5 ECOLOGICAL DEBT: A CASE STUDY FROM ORISSA, INDIA

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Integrated Rural Development of Weaker Sections in India

"They [NALCO] told [us]: we will teach you; we will give you jobs; you can wear pants like us, you can comfortably sit like us in chair[s]; you do not bother about anything; just give us some land. These people thought that we were illiterates, that we were scared. These people have made us fools. And slowly different factories have come up in our place. What benefit it has given us? It has only degraded our land, forest, streams, and rain. If we had [an] idea we would not have given land, our forest, our water. We would not have given even a needle- size of land to them".
–Banguru Jani, Adivasi leader in Jhimkiguda

I. INTRODUCTION

The living standards of industrialised Northern countries owe a great deal to the massive flow of wealth from the developing countries of Africa, Latin America and Asia. That is, the impoverished countries of the South have subsidised and continue to subsidise the rich countries of the North through the provision of raw materials, commodities, labour and other services.

The North comprises only 25 percent of the world's population, yet consumes around 75 percent of global resources. Pre-existing political and economic structures, the legacy of centuries of European colonialism, have resulted in a situation in which the Northern countries, through the activity of Northern companies and the individual lifestyles of people in those countries, draw vast levels of resources from the Southern countries. This drain of basic resources and raw materials has greatly undermined the capacity of Southern countries to feed their peoples.

According to the United Nations Development Programme (UNDP, 1998), 20 percent of the world's population living in the highest income countries makes 86 percent of all consumer purchases. The richest fifth consumes 58 percent of the energy used by all humans. The richest fifth also produces 53 percent of carbon dioxide emissions, while the poorest produces just three percent.

Against this background, the concept of ecological debt was coined by a South American non-government organisation in the nineties to refer to the responsibility held by those who live in industrialised countries, as well as their accomplices in the South, for the continuing destruction of the planet due to production and consumption patterns driven by the neo-liberal global market economy. Critically, it states that the exploited peoples of the South are the principal creditors of the ecological debt, while the ecological debtors are the world's wealthiest citizens. Yet not only are these ecological debtors not held accountable, international institutions and governments have yet to acknowledge and measure the size of the ecological debt. Meanwhile, developing countries are paying over and over again their financial debt to rich countries.

By looking closely at the example of mining in the state of Orissa in India, this report aims to explore ways of understanding ecological debt, its possible components and dimensions. When a corporation seeks to mine in a state, the government incurs substantial loans with the ostensible objectives of developing the region and creating employment, though at the expense of the environment. The loans allow government to provide subsidies and infrastructure to corporations. For this and other reasons, a study of the

concept of ecological debt should have implications for determining the issue of financial debt.

In the context of Orissa, where more than 80 percent of the population depends on local resources of land, water and forest, the concept of ecological debt could provide useful instruments for seeking redress, fixing accountability, and enforcing compensation and restitution.

Objective

The study has the broad aim of elaborating on the social and ecological costs of large-scale mining, thereby contributing to a better understanding of the concept of ecological debt from the perspective of resource-based communities in Orissa. The study also has the specific objectives of, first, exploring the felt and perceived impact of mining and mining-based industries on the resources base, livelihood, and culture of local communities, and, second, of identifying the responsible agencies within the purview of both ecological debt and financial debt.

Focus

The study looks at the livelihoods and lifestyles of affected communities, land use patterns, impact on natural resources and climate change in the context of mining. It attempts to describe the whole mining scenario in Orissa and its effects, focusing on the National Aluminium Limited Company (NALCO) and its relationship to resource exploitation. NALCO as a mining company must call on many additional industries, e.g. hydroelectric power projects, refineries, smelters, roads, rail systems and port facilities. Hence the study looks at how the relationships between each of these activities contribute to ecological debt.

Methodology

The study depended upon secondary data, i.e. research, documentation, and reports available on the mining industry in India. It followed cases of existing and forthcoming mining and industrial bases in the state of Orissa, all of which are located in the undivided Koraput district[1], and Talcher-Angul, Sundergarh, Sukinda Valley and Paradeep. Field work and interviews in these communities were undertaken. The commissioning of the case study was preceded by a consultation of civil society groups, activists, researchers and academics on 13 August 2004 at the state capital of Bhubaneswar to identify the main issues.

II. MINING AND FINANCIAL DEBT FROM THE PERSPECTIVE OF ORISSA

Mining India

Since 1947, India's mining industry has shown rapid growth. In the pre-plan period prior to 1950, India produced 24 types of minerals with a total value of US$23 million. Today, it produces 89 minerals, accounting for 3.5 percent of the country's gross domestic product and 11.5 percent of total industrial output. Public sector mines comprise 91 percent of the nation's total mineral value, even though 80 percent of mines are privately owned. By 1996-97, India had 3,488 mines. Of these, 563 were coal, 654 were metals and 2,271 were non-metals.

In 1990, with the restructuring of the Indian economy into an open economy, the mining sector was liberalised, making it easier for mine-owners to obtain permission for prospective mining. In March 1993, with the announcement of India's new National Mineral Policy, the mining sector was opened to private initiative and investment. Between 1994 and 1999, restrictions on foreign equity participation in the mining sector were removed in order to attract foreign capital and technology. Some 34 mining investment proposals from transnational corporations (TNCs) covering an area of 49,000 km^2 were approved by the national government. The setting up of the national Apex Advisory Committee to monitor and review the environmental aspects of mining activities was merely a formal gesture, as the committee was chaired by the Mining Secretary and most of the members belonged to the mining lobby. In general, environmental expertise within government has always had weak representation, and there has been no space at all for representatives of grassroots groups and local communities.

Orissa's economy and burgeoning debt

During the 49th National Development Council Meeting in New Delhi in 2001, the Chief Minister of Orissa (Patnaik, 2001) noted:

> "The problem of economic backwardness of the state has assumed serious proportions. The long-term growth rate of the state's economy during the period from 1951 to 1995 has been around 2.7 percent, which is substantially lower than the growth rate of the national economy. While the per

> capita income of Rs.200 of the state during the year 1951-52 at current prices has gone up to Rs.9,162 during 1999-2000, showing an increase of 46 times, the national per capita income shows an increase of 65 times from Rs.248 to Rs.16,047 during the corresponding period. The percentage of people below the poverty line has decreased from 68.6 percent during 1972-73 to 47.15 percent in the case of Orissa, where as at national level, the same has declined from 48.3 to 26.1 percent during the same period. More so, the percentage of [people living under the] poverty line for Orissa is the highest among all other states. This conveys a clear picture that poverty continues to be an intractable problem for the state of Orissa".

In 2001, Orissa's revenue deficit reached the staggering figure of Rs.2,573.87 crores[3] or 6.5 percent of the gross state domestic product (GSDP) (Patnaik, 2001). Currently, the state does not have funds to meet its salary, pension and interest payment and repayment liabilities since its total liabilities (Rs.7,733 crores in 2001-2002) exceed its revenue receipts (Rs.7,511 crores). The ever-increasing gap between revenue expenditure and receipts was met through borrowing. The state's debt stock as of March 2001 stood at Rs.21,072 crores or 51 percent of the GSDP. Almost 73 percent of Orissa's revenues went to the servicing of this debt. Consequently, spending on education and other social services declined from 40 percent of total state expenditures in 2000 to 24 percent in 2004. Likewise expenditures on agriculture decreased from six percent of total state expenditures to two percent, while spending on rural development fell from 12 to seven percent in the same period.

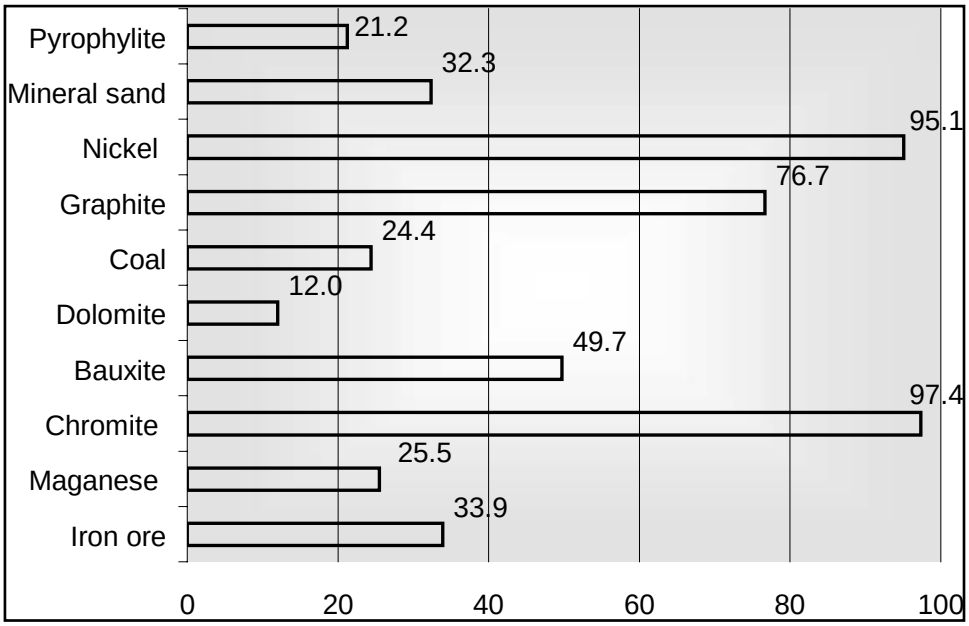
Orissa's mineral base, production and exports

In this context, mining has become one of the focuses of the Government of Orissa to raise revenues. According to its Economic Survey (Government of Orissa, 2004):

> "Though Orissa is rich in minerals, exploitation is still not commensurate with the potential. Enhanced rate of exploitation of different mineral reserves will not only improve the financial position of the State but also will be helpful in generating sizeable direct and indirect employment".

Orissa has 97 percent of India's chromite and 95 percent of its nickel reserves, 50 percent of its bauxite, and 24 percent of its coal reserves (Government of

Figure 1. Orissa's mineral reserves (percentage to national level)



Source: Government of Orissa (2005).

