995 due to water contamination. The villagers fought against NALCO, and NALCO finally gave compensation for their loss.

It was found that transport is the major problem between the refinery and the surrounding villages. While the men use bicycles or motor cycles, women trek for long distances. Women from the Mujanga Village said that they are working in the refinery as contract/ wage workers but have no transport facility to reach the refinery-they have to walk for 9 to 10 km on kutchra road to reach the refinery, which takes more than one hour time. They hope NALCO will provide transport facility to reach the refinery on time. During the land acquisition, NALCO had promised to provide employment to all the affected persons in the household. However, NALCO later disagreed to provide employment opportunity to every affected person in the household.

Even in the villages displaced due to refinery/ARMP (2 villages and 10 hamlets), which were resettled in two colonies, around 389 people were given regular employment, out of the 600 households affected. The rest were given only contractual employment, which is not remunerative. Such unequal distribution of the employment opportunities created tensions among the households. This issue becomes clear when one observes that only one person from each household was offered job; the others are rendered totally dependent. It was also observed during the main study that once an employed person got married and left the house, the others, especially the elderly, become totally dependent, without any source of regular income.

Regarding the health status, the data shows that compared to earlier times, health infrastructure has developed, but the quality of the services is very poor in both

government and NALCO hospitals. It was a pity that the affected households became addicted to certain social evils such as liquor and drugs (particularly the youth) as a result of cash compensation. It was found that in the Analabadi rehabilitation colony, most of the employees are addicted to alcohol and tobacco chewing, etc., and due to these addictions many people died at an early age. In the process of development, many people have been adversely affected in terms of livelihood portfolio, social disarticulation, etc. Unfortunately, wherever development has taken place in India the vulnerable and lean communities such as STs and SCs have been adversely affected.

In the context of NALCO, before mining in this area, the major economic activity of the people was agriculture. At that time, most of the households from all the villages were having agriculture and *podu* lands—they practiced traditional agriculture such as *podu* cultivation, and their secondary occupation was NTFP collection for both self-consumption and sale. Earlier, all the resources, including natural water streams, fish ponds, hillocks, grazing lands, common lands, and plenty of forest products, were available in this area. However, NALCO acquired the agriculture lands, *podu* lands and other forest lands; and due to mining and refinery, most of the households from the surrounding areas lost their agriculture lands and have been restricted from entering into mining and refinery areas. Due to these changes, the people diverted from the agriculture to non-farm business.

Although agriculture is the main occupation, the income from the activity is very less. Hence, people depend on wage labour works and NALCO contract/wage labour works for their survival. Further, among the households displaced in the refinery and ARMP core zones, most received jobs in NALCO, but these people do not know the value of savings for their future sustainability.

Another issue of concern in the study area is that the percentage of illiteracy is very much high (51 percent: males 32.2 percent and females 67.8 percent). It is clear that the people are not aware of the importance of education and its benefits. For e.g. Mujanga Village that comes under the refinery buffer zone has a primary school that is being monitored by the Missionaries. However, the school is not functioning properly. The government is trying to convert this to a Govt. school but the Missionary management is not willing to give the school to the government. Therefore, child education is adversely affected. Sadly the parents do not bother about the school. Due to land occupancy, depletion of forests, mining, and refinery, lots of changes have occurred in this area. Largely, the water and air are polluted, and natural water streams have been destroyed. The livestock are adversely affected, and there has been a decline in their population.

NALCO does not provide any skill development training to the affected people for the creation of alternative livelihoods. The data in the previous sections show that NALCO does not take any initiative to involve women in its works. It is important for NALCO to conduct awareness camps regarding health, education, income-generating activities, and savings for people living in the surrounding areas. However, there is no data to show that NALCO has conducted training programs for the people to help their future sustainability.

It was mentioned in the text that technical education such as ITI diplomas and a little higher education is nearly absent in the NALCO areas, thus making the local people unfit /ineligible to become skilled workers in the NALCO. In this context, it is important for NALCO to contemplate the imparting of skills/trainings to ready the local people for better opportunities. It is also the duty of the NALCO to provide Income-Generating Activities (IGA) to the household members of the villages in tandem with line departments of the district administration.

On the whole, the resettlement and rehabilitation measures by NALCO are found to be piecemeal and ad hoc. The company with its huge profit base could have done much better for these marginalized people. It was observed that the people of the nearby villages still do not have the basic necessities of life such as drinking water, schooling, medical facilities, etc. The Government of Odisha and NALCO should work in unison to improve these areas possessing a rich mineral resource.

On the whole, the resettlement mechanism adopted by the NALCO is not transparent. Moreover, it is observed that the NALCO did not have the CSR (Corporate Social Responsibility) initiative, and has generally passed the money towards resettlement and rehabilitation of the PAFs (Project Affected Families) to the Government of Odisha under the leadership of the District Collector.

5.3: Way Forward

Though NALCO has undertaken some initiatives for the affected people in terms of providing jobs, shelter, free education, and free health and infrastructure including community hall, school building, roads and drainages, etc., there is still a feeling among the affected population that problems such as job security to all, shelter, access to free health and education facilities, basic amenities, and other infrastructure facilities, remain. It is time for the NALCO to rethink about the affected people's problems and conduct some welfare activities for them in terms of livelihoods promotion, health and education, skill development activities, infrastructure facilities, etc.

Livelihoods:

A comprehensive livelihood portfolio needs to be created for the project affected population in all areas in terms of providing IGAs and developing skills among the local communities. NALCO needs to do this in conjunction with various development departments in the district. In this context, it is important for NALCO to appoint a special recruitment/welfare cell to clear pending employment issues and other problems, and also monitor contract/wage labour employment to avoid middle men/contractors or undemocratic activities so that the affected people get the opportunity directly from NALCO.