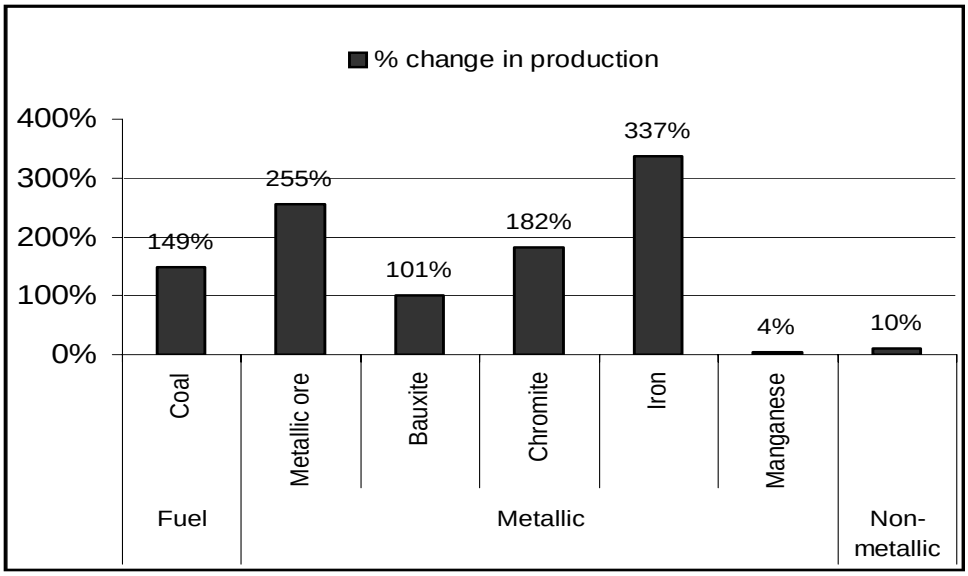
Orissa, 2005). Overall, it has an estimated reserve of about 5,923 million tons of 18 minerals valued at Rs.1,674 million in 1996.

Mining in Orissa started in 1857 in Talcher, one of the 14 most polluted industrial zones in India. Some 370 mining companies are active in Orissa, including public undertakings such as NALCO, Steel Authority of India, Mahanadi Coalfields Limited, Orissa Mining Corporation (OMC), and private mining companies. The total number of mining leases in the state by 2004 numbered 607, covering an area of 101,947 hectares. Out of these, 339 leases covering an area of 73,910 hectares were in operation, including the extraction of bauxite, iron ore, chromite and manganese (Government of Orissa, 2005).

Mineral production in Orissa is increasing. Between 1993 and 2003, there was a phenomenal 278 percent growth in mining and quarrying GSDP (from Rs.7,005 to Rs.19,489 million) even as production in the agriculture, forestry and fishing sector fell by 16 percent (from Rs.71,625 to Rs.60,866 million in the same period) (Government of Orissa, various years).

In 2003-04, total production of minerals and ores was 108,283 million tons – an astounding increase of 171 percent from 1992-93 levels (Government of Orissa, various years). Iron ore registered the highest growth in production

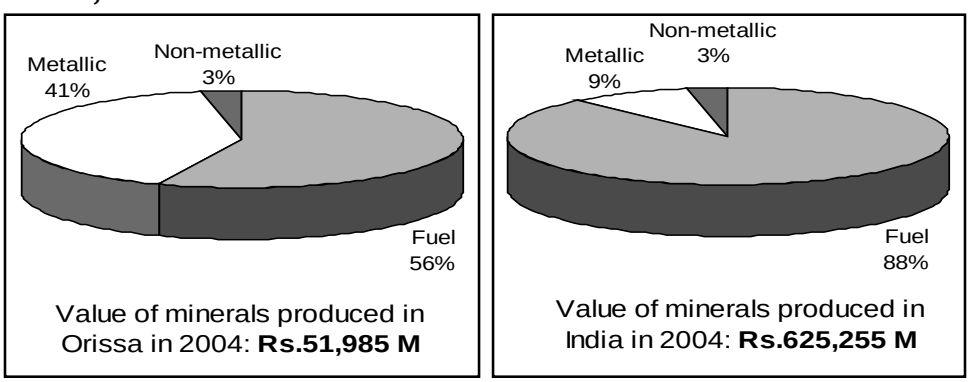
Figure 2. Growth in mineral extraction, Orissa, 1993-94 and 2003-04



Source: Government of Orissa (various years).

(337%), followed by chromite (182%) and bauxite (101%). The value of minerals and ore production in Orissa was the highest in the country, constituting eight percent of the national total (Rs.625,255 million). Of the total value of the minerals produced in Orissa, the share of coal is 56 percent and the shares of metallic and non-metallic minerals are 41 percent and three percent, respectively. The picture at the country level is quite different: of the total value of minerals produced in the country, coal comprises 88 percent; metallic minerals, nine percent; and non-metallic minerals, three percent.

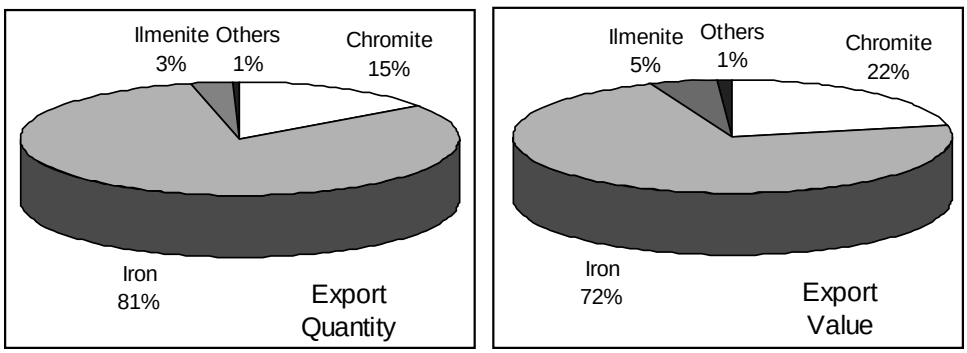
Figure 3. Contribution to total value of mineral production, Orissa, 2003-04



Source: Government of Orissa (2005).

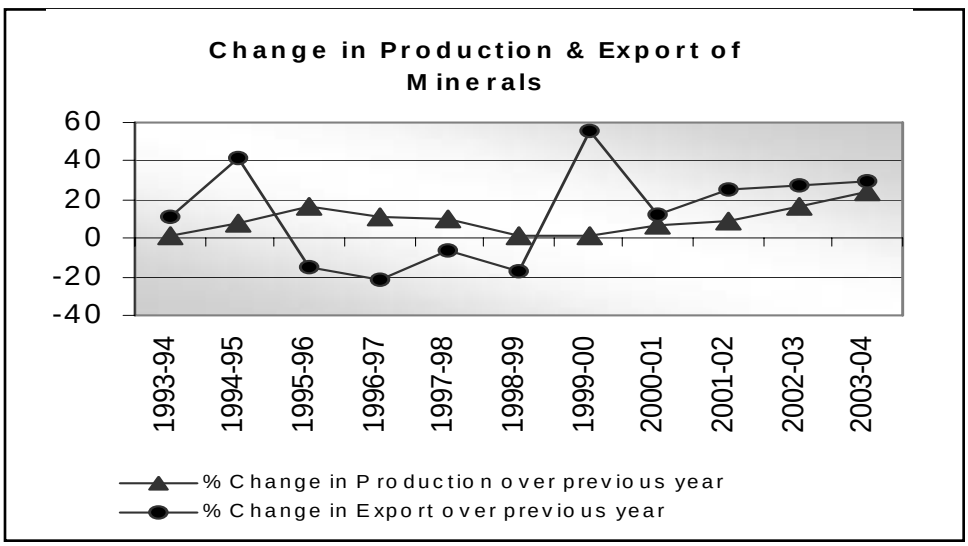
In 2003-04, Orissa exported 7.64 million tons of minerals and ores valued at Rs.11,865 million, representing a 321 and 206 percent growth in quantity and value, respectively, over 1999-2000. Of the total quantity of minerals exported, iron ore constituted 81 percent, followed by chromite (15%) (Government of Orissa, 2004). Overall, the last decade (1993-94 to 2003-04) saw a 167 percent increase in mineral production and a 329 percent growth in mineral exports (ibid).

Figure 4. Mineral exports, Orissa, 2003-04



Source: Government of Orissa (2005).

Figure 5. Mineral production and export, Orissa, 2003-04



Source: Government of Orissa (various years).

TNC mining and mining-related ventures in Orissa

With its abundant natural resources, Orissa attracts TNCs and big businesses (e.g. Aluminium Peshiney (AP) International of France, Norsk Hydro of Norway, Alcan of Canada, Alu Sussie of Switzerland, Broken Hill Propriety (BHP) - Billiton and Rio Tinto of Australia, Vedanta, Sterlite, and Alocoa of the United States, and NALCO, Hindalco, Larsen and Toubro, Utkal Aluminium International Limited, Aditya Birla, and Tata Group of India) in mining, steel, aluminium and coal-based power projects. Besides the availability of cheap labour, the Government of Orissa offers exceptionally huge subsidies to investors in the form of guarantees and tax concessions. The state currently ranks sixth in foreign investment, having attracted Rs.973,000 million in investments in the last five years.

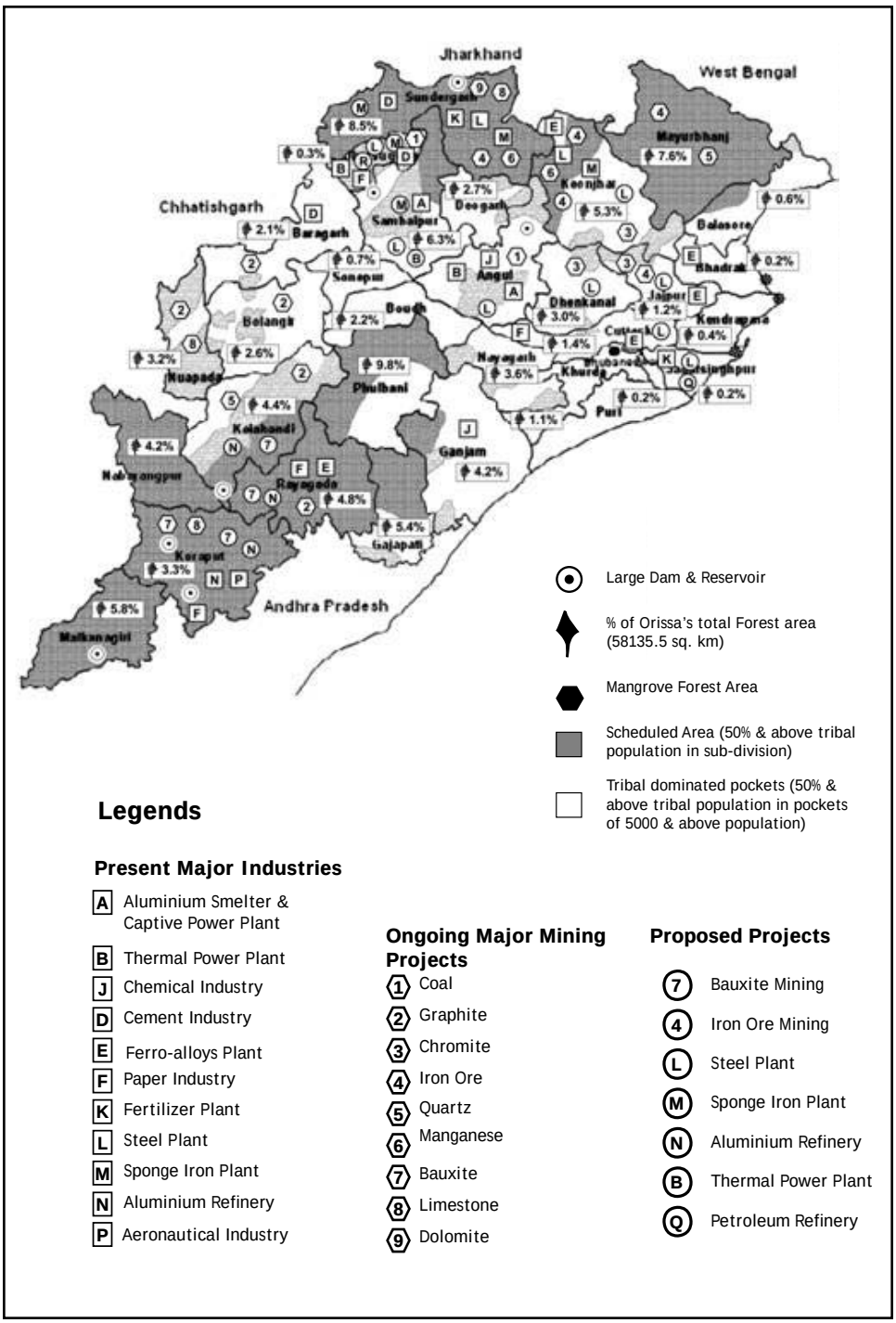
Projects worth Rs.2,500,000 million are envisioned to be implemented in the state in the next five to ten years, the majority being mining and mining-related projects. In particular, 42 steel plants are poised to come up in Orissa, requiring some 1,600 million tons of iron ore (or half the state's known resources). The state is currently leasing out mines containing 1,000 million tons of bauxite ore (or nearly 60% of its known reserves) to prospective entrepreneurs through the state-owned OMC on condition that they will set up aluminium industries in Orissa.

Table 1. G7 Investments in Orissa in the last five years

Country	Investment in Orissa
USA	US$232 million toward the Ib Valley coal-fired power plant (an additional US$75 million is forthcoming)
France	US$607 million toward the construction of an aluminium smelting complex, NALCO, the Kaniha and Ib Valley coal-fired power plants, and the Ananta coal mine.
Japan	US$125 million in coal mining expansion
UK	US$40 million in the upgrading of the Hirakud Dam and an additional $75 million toward the privatisation of the power sector

Source: Government of Orissa (2004).

Map 1. Location of major mines and allied industries in Orissa

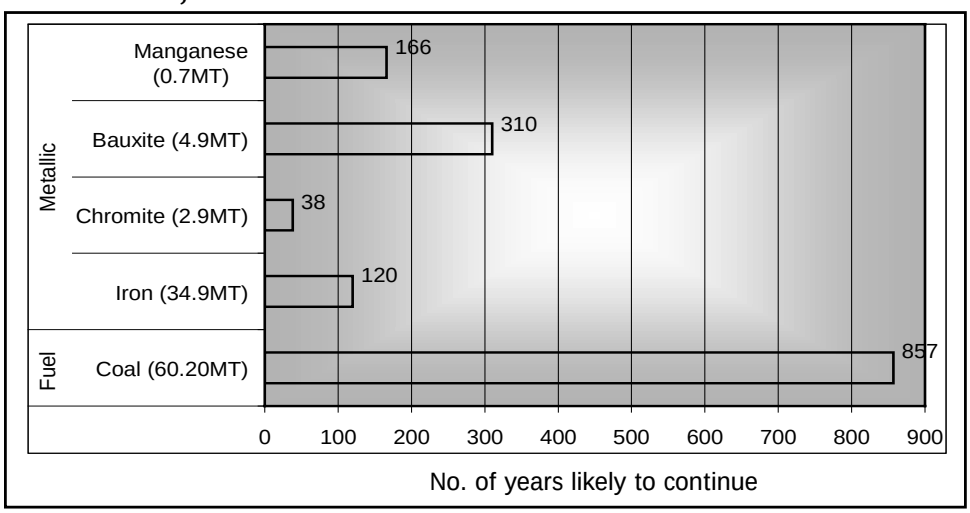


Source: Government of India (2002), Government of Orissa (various years) and Singa 1999.

Box 1. Mineral-wise Orissa can be divided into four parts

- Central Orissa on the bank of river Mahanadi, which includes Angul, Jharsuguda and Sundergarh district, is known as the coal belt, where about 1/3 of the coal deposit of the country is located.
- The Sukinda Valley, Keonjhar district, part of Maurbhanj and part of Sundargarh are known as the chrome, iron ore and manganese belt.
- Southwest Orissa, which includes Koraput, Rayagada, Bolangir and Kalahandi, is know as the Bauxite Belt, having about 70% of the bauxite deposit of the country.
- Coastal Orissa has deposits of mineral sands and rare earth.

Figure 6. Life of major mineral resources at present rate of extraction, Orissa



Source: Department of Mining and Geology, Government of Orissa (2005).

It is important to point out that investments in mining are unsustainable since minerals are exhaustible. Once the mineral ore is exhausted, the companies leave. At the current rate of exploitation, Orissa's mineral reserves are conservatively expected to last as follows: chromite, 38 years; iron ore, 120 years; graphite, 153 years; manganese, 166 years; bauxite, 310 years; and coal, 857 years.

Summary of Part II

The Government of Orissa has actively promoted transnational and national

exploitation of the state's mineral resources based on the stated objectives of development and employment generation. The production and export of minerals have indeed contributed to state revenues that are needed to meet the state deficit as well as to service the state debt. On the surface, the state's trajectory of increased dependence on mineral production and allied activities may be justifiable. But is it sustainable? Does the revenue from mining and allied activities take into account their profound social and environmental costs that constitute a social and ecological debt to the people of Orissa? The next part of the report attempts to respond to these questions.

III. MINING AND ECOLOGICAL AND SOCIAL DEBT FROM THE PERSPECTIVE OF ORISSA

Orissa ecological and social profile

Orissa, one of the states on the eastern coast of India, comprises five percent of India's landmass; and with 36.71 million people, accounts for four percent of the population of the country. While more than two-thirds of the area is comprised of hilly forest, it has a coastline of 480 km.

The state's estimated fresh water resources are one of the highest in the country (11% of India's total surface water resource or 663,774 hectares). Orissa has 3,678 inland fishing villages with 122,553 households and a population of 751,356. About 50 percent of the population in these villages are engaged in fishing and ancillary activities.

Nearly 85 percent of Orissa's population lives in the rural areas and depends mostly on agriculture for livelihood. Officially, only about 34 percent of the irrigable land benefits from irrigation facilities. Hence, in hill forested tracts, rain-fed agriculture and forest collection are the primary sources of livelihood.

Of the total families who own land, 82 percent are marginal farmers (possessing less than one hectare of land) or small farmers (one to two hectares). Among the Dalits[3], landholding families constitute 91 percent and among the Adivasis, 80 percent. At the state level, 47 percent of families live below the poverty line (or earns an annual income of less than Rs.11,000).

Given this profile, it does not require any academic discussion or complex

analysis to establish that, in the case of Orissa, most of the communities till today have earned their livelihood based on the multiple products and services available in the state's ecological niches.

Orissa's environment and social fabric are severely threatened by large-scale mining and industrial activities that are expected to further intensify in coming years. Presently, the state emits one percent of the world's greenhouse gases. By 2008, this figure is expected to rise to five percent at the current rate of development. Besides causing drastic climatic changes and a decline in wildlife habitats, mining in Orissa has displaced and undermined the way of life of thousands of Adivasis. It deprives future generations of the benefits of the state's mineral resources. By allowing mining groups to exhaust resources in a few generations, the government is violating the principle of inter-generational equity laid down by the Supreme Court.