According to the Forest Rights Act (2006), the Scheduled Tribes and Other Traditional Forest Dwellers (OTFDs) have the right to self cultivation for livelihood in forest land. They also have the ownership rights and access to use minor forest produce. Therefore, neither the Government of Odisha nor NALCO should restrict these people from using the forest resources in that particular area. This will help the people to achieve access to supplementary livelihoods. The draft National Land Acquisition and Rehabilitation and Resettlement Bill, 2011 has also included the landless category besides land losers to be given a comprehensive Rehabilitation and Resettlement (R&R) package since these people lose their livelihood. Though it talks about cash compensation and mandatory employment for one member from each affected family, it does not solve the problem completely-most of the time, it is observed that the employed family member leaves the original family after marriage.

The R&R Bill 2011 also mentions special provisions for the Scheduled Tribes. It says that "In case of displacement of 100 or more ST families, a Tribal Displacement Plan is to be prepared:

- Detailing the process to be followed for settling land rights and restoring titles on alienated land;
- Details of the programme for development of alternate fuel, fodder, and non-timber forest produce."

Therefore, what is important is the creation of alternative livelihoods, which will help the people to go for sustainable livelihoods, with or without the project. Any short term solution is not a solution at all.

Basic Amenities

Health: NALCO has promised to provide health service to all affected people in the surrounding villages. The company has issued health cards to the affected people, who got permanent employment in the NALCO and in addition to two villages, i.e.,

Ambogam and Goudaguda, because these two villages are more affected by the refinery and ARMP. This is very unfair; NALCO has to issue permanent and free health cards to all the affected people as well as to the contract/wage employees and their families.

Education: NALCO is providing free education only to the affected people, who got employment with the company; the rest do not have access to the free education. In this area, literacy rate is very less, especially among women. The reason for this is that the people do not have access to better education. If NALCO provides free education to the affected villages, then there will be much more benefit to the girl child. NALCO must think on this service.

Drinking Water: In all affected villages, people do not have access to safe drinking water. Mostly, they depend on stream water for their drinking and other household needs. Due to the water contamination, people are suffering from health problems including water borne diseases. If NALCO can initiate the provision of safe drinking water, many people from the surrounding villages will be benefited.

Transport: NALCO has promised to lay roads to all surrounding villages, but no action has been taken up yet. In this area, transport is the major problem, and people still depend on their own transport to reach other villages, markets, and working place. Many people from the surrounding villages are working in NALCO as contract/wage labour; these people, due to the transport problem reach home late, and thus have no time to spend with their children and family. They expect NALCO to provide transport facility to reach the refinery on time. NALCO is providing transport facility only to its permanent employees. Providing transport facility to also the surrounding villagers who work in NALCO as contract/wage labour would be helpful, especially to the women.

Pollution Control

In the mining area, due to the mining activity and the conveyor belt, some of the natural streams got destroyed, while some of the streams were diverted into the mining site. Hence, people from the surrounding villages are facing water shortage. Further, due to the mining activity the stream water is contaminated; and due to the conveyor belt, the people are also suffering from sound pollution. In the refinery and ARMP areas, the surrounding villages are affected by smoke, caustic water, and fluids. Hence, the water is contaminated, the agriculture fields' fertility is affected, and crop production has been affected. Further, pollution has also affected the livestock. Hence, NALCO has to take some more preventive measures to reduce air, sound and water pollution.

Skill Development Activities and Sustainable Livelihoods

NALCO did not provide any skill development activities for the affected people. The main livelihood source for most of the affected people is agriculture and NALCO contract/

wage labour. However, these people are not getting sufficient income to meet their household needs throughout the year. Therefore, NALCO has to provide skill development activities to the affected people, which will help them to develop alternative livelihoods. Further, the NALCO must encourage these affected people's children to get technical education so that they can get skilled/semi-skilled jobs in the NALCO. For this, some awareness activities as well as training programs should be taken up by the NALCO in collaboration with some development agency, or the government to help these people develop alternative livelihoods for their future sustainability. Skill development trainings would certainly help the women folk to opt for alternative livelihoods.

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About the Authors

M. Gopinath Reddy is a Professor with the Centre for Economic and Social Studies (CESS) in Hyderabad, India. A political science and public administration specialist, he has been working on the areas of decentralized and Community Forest Management issues for two decades and published a number of academic papers in national and international Journals. He recently brought out a book (co-authoring with Prof. V. Ratna Reddy and Prof. John Soussan) on "Political Economy of Watershed Management: Policies, Institutions, Implementation and Livelihoods" by Rawat Publications. Also contributed a chapter on AP Community Forest Management Experience in a book brought out by Earthscan (2007), London titling "Forests, People & Power: The Political Ecology of Reform in South Asia" edited by Piers Blaikie and Oliver Springate Baginski of UK. He has to his credit more than 40 publications in international and national journals and is author of two books.

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S.V. Ramana Currently as Coordinator in M.S.Swaminathan Research Foundation, Regional Office, Jeypore, Odisha during 2006 and Coordinated projects like Bio-industrial watershed project, documentation of forest management and shifting cultivation of 7 primitive tribal groups of Odisha and also remained incharge of the Director, MSSRF, Regional Centre Jeypore for more than a year. Considered as instrumental in getting a NATIONAL WATER AWARD for 2010 for the organization. Resource person for agriculture, horticulture, watershed management and other livelihood trainings and workshops. Before joining MSSRF, worked in Odisha State Government in Agriculture Department for almost 18 years in various capacities.