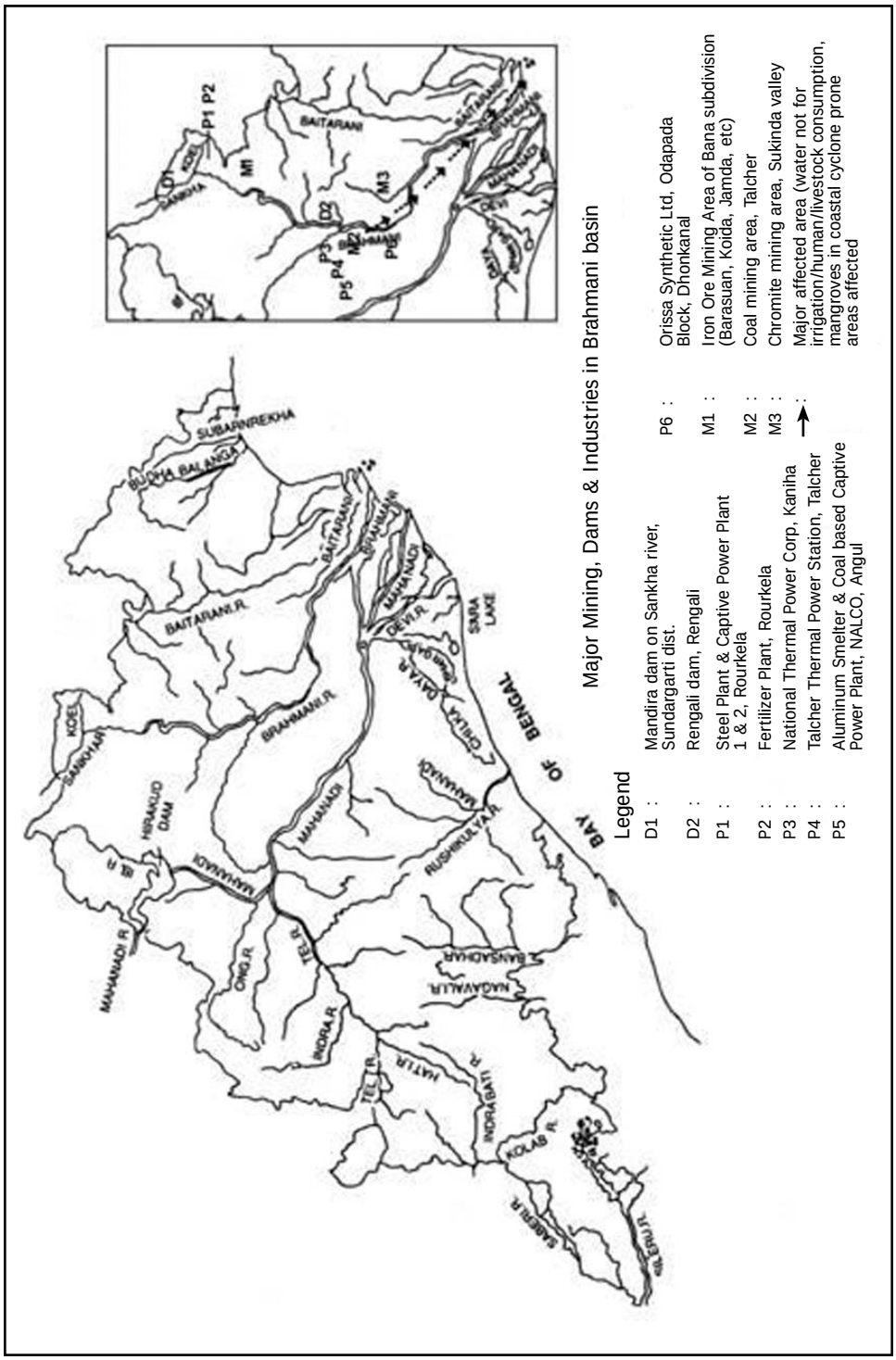
The ecological debt

Pollution of the Bramhani River

The Bramhani, with a catchment area of 39,000 km^2 and a length of 701 km, is the second largest river of Orissa. As a result of large-scale mining operations, it is also one of the most polluted rivers in the state and one of the top ten most polluted rivers in the country. At the upper reach, the river is polluted by the effluents of Rourkela Steel Plant, Rourkela Fertilizer Plant and the iron ore-mining industries of the Bonai subdivision. The pollution level further increases at the middle section due to drainage from the coal belts and industrial wastes from the Angul-Talcher region mainly carried by its tributary, Nandira, that travels through the industrial region of Angul-Talcher. Downstream, the Bramhani River is polluted by mine discharges from the Sukinda belt and industrial activities in Duburi. Damasala River, one of the major tributaries downstream, carries toxic effluents from chromium mining (mainly hexavalent chromium) in the Sukinda Valley into the Brahmani. To make matters worse, floodwater has been reduced in the Bramhani River following the construction of the Rengali Dam which caters to the needs of the industrial belt.

The pollution of the Bramhani River has tremendous implications for the livelihood of fishermen and farmers as well as the health of communities living along the river, as will be further discussed in the section on mining and social debt.

Map 2. Major mining industries in the Bramhani River Basin



Source: Government of Orissa (various years) and Sinha (1999).

Climate change and natural disasters

According to a study by the Institute for Policy Studies (Wysham, 2003), greenhouse gas emissions from Orissa make up nearly one percent of global emissions. The study further points out that Orissa's industries and coal-fired power plants will be emitting 164 million tons of carbon dioxide annually by the year 2005, or the equivalent of about three percent of the projected growth in man-made greenhouse gases anticipated globally over the next decade. Moreover, it is estimated that Orissa's aluminium industries will release toxic and potent global warming agents, tetrafluorothemethane and hexhafluoroethane, equivalent to eight million tons of carbon dioxide emissions, which, because they can stay in the atmosphere for 10,000 years, will contribute to a "perpetual change" in the earth's atmosphere. Orissa's aluminium industry also draws power from multi-purpose dam projects (e.g. Rengali, Upper Kolab, Machkund and Balimela) that are now known to be sources of greenhouse gas emissions.

Box 2. Some important facts about Orissa, bauxite mining, the aluminium industry and climate change

- The percentage of coal produced in Orissa and consumed in alumina companies: 33 %.
- The percentage of Indian bauxite resources located in Orissa: 50%.
- The percentage of world's bauxite products in Orissa: 10%.
- In 1995, 2,466 megawatts of coal-fired power was produced in Orissa and 1/3 of it was consumed by two aluminium smelters: NALCO and INDALCO.
- Aluminium smelters in Orissa consume power equivalent to 515,000 households in the United State for one year.
- Ongoing smelter construction by NALCO and others will increase captive coal-fired power consumption to 1,680 megawatts.

Because of accelerated climate change, which, in turn, is induced by greenhouse gas emissions from aluminium and other industries, Orissa has been frequently haunted by natural disasters, including cyclones, tornados, storm surges, heat waves and droughts that are a regular feature of the Western districts of the state. In 1998, a heat wave resulted in the deaths of 2,000 people. In 1999, a cyclone of unprecedented severity ripped through coastal Orissa, leaving 10,000 people dead and causing extensive damage to houses, livestock, crops, infrastructure, tree cover and communication systems. Droughts occurred in 2000 and 2002, followed by periods of massive flooding in 2001 and 2003.

Some of the adverse effects of drought, especially in the Western districts, are migration and increased indebtedness.

The social debt

Dispossession of land and displacement – a development phenomenon

In Orissa, the entry of government-supported mining companies and other huge industries and the construction of multi-purpose power projects have meant the uprooting of thousands of people, many of them Adivasis or indigenous tribal peoples, Dalits and other marginalised communities who have been historically dispossessed of their lands. A study points out that in four districts of Orissa, namely Dhenkanal, Ganjam, Koraput and Phulbani, over half of Adivasi land was lost to non-Adivasis over a 25-30 year period. Another study (Fernandes and Raj, 1993, cited in Sainath, 1996) contends that in Koraput district alone, over 100,000 Adivasis were dispossessed of their land, including 1.6 lakh[7] hectares of forest on which they had depended for their survival. More than six percent of the district population, a majority of them adivasi, were displaced.

The absence of any meaningful rehabilitation contributed to land alienation. The Government of Orissa established transmigration schemes for displaced people that essentially eroded their cultures and facilitated their assimilation into

Displaced people living in slum colonies.

mainstream consumer-oriented society through industry-friendly education and skills training.

Loss of sources of livelihood and sustenance

For Adivasis in the districts of Orissa and other people who have relied on the forest for centuries, the takeover of their lands for mining, industrial and power generation-related purposes effectively deprived them of their sources of livelihood. Adivasis have traditionally depended on non-wood forest produce for their sustenance: more than 50 percent of their food had come from the forest before their displacement.

The contamination of Orissa's water sources, particularly the Brahmani River, due to effluents coming from mining and other industrial projects, also had profound impacts on the livelihood of non-Adivasis. About 500,000 people, mainly fishermen and farmers, comprising 1,800 villages were affected. The Brahmani River is the prime source of irrigation as well as soil nutrition for thousands of farms running through the Angul, Dhenkanal, Jajpur and Bhadrak districts of Orissa. There are reports of damage to seasonal crops and fruit-bearing trees which came in contact with this polluted water. There are even reports of pests becoming resistant to pesticides after coming in contact with the water. In the Damsala Basin, harvested paddy and leafy vegetables were found to contain chrome poison. Sugarcane and paddy cultivation have decreased considerably due to the polluted water. About 40 years ago, the Bramhani was the lifeline for the inland fishermen of Angul, Dhenkanal, Jajpur and Bhadrak. However, mining and industrial effluents have adversely affected the breeding and species composition of fishes, turning fishermen who have lost their livelihoods into daily wage earners or migrants. The pollution of the rivers also affects fish breeding in the mouth of the region and the mangrove forests in the estuarine region.

Increase of employment through mining: a myth

One of the government's stated reasons for opening up the mining sector is to generate employment. Reality, however, provides a different picture. From 1990-91 to 2000-01, the output of minerals went up by 121 percent. However, the number of mines in the state of Orissa decreased by 14 percent, mining areas declined by 11 percent, and the number of workers directly employed fell by 20 percent. Except in the case of coal and bauxite, the number of workers employed in the mining of major minerals has fallen substantially, while production has gone up, presumably due to increased mechanisation.

Table 2. Production and employment by mineral, Orissa, 1990-91/2000-01

Mineral	Growth in Production	Growth in Mining Area	Growth in employment
Iron ore	71%	(11%)	(17%)
Manganese	0%	16%	(49%)
Chromite	106%	(21%)	(20%)
Bauxite	57%	(1%)	49%
Coal	194%	38%	8%
Graphite	42%	(44%)	(61%)
Limestone	(67%)	(70%)	(96%)

Source: Government of Orissa (various years).

Table 3. Mining area and employment by region, Orissa, 1997-98

Region	Growth in Mining Area	Growth in Employment
Angul	45%	(6%)
Bolangir	9%	(31%)
Cuttack	8.5%	0%
Jharsuguda	5%	3%
Kalahandi	3283%	200%
Keonjhar	(6%)	(28%)
Mayurbhanj	(4%)	(55%)
Nuapada	39%	(27%)
Sundargarh	1%	(11%)

Source: Government of Orissa (various years).

Thus, while mining has destroyed the livelihood of many communities who eke out their living through rain-fed farming or forest collection, it has failed to provide alternative employment. For every one hectare of land that is mined, only 1.6 workers are employed.

It is important to point out that while employment rates overall have decreased, the number of informal wage labourers in mining areas has been increasing. Wage labourers start at an early age (perhaps 15 years old), endure hard work, accident-prone workplaces and sub-human living conditions (i.e. slums). Ridden with health problems, their average life span is between 40 and 45 years (less than both the national and state averages). The provision of minimum

wages, gender-equitable wages, housing, health, and education services to wage labourers are simply avoided.

Heightened poverty

Perhaps not surprisingly, the districts of Orissa that are the most mined, namely, Jajpur, Kendujhar, Dhenknal, Angul, Jharsuguda, Sundergarh, Mayurbhanja, Koraput, are also the poorest districts in the state. Against the state average of 78 percent, families living below the poverty line (BPL) in the most mined districts range from 49 to 85 percent. Adivasi and Dalit families in the most mined districts constitute 44 to 82 percent of the total BPL families (Orissa Development Report).

Adverse effects on health

The impact of mining on the health of communities is dramatic. According to community organisers, the average life expectancy of Orissa's peoples is below the national average in mining areas. Mining workers usually work for no more than 15 to 20 years. The infant morality rate is also higher than in other non-mining areas. Lack of safe drinking water and housing and long working hours (10 to 12 hours) per day impose additional health strains on women who have dual responsibilities in the household and workplace.

In particular, the polluted Brahmani River and its tributaries have made skin diseases, malaria, tooth diseases, eye infection, fever, jaundice, intestinal and stomach problems very common in the areas of Kamakhyanagar, Parajanga, Dhenkanal Sadar, Bhuban, and the Gondia block of the Dhenkanal district as well as in Damasala, Rasulpur, Bari, Sukinda, Danagadi, and the Binjharpur blocks of Jajpur. Reportedly, 85 percent of patients in government dispensaries in this region suffer from stomach and skin diseases.

Mining has resulted in the destruction of forests in Gadhamardan in the Keonjhar district, Similipal and the Sighum belt and, therefore, the loss of precious herbal plants that are used by indigenous peoples as medicine and, relatedly, the loss of traditional health practices of indigenous peoples that are strong linked to the forests. Until recently, in every Adivasi village there would be a Baida (traditional Ayurvedic doctor) providing traditional treatments. But as the plants decrease, Baidas are slowly shifting to other occupations.

Health services provided by public sector companies have been limited to regular company employees only. Many private mining companies are violating health obligations to workers and local communities. Unorganised contract workers, especially women and child labourers, have no option but to depend

Box 3. Documented impacts of mining on health

- Chromium and hexavalent chromium, which has contaminated Orissa's food chain, are toxic and exposure to either of these compounds lead to inflammation and irritation of eyes, peptic ulcers as well as marked irritation of respiratory tracts and nasal passages. Hexavalent chromium is known to adversely affect women's health in particular.
- Coal dust pollution of air, water and land affects respiratory health in coal mining areas of Orissa, which cover about two hundred villagers in six blocks of three districts. Burning of coal for refining and thermal power produces fly ash which contains florosis.
- Red mud, which is produced when bauxite is processed into alumina and which contains iron oxides, silica, zinc, phosphorus, nickel, among others, causes skin diseases.
- A number of studies and surveys have revealed that mining workers and communities living around mining areas are exposed to silica.
- There is also more incidence of tuberculosis among the mineworkers of Orissa.

on government-run public health centres, the conditions of which are notoriously poor due to the shortage of health workers and infrastructures facilities.

Mining-related skin diseases.

Summary of Part III

Mining and related industries, including power projects – that are being promoted by the Indian Government as well as the Government of Orissa in the name of higher revenues and development – have imposed huge ecological and social burdens on the local communities in Orissa, especially on Adivasis.

Ranging from the displacement of tens of thousands of peoples from their sources of sustenance to the contamination of water sources and its adverse impacts on health, these costs comprise the general ecological debt owed to the local communities in Orissa. In the next part of the report, a closer look is

taken at the operations of a particular mining and aluminium company.

IV. NALCO'S ECOLOGICAL AND SOCIAL DEBT

NALCO's bauxite mine, alumina refinery and aluminium smelter

The National Aluminium Company Ltd. (NALCO) is an integrated multi-locational aluminium complex that was incorporated in 1981 as a public company to exploit large deposits of bauxite discovered in the Eastern Ghats in Adivasi areas (Koraput) of Orissa, which possess 310 million tons of bauxite ore, and in Northern Orissa (Angul). While bauxite ores in India are harder and have a higher stripping ratio when compared with that of its Australian counterpart, the rich content of aluminium makes Indian bauxite ore attractive for aluminium refining. NALCO's bauxite reserves of 370 million tons are expected to last 75 years at current mining rate of 4.8 million tons per annum. The low silica content of India's bauxite makes it possible for NALCO to produce high quality aluminium at low cost.

The authorised capital of the company is Rs.1300 million. The original project cost, particularly the construction of the refinery and the Talcher Super Thermal Power Project was partly financed by external commercial borrowings from a consortium of international bankers, French credit facilities and partly by equity subscribed by Government of India. The entire foreign currency loan, totalling US$1.755 billion, has been repaid as of 30 September 1998 and NALCO claims at present that it is a "zero debt-company" except for debt created out of equity.

Technical know-how and basic engineering for the project were supplied by AP International of France. Since 1985, NALCO operates a fully mechanised open cast bauxite mine in Panchpatmali, with a capacity of 4.8 million tons per annum. It feeds ore to the alumina refinery in Damanjodi, which churns out alumina, the fine white powder that goes into the making of aluminium metal at the aluminium smelter in Angul.

Built in 1986, the refinery has three parallel streams with a capacity of 525,000 tons per annum each, producing 886,000 tons of alumina powder in 1999-2000 for the company's smelter in Angul, out of which 479,620 tons were exported to overseas markets, mainly France, through the Visakhapatnam Port. NALCO has completed the expansion of the aluminium refinery from

NALCO alumina refinery in Damanjodi.

NALCO power plant and refinery in Damanjodi.

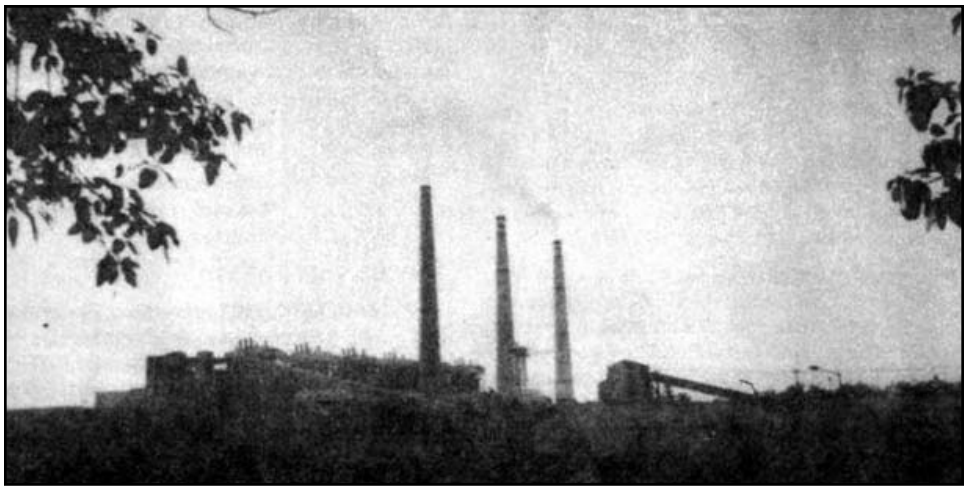
800,000 tons to 1,050,000 tons. The planned capacity level of 1,575,000 tons is expected to be reached during the current year.

The refinery has a captive power plant with a capacity of 55.5 megawatts as against its actual need of 32 megawatts. For captive power, coal is mined elsewhere in Orissa (Dhenkanal district), displacing thousands of people and causing severe environmental degradation. When NALCO was first established, power was derived from a major hydroelectric power project which submerged 57 villages and displaced more than 50,000 people. The refinery's "red mud" and ash ponds were earlier large land tracts used by indigenous peoples for subsistence farming. Water for the refinery plant is drawn from the Upper Kolab reservoir, which is about 8 km from the plant.

With a capacity of 345,000 tons per annum, NALCO's aluminium smelter is located at Angul in Orissa and has been in operation since early 1987. Presently, the capacity is being expanded to 460,000 tons per annum. An export-oriented rolled products unit is set to produce foil stock, can stock, cable wraps,

NALCO mining area in Panchamatli Hills, Damanjodi.

NALCO mine to refinery conveyor belt, Damanjodi.



NALCO power plant in Angul.

standard sheets, coils and other aluminium products. The smelter plant has a captive power plant containing 6 units of 120 megawatts. Coal, amounting to 3.5 millions tons per annum, is supplied to the captive power plants from the Talcher coalfield of MCL.

NALCO is one of the lowest cost producers of aluminium mainly on account of low cost captive power (access to cheap source of coal) and the high quality of its bauxite. The cost of power works out to Rs.0.5 per kilowatt-hour (US$1.1 cents) as opposed to US$2 cents per kilowatt-hour for the low cost fossil fuel-based energy producers in the Middle East.

Box 4. Aluminium: where it comes from, where it goes

Aluminium production consists of three processes: mining the bauxite, refining the bauxite to alumina, and smelting alumina to make aluminium. In India, producing a ton of aluminium needs two tons of alumina and each ton of alumina needs three tons of bauxite. These processes are inexpensive in India compared to international standards due to multiple factors: one, Indian bauxite is less impure, which translates into lower power consumption in smelting; two, Indian bauxite is close to the surface, which makes access easier and cheaper; and, three, electricity and, crucially, labour in India is relatively cheap. Mining bauxite in India costs a quarter of the world average and producing aluminium is 25-30 percent cheaper.

Huge bauxite reserves, one billion tons, were unearthed in Orissa and

contiguous parts of Andhra Pradesh in 1995, making India a fairly significant player in the bauxite and aluminium market worldwide. India currently has about three billion tons of known bauxite reserves, the fifth largest in the world, nearly 60 percent of it in Orissa. India's aluminium production – over 7 lakh tons in 2003 – already comfortably meets domestic demand and 1.65 lakh tons are currently exported. India's aluminium demand – 6 lakh tons in 2004, or 0.6 kilograms per person per year – is very low compared to 15 kilograms in Japan and 25-30 kilograms in the US and Europe.

Over half the aluminium worldwide and in the developed world is consumed by the packaging industry and transportation. Aluminium is also used hugely in defence weaponry and aircraft.

In the coming years, more Indian aluminium will be exported: it is expected to jump six-fold to a million tons a year by 2010. This will intensify with the entry of huge foreign companies to facilitate deeper links to globalised production processes and markets.

Source: PUDR (2005).

NALCO's ecological debt

Pollution of rivers and streams: "red mud" and ash pond overflows

NALCO's bauxite and alumina refinery leaves a toxic residual known as "red mud". This by-product, whether it is dumped into the mined areas or sealed ponds, percolates into the soil. Based on field visits, it was observed that the "red mud" pond of NALCO's alumina plant did not have the obligatory impervious lining preventing the "red mud" from seeping into the soil, indicating that the contamination of ground water is unavoidable. Moreover, the huge power requirements of the NALCO plant are met by coal power stations. The generated ash is dumped into a separate ash pond. Villagers have complained that whenever it rains both ponds overflow and their toxic material is spilled into their streams and rivers. Indeed, on 31 December 2000, a breach in the ash pond occurred. This is in sharp contrast to statements of the State Pollution Control Board that heavy monsoons will not lead to an overflow of the ponds (Mankame and Pabst, 2004). NALCO's bauxite refinery releases waste water into Kolab River by a drain passing through nine villages. Futhermore, fluoride dust from NALCO's aluminium smelter in Angul pollutes water bodies within a five kilometre-radius in nearby 30 villages.

NALCO "red mud" pond, Damanjodi. **NALCO ash pond, Damanjodi.**

Box 5. Accident: Breach in NALCO's ash pond

On 31 December 2000, a breakdown of NALCO's 800 acre-ash pond in Damanjodi created an "ash flood" (equivalent to a flow of 5,000 metric tons of ash) that covered the shores of Nandira. Down stream, in the district of Jajpur, five lakh people in 166 villages were affected by ash floods in the Brahmani and Kharasrota Rivers. Ten villages in Angul district were submerged, affecting a total of 773 families in 23 villages. More than 50 cattle were washed away and hundred of acres of crops were destroyed. NALCO provided minimal compensation of: Rs.30,000 per acre for lifting ash from land (a total of around Rs.1 million); Rs.46 lakh to 630 persons towards the destruction of crop and Rs.6.5 lakh towards damaged houses.

Source: Mankame and Pabst (2004).

Climate change

Bauxite refining and production of aluminium are a cause of rising temperatures because of high electricity requirements met by thermal power generation. Every ton of aluminium produced by NALCO generates 12-18 tons of carbon dioxide (equivalent to 9,000 times the normal level) and 0.5 kg of tetrafluoromethane, which is up to 9,500 times more potent than carbon dioxide as a global warming agent.

NALCO's social debt

Dispossesion of land and displacement

NALCO is located in the so-called "V Schedule" area for which land acquisition needs special permission. Through the infamous Land Acquisition Act, the company obtained around 10,000 acres of land – much more than what it

requires (more than 60 percent of the land has not been utilised in the last 25 years). Under the notion of public purpose, lands of the indigenous peoples were acquired for a throw of the market price. According to one estimate, around one lakh adivasis were deprived of their land, including 400,000 acres of forest which they relied on for their livelihood and sustenance. The villages in the surrounding area had depended on the forest for many of their needs including food, especially during lean seasons. More than 70 villages had used the area for hygienic needs and the collection of roof and fuel materials.

Box 6. NALCO's land acquisition

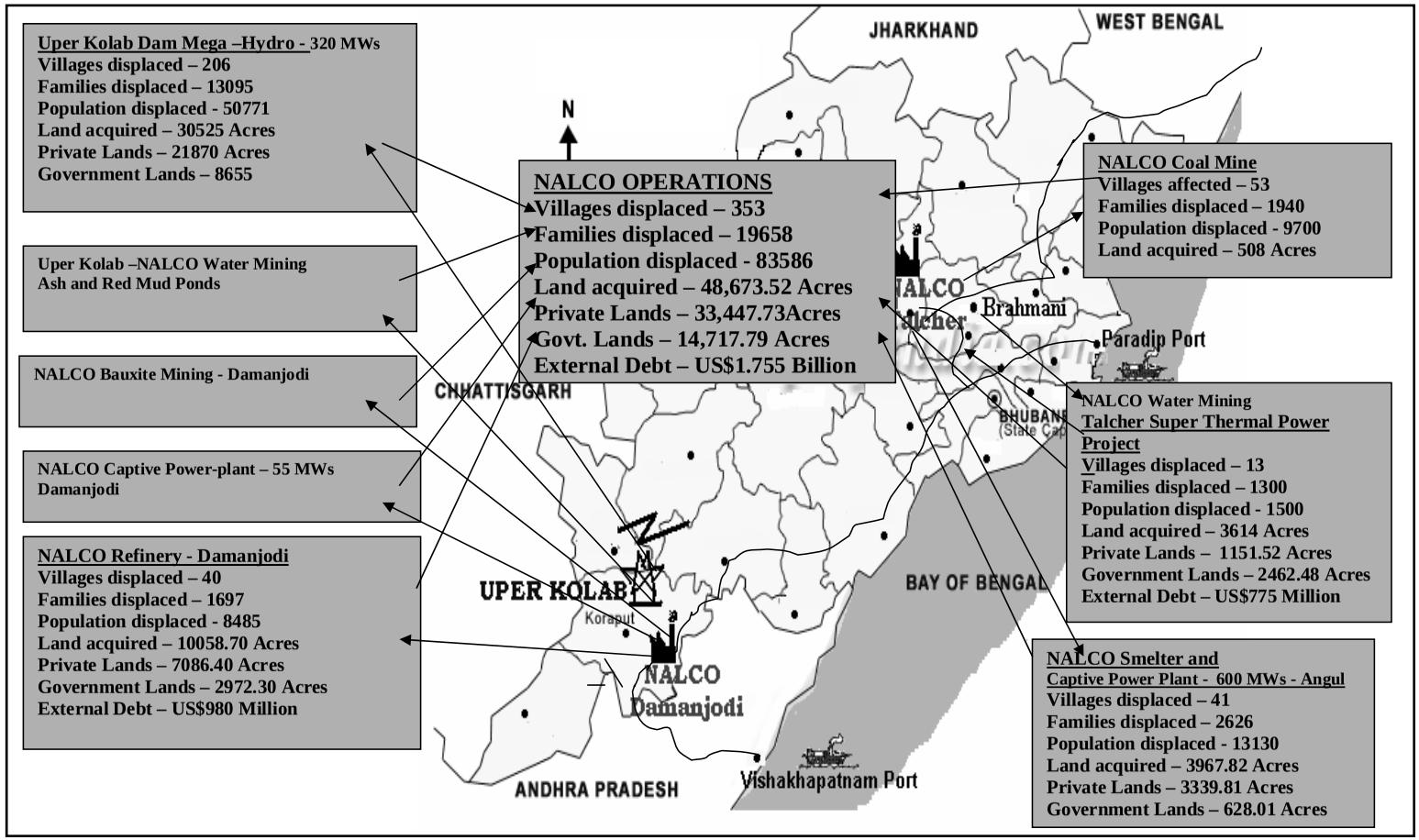
> To set up the mines and refinery complex, the company had acquired 10,059 acres of land, out of which 4,352 acres were private lands. Out of the 10,059 acres of land acquired, 427 acres were for mines, 2,639 acres for a township and 6,993 acres for the plants. 41 percent were government lands for which no compensation was paid; another 41 percent were agricultural lands.

While no exact data exists, it is estimated that NALCO's overall operations since its establishment in Koraput district in 1981 have displaced some 353 villages comprised of 19,658 households or 83,586 people. Dam and power projects related to the mining and aluminium complex, namely the Upper Kolab Dam and the Talcher Super Thermal Power Project, displaced 13,095 and 1,300 families, respectively, or some 52,271 persons, more than 50 percent of them belonged to scheduled tribes or castes. The construction of NALCO's refinery in Damanjodi and smelter in Angul directly affected 81 villages: 4,323 families (or around 21,625 people) were displaced. Finally, the company's coalmines resulted in the dislocation of around 53 villages – a total of 1,940 families or 9,700 people.

NALCO issued the first notification for land take over in Damanjodi on 12 August 1981 in the Orissa Gazette Extraordinary. In many cases there was a time lag of five to ten years between the first announcement and the final acquisition of land. A total of Rs.148,73,474.52 was paid as compensation for patta land alone. No compensation was paid for community property resources (CPR) or government and village land, upon which landless villages depended for subsistence farming and other needs.

Initially, displaced people agitated against the project itself. However, NALCO had promised the displaced villagers decent jobs and good relocation, including money for their land. Slowly the displaced people settled down to demanding

Map 3. NALCO Impact Assessment Map, Orissa



for the promised reparations. The agitation persisted for several months until some of the demands were met. The project authorities compromised with the villages that were most active in the agitation: these communities were shifted to a new area. Without any agitation, displaced people would have not received any compensation.

Out of 597 families that were initially ousted from Damanjodi, 441 were relocated in the Analabadi colony, for which Analabadi villagers were deprived of their land. Some 352 families were offered one job each, especially in low paid positions (e.g. drivers, diggers). Of these, 35 were Dalits; 149, Adivasis; and 168, other castes. Only eight of the employees were women. Many of these employees eventually lost their jobs in NALCO in a couple of years due to lack of training. Overall, every family consisting of 5-15 members received Rs.3000/acre, one house consisting of one and a half rooms, but no farmland.

At the rehabilitation colony, the supply of drinking water was inadequate: NALCO had only provided three wells for more than 500 families. People built two more wells out of their own resources. They complained that in the dry season the water situation would worsen, as the water in the wells would dry up. Before their displacement they had used the spring water in their villages freely, which was enough to satisfy their daily requirements for both domestic and agricultural purposes.

Threatened sacred grove in Damanjodi.

There is only a primary school in the rehabilitation colony. To continue their education, students had to travel long distances to other towns. Most of the displaced families living in the colony could not afford the costs involved in the long distance travels of their children, impairing their children's chances of securing good jobs in the future. Not only, therefore, have displaced people lost their lands and homes, neither have they received just compensation in terms of decent jobs, adequate shelter, facilities and human resource development measures from NALCO.

Finally, the resettlement area did not provide for traditional adivasi places of religious worship (sacred groves) and ancestral links (e.g. cremation or burial grounds) nor consider the needs of Adivasi councils, which were disrupted during the relocation. As a consequence, the Adivasi structural support based on their traditional culture is disappearing.

Needless to say, during the entire displacement and rehabilitation process, NALCO did not consult the affected people and communities; much less involve them in decision-making processes.

Loss of sources of livelihood and sustenance

Even as displaced people, primarily Adivasis, were not justly compensated for the loss of their lands, including community property resources for which no recompense was paid at all, the forest, upon which people fell back for non-wood forest produce that sustained them especially during lean months, has dwindled. Although NALCO has an environmental regeneration scheme involving the planting of thousands of trees (particularly of commercial species), these were no longer made accessible to the people: fences were built around them.

In the traditional village society, castes which did not own land were also an integral part of the rural socio-economic system, providing a variety of services to the community, and relying on community property resources for their subsistence needs. These factors were not taken into consideration by NALCO in calculating compensation. Impoverishment of displaced people was an obvious consequence.

To make matters worse, according to the local communities in Orissa that were visited as part of the study, the pollution generated by NALCO's refineries and smelters had the following negative consequences on agriculture, the major source of livelihood, as follows:

- Drop in harvest in 300 acres of cultivable land due to the effluents;

- Germination problem in millets, ginger, and tumeric;
- Damage to stored potato, turmeric, ginger, arum, among others, due to increase in temperature;
- Loss of cattle and goats due to pollution-induced dysentery;
- Damage in 800 acres of paddy crops and 500 acres of paddy crops in Tulasipal and Languliabedha due to poisonous fluoride leaks on 29 October 1999 and 13 September 2004, respectively; and
- Damage to teak, mango, eucalyptus and other crops in Kulada, Gadarkhai, Tulasipal, and Banda due to a gas leak on 02 August 2005.

Adverse effects on health

Local communities in Orissa have complained that NALCO's ash pond is creating a damp environment that constitutes a breeding ground for mosquitoes: many villagers in Koipasi suffer from malaria. It has also been found that villagers living in the vicinity of NALCO's aluminium smelter in Angul, Orissa suffer from brittle bones, tooth and gum diseases, lumps of dead skin, and other symptoms of fluorosis. Before the establishment of the smelter plant, flourosis did not occur in these areas.

Box 8. Impact on women

Adivasi women were disproportionately affected by the social and environmental burdens wrought by NALCO's mining and mining-related activities.

For one, women are more dependent on non-wood forest produce than men since it is their responsibility to ensure the regular supply of food, fodder, fuel and water for their families. Many women have reported an increase in domestic work hours since the disappearance of the forest and the contamination of water sources resulting from NALCO's activities have made it more difficult and time-consuming for women to perform these tasks. The takeover of Adivasi lands by the NALCO project also meant a decrease in women's (already limited) cash incomes since women were no longer able to sell extra farm produce in the markets, thereby increasing their economic dependence on men and undermining their social status

In the resettlement areas provided by NALCO, displaced women were unable to get any skilled jobs because of their lower literacy rates and because of continued discrimination against them in the formal labour market – both of which are rooted in patriarchal middle-class and upper caste views that women's role is limited to the home. While

NALCO initially promised one job per displaced family, these were offered mainly to men. As a result, women found themselves in very low-paid and insecure jobs in the informal economy.

The absence of sanitation and hygiene facilities in resettlement areas also caused problems mainly for women, who, to begin with require greater privacy, than men.

Finally, there are reports of increased incidence of violence against women as men attempt to cope with the tension and disruption caused by displacement and a new economy through heightened alcohol intake.

Overall, Advisasi women have lost their independence and dignity since their land and forests were occupied by NALCO. The change of culture in the resettlement areas only legitimises the denial of economic opportunities for women, forcing them to remain at home and/or restricting their work to unskilled, very poorly compensated jobs. It is not unknown for advisasi women to starve themselves in order to feed the rest of their families.

Source: MMP (2003).

Summary of Part IV

NALCO, one of the biggest bauxite mining and aluminium companies in Orissa, is a multi-awarded export-oriented company that been hailed as bringing development to the region. However, closer study has revealed that NALCO broke many of its promises to the local communities that have been affected by its activities, taking away their lands and forest, effectively destroying their sources of livelihood, and undermining their overall health and well-being. It can be said, therefore, that NALCO owes a tremendous ecological debt particularly to the tens of thousands of people who suffered total displacement as a result of the company's operations.

V. FORTHCOMING BAUXITE MINING AND REFINERY PROJECTS IN ORISSA

Aside from NALCO, there are forthcoming bauxite mining and refinery projects being planned in Orissa such as the Vedanta, Sterlite and UAIL projects.

The Vedanta project

Vedanta Aluminium Limited (VAL), a wholly owned subsidiary of London-based Vedanta, is putting up a one million ton refinery at Langigarh in Kalahandi district. On 07 June 2003, VAL had entered in to a memorandum of understanding with the Government of Orissa to build an aluminium complex, comprising an aluminium refinery plant, a three metric ton bauxite mining facility and a 75-megawatt capacity power plant. Mining will be conducted over a forest area of 672,018 hectares situated in the Niyamgiri Reserve Forest and protected forest of the Rayagada Forest Division. The project would also cover over 26 hectares of village forests.

According to a report from the Orissa-based Environmental Protection Group, bauxite deposits are situated in the upper portion of hills in Niyamgiri that effectively act as overhead aquifers. Mining of bauxite in this area will therefore destroy the aquifers. Moreover, the Dongaria Kondhs, one of Orissa's most distinctive and traditional tribes, live in 90 small villages that dot the Niyamgiri range. The project will spell doom for these tribes whose lands fall under the aluminium plant area.

The Sterlite project

The Sterlite project, which falls in a "Schedule V" area, runs counter to the spirit of the Supreme Court ruling that not only prohibits sale of land, government or private, in Schedule V areas to non-Adivasis, but also bars mining leases or prospecting licenses to mining companies. However, the Government of Orissa performed a legal sleight of hand by arguing that the transfer of land for development activities, establishment of industries, and operation of mining leases in these areas would bring about encouraging socio-economic development of the adivasi population.

Sterlite's proposed mining site holds some of Orissa's most biodiverse forests with an impressive crown density of over 40 percent. It is home to the endangered Indian tiger apart from leopards, sambars, bisons, and a host of species. Streams and springs sprout on Niyamgiri's Northern ridges, giving birth to Vamsadhara, the only river of the region. There is an urgent need for conservation here (Devarajan, 2004).

The UAIL project

The Paroja Kondha tribe of Adivasis, living in the Kashipur block of Rayagada

District in Southwest Orissa, are being asked to give up their land to make way for mining of bauxite by Utkal Aluminium International Limited (UAIL). The Government of Orissa entered into a contract with the private company, which today is a consortium of Alcan of Canada and Hindalco of India, in 1993. The venture is 100 percent export oriented. UAIL plans to mine bauxite from the Baphlimali hill in the area using fully mechanized bauxite-mining techniques to recover 195.73 million tons of bauxite.

Local communities in Kashipur stand to gain little tangible benefits: the project will create at most 50 jobs. Cash compensation will be provided to those who are defined as "project affected": 10 cents of land and a house of 300 square feet. Many of the villages which will lose 75 percent of cultivable land will not even be considered displaced, rendering the villagers virtually landless. The proposed compensation is insufficient for the loss of livelihood and the manifold effects on ecology. The conduct of a detailed and independent economic, social and environmental assessment of the project (TARU, 1996) shows that the requirements of 2,610 hectares of land for the factory wastage dump will cripple the livelihood of most settlements now residing in the valley.

At least 11 villages downstream to the refinery, with a total population of more than 2,000 people will be affected by the project's "red mud" discharge" (Das Vidya, 2001). The project is also expected to generate 1000 tons of ash per day that will be dumped into an ash pond, which, according to the environmental clearance given by the government, the company does not have to take care of for the first five years. It is feared that the overburden will be dumped on the slopes of the mined area, contaminating the cultivable lands and local streams in the area.

According to Das Vidya (2001), the state of Orissa will receive royalties of about Rs.42 per ton of bauxite or Rs.12.6 million a year and some returns in terms of taxes from the project. However, the state has also taken out a loan of more than Rs.300 million for the construction of a railway linking the bauxite route to the port, and another loan of more than Rs.900 million from the World Bank to provide power to project.

Summary of Part V

Many more companies are interested in setting up mining and related operations in Orissa. Environmental impact assessment studies for Tata-INDAL have yet to be completed. Other companies in the mining race such as Larsen and Toubro, Vedanta, Aditya Birla and Sterlite, have already acquired

leases for vast areas of land in Rayagada and neighbouring Kalahandi and Koraput districts, and are awaiting authorisation from the Ministry of Forest and Environment. However, if one clear lesson can be drawn from Orissa's experience with NALCO, it is this: should additional mining and industrial projects push through, these will surely increase the ecological debt owed to the local communities in Orissa.

VI. CONCLUSION

Synthesis

After India's independence in 1947, Orissa became a direct target for economic expansion through the exploitation of natural resources by corporate mining activites and hydropower projects. The principal actors in the ensuing large-scale destruction of ecological space in Orissa include national corporations primarily NALCO, TNCs such as AP International of France, Norsk Hydro of Norway, Alcan of Canada, BHP of Australia, Alu Suisse of Switzerland, Rio Tinto and Alcoa of America, G7 countries that are major consumers of aluminium, and the World Bank. They are the debtors of an ecological debt owed to the people of Orissa.

In pursuit of growth based on a neoliberal development paradigm in an era of heightened economic globalisation, India's central and state government policies have favoured increased foreign investment in mining and related industries, and have relied significantly on the exploitation of domestic mineral resources for export – at the expense of the environment and local communities. In Orissa, laws that exist specifically to protect Adivasi people's livelihood and land are being constantly flouted. There have also been many recent actions to relax such protective legislation (e.g. amendment to the Land Acquisition Act in 1998, amendment to the V Schedule in 2001, amendment to the Land Transfer Act in 2004, and amendment to the Forest Bill in 2005). Apart from these efforts, the central and state governments have also framed policies on water, agriculture, education, health, and employment in order to facilitate corporate activity in mining and other industries. In the case of Orissa, the state has signed over 35 memoranda of understanding committing the state's approximately 40,000 lakh tons of iron ore reserves for mining: what was meant to be exploited over a period of 200-300 years shall now be used within a quarter of a century. Moreover, the state has incurred a massive amount of debt for the construction of mining-related infrastructure.

Following the Climate Convention protocol signed by most of the world's governments at the 1992 Earth Summit in Rio de Janeiro, Brazil, the developing countries of the Southern hemisphere were given lead time to "develop their economies" before they reduced greenhouse gas emissions contributing to global warming, while rich countries were given notice that their emissions would soon have to be reduced dramatically. The latter responded by funnelling massive quantities of capital, via their corporations, governments and the World Bank, into fossil fuel-driven power plants in the South, and by moving energy-intensive industries to the South, including India and the state of Orissa in particular. Despite India's commitment at the Climate Convention, greenhouse gas emissions in Orissa have skyrocketed: Orissa's industries and coal-fired power plants currently emits 164 million tons of carbon dioxide.

As a result of these developments, mining activities in Orissa have severed at least 80,000 people, mainly Adivasis, from their land in the name of development and progress; and new mining projects are expected to dislocate at least another 100,000 people. In general, the process of displacement reinforces and aggravates societal divides based on class, caste/tribe and sex. Marginalised people, whose only wealth might be a small plot of land must now endure global warming-induced fluctuations in rainfall, ash overburden and effluents that harm their agricultural lands and destroy their produce. They are forced to live with a scarcity of water as rivers are diverted for industrial use and are rendered unusable by pollution. They are no longer able to fall back on the forest that looked after their subsistence needs during lean months. The lands and forest are closely interwoven with their Adivasi inhabitants' livelihood practices, culture, wisdom, sense of dignity and sovereignty. As these are taken over by corporations with the aid of government, the Adivasi way of life is in danger of extinction. All of these constitute an ecological debt owed to the people of Orissa, especially the Adivasis.

Resistance

Notwithstanding the onslaught on their environment, livelihood, health and culture, it is important to note that the people of Orissa are not merely victims. After many years of experience with NALCO, they have realised the direct and indirect consequences of bauxite mining and aluminium production. Therefore, in the last two decades, Orissa has witnessed many struggles to protect life and livelihood (for example, in the towns of Baliapal, Gandhamardan, Chilika, Indravati, Gopalpur, Kotagarh, Lakhari, Kashipur, Lanjigarh, and Kalinganagar). Common to all these struggles is that a large section of small peasants, Adivasis, Dalits and women were involved in

demanding for sustainable living and an end to the sustainable practices of mining corporations. Mobilisation has helped to stall future large-scale mining initiatives by both the state and corporations and clearly depict the ongoing conflict over control of resources between communities and corporations.

While these struggles are legitimate movements, the government has nevertheless termed these "anti-development" and "anti-national". Protestors have been imprisoned or killed. Following a recent protest, more than 500 people were arrested and warrants were served to another 300. The state government also initiated a deregistration process against four local non-government organisations that are seen to be supporting Adivasi struggles, namely Agragamee, Lakshman Nayak Society for Rural Development, Anukaran and the Integrated Rural Development of Weaker Sections in India. On 2 January 2006, police opened fire on hundreds of Adivasis demonstrating against mining projects in Kalinganagar: 12 Adivasis were killed and about thirty were seriously injured. The movements believe that the police were acting on the instructions of mining corporations with the unofficial backing of government.

Adivasi rally in Bhubaneswar, capital of Orissa, for rights over land, water and forest.

What kind of development path?

Government actions against so-called "anti-development" protests against mining as well as their policies in the mining and other sectors have increasingly shown that "development" is not just a concept any more. Under the current neoliberal paradigm, it has become an ideological garb to disguise the appropriation of people's resources by private capital, thereby increasing ecological debt owed to people. Thus there is a need to examine every single development project, which consumes tremendous resources, through environmental and social lens, to ensure that genuine development accrues to people.

Martyrs of Kalinga Nagar massacre on 02-03 January 2006: 12 Adivasis were killed by the police.

Moreover, as the people of Orissa continue to organise themselves to resist mining and mining-related industries in their communities, it is important to ask a fundamental question: what development trajectory or paradigm will benefit the people?

Box 8. Ecological debt: a chicken and egg story

A few decades back, moneylenders in Koraput, Orissa used to exploit the Adivasis. They used to employ a number of tricks. For example, one adivasi might go for a loan of a chicken to the moneylender to treat a guest. The moneylender would decline to give a chicken but would offer an egg instead in the presence of no witnesses.

A few months after, the moneylender might go to the Adivasi while he was busy in his field and demand a few hundred rupees against the egg, urgently, and even ask for the land as an alternative. The adivasi would be crestfallen, but the moneylender would explain: if you had not taken the egg, I would have hatched it, it would have given many eggs, which would have given many more chickens, and thus many more eggs. Just imagine the cost! Since you are good person, I'm not asking for the full cost.

If the communities were left with their own eggs, to hatch as they please, they could indeed create more chickens, and more eggs. If the communities could be given back their resources to utilize on their

own terms, they could sustain themselves – as they have done for thousands of years.

At the moment, however, corporations are killing all the chickens, and eating all the eggs. The long-term ecological debt is incalculable. But if we do not try, the debt will continue to remain invisible.

Even if reparations could potentially lessen the ecological debt, these will never truly compensate for the pillaging of resources in Orissa and elsewhere, or the destruction of people's traditional ways of sustaining themselves and their communities.

Perhaps any solution to ecological debt will learn from the indigenous communities' own success at survival. People visiting these communities quickly observe individuals who live a lively and full life, full of spirituality, art, and a deep sense of community, and taking full and respectful advantage of their few resources. Their religions celebrate and venerate nature in its abundance and generosity, and their lifestyles seem in themselves to be odes to simplicity and gratitude.

This study has been a humble attempt to begin to understand the emerging concept of ecological debt from the perspective of Orissa. Future studies on ecological debt in Orissa might propose mechanisms for measuring ecological debt, particularly vis-à-vis a country's financial debt. The studies might also propose legislation for calculating, restricting and compensating for the impact of ecological debt. It is important to point out that while it is impossible to completely compensate for the destruction of the environment, people's livelihoods and ways of life, some correction may be made in terms of controls in the use of the resources, accountability of and sanctions on the institutions involved in the accumulation of ecological debt, reflection in cost-benefit analyses of environmental and social concerns; and mechanisms of governance to ensure community participation and leadership in decision-making processes on development, among others. The way forward therefore entails demonstrating alternatives to the neo-liberal paradigm, critiquing policies and legislations, and providing alternatives through research, advocacy, lobbying, networking and alliance building. Let us build a world that is free of ecological debt.

NOTES

1 The district was divided in 1992 into four separate districts.

2 One crore is equivalent to 10 million.
3 The so-called fifth or "untouchable" caste.
4 One lakh is equivalent to one hundred thousand.

REFERENCES

Agragamee (undated), "Declining Quality of River Water in Orissa", retrieved from http://www.agragamee.org.

Author unknown (2005a), "As MNCs go on 'mineral hunt' Orissa's Adivasis could lose lands, jobs", retrieved from http://www.infochangeindia.org.

Author unknown (2005b), "State Pulse - Orissa: Mining at Adivasis' Cost", The Central Chronicle, 04 January 2005, retrieved from http://www.centralchronicle.com.

Author unknown (undated), "The Transition to a Sustainable Planet", retrieved from http://www.geocities.com.

Author unknown (undated), "UAL", retrieved from http://www.ganesha.co.uk/JoPubWeb/TNCEssay.htm.

Bhanumati, K. (undated), "Globalization in the Fifth Schedule Areas – Alienation of Lands and Resources of Adivasis in India", mimeo.

Bavadam, L. (2004), "The Ecological Debt", retrieved from http://gv.agora.eu.org/article.php3?id_article=967.

Center of Environmental Studies (undated), "Chromite Mines in Orissa", retrieved from http://www.cesoridda.org.

Chatterji, A. (2005), "Who benefits? At what cost? - State tyranny in Orissa, India", Sikh Spectrum Quarterly Issue No. 19, retrieved from http://www.sikhspectrum.com/022005/orissa.htm.

Council of Professional Social Workers or CPSW (1994), State of Orissa's Environment, CPSW: Bhubaneswar.

CPSW (2001), Odisa Paribesh Vols. I and II, CPSW: Bhubaneswar.

Das, V. (2001), "Orissa: Mining Bauxite, Maiming People" retrieved from http://www.saanet.org/kashipur/articles/vidhyadas.htm.

Dash, J. (2005), "Mining Threatens Orissa's Environment", Indo-Asian News Service, 05 November 2005, retrieved from http://www.indiaresource.org/news/2004/1048.html.

Devarajan , P. (2004), "Struggle to save Niyamgiri forests", The Hindu Business Line, 08 August 2004, retrieved from http://www.thehindubusinessline.com/2004/08/08/stories/2004080801141600.htm.

Dias, X. (2001), "Rio Tinto in Orissa: The Background", retrieved from http://www.minesandcommunities.org/Company/rio11.htm.

Friends of the Earth International or FoEI (2002a), "Toward Binding Corporate Accountability", Position Paper for the World Summit on Sustainable Development, retrieved from http://www.foe.co.uk.

FoEI (2002b), "Ecological Debt", retrieved from http://www.rio-plus-10.org/en/info/ecological_debt/.

FoEI (undated), "Ecological Debt", retrieved from http://www.worldrevolution.org/guide/ecologicaldebt/intro.

Friends of the Earth or FOE Scotland (undated), "Global Communities Project: Ecological Debt", retrieved from http://www.foe-scotland.org.uk.
Henderson, C. (undated), "Economics Forever", Panos Media Briefing Paper No. 38.
Karki, A. K. and R. P. Gartoulla (2003), "Ecological Debt: Prospective and Consequences on Land", retrieved from http://www.jubileesouth.org/journal/prospect.htm.
Karunakaran, C. E. (2004), "Global Warming – Whose Ecological Debt?", retrieved from http://www.cadtm.org/article.php3?id_article=344.
George, G. M. (2004), "Mining To Destruction And Hijacking Their Rights To Submission", retrieved from http://www.countercurrents.org/hr-george280204.htm.
Government of India (2002), Orissa Development Report, GoI Planning Commission: Bhubaneswar.
Government of Orissa (various years), Economic Survey, Bureau of Statistics and Economics: Bhubaneswar.
Government of Orissa (various years), Statistical Abstract of Orissa, Bureau of Statistics & Economics: Bhubaneswar.
Government of Orissa (various years), District Statistical Handbooks – Keonjhar, Sundargarh, Angul, Jharsuguda, Koraput and Jajpur, Bureau of Statistics and Economics: Bhubaneswar.
Government of Orissa (various years), Climatological Data of Orissa, Bureau of Statistics and Economics: Bhubaneswar.
Government of Orissa (undated), "Development of Mineral Sector", retrieved from http://orissagov.nic.in/industries/index.htm.
Janardhan, J. (undated), "Employment Mirage", retrieved from http://www.sulekha.com.
Jayaraman, N. (2001), "Norsk Hydro: Global Compact Violator", Special to CorpWatch, 18 October 2001, retrieved from http://www.fsa.ulaval.ca/personnel/vernag/eh/f/cause/lectures/norsk_hydro.htm.
Kalshian, R. (2004), "Sterlite Brings Darkness to India's Indigenous Peoples", India Resource Center, retrieved from http://www.indiaresource.org//issues/globalization/2004/sterlite.html.
Krishna, O. and A. Ghosal (1995), Rice, Navdanya: New Delhi.
Kujur, M. (2005), "Development not for tribes", retrieved from http://www.minesandcommunities.org/Country/india17.htm.
Lenka, D. (2001), Agriculture in Orissa, Kalyani Publishers: New Delhi.
Majhi, B. (undated), "Adivasis' War against Industrialisation", mimeo.
Mines, Minerals and People or MMP (2003a), "Land, Forests, Displacement and Livelihoods: Protecting Women Rights in Mining", Background Paper for the Indian Women and Mining Seminar, New Delhi, April 2003, retrieved from http://www.minesandcommunities.org/Mineral/women3.htm.
MMP (2003b), "Labour and Women in Mining", Background Paper for the Indian Women and Mining Seminar, New Delhi, April 2003, retrieved from http://www.minesandcommunities.org/Mineral/women4.htm.
MMP (2003c), "Women in Mining Struggles in India: The Invisibility of Gender Concerns in Mining Struggles", Background Paper for the Indian Women and Mining seminar, New Delhi, April 2003, retrieved from http://www.minesandcommunities.org/Mineral/women1.htm.
Moody, R. (2000), Passages through India, Nostromo Research: London.
Mundu, B. (2003), "India Case Study", Paper presented at the workshop on "Indigenous Peoples, the Extractive Industries and the World Bank", Oxford, April 2003, retrieved

from http://www.forestpeoples.org/documents/prv_sector/eir/eir_internat_wshop_india_case_eng_apr03.pdf.
New Economics Foundation (undated), "Ecological Debt", retrieved from http://www.neweconomics.org/gen/climate_ecodebt.aspx.
Oilwatch International (2000), "Oil and ecological debt", retrieved from http://www.deudaecologica.org.
Padua, J. A. (2000), "A Synthetic Report on the South-North Consultation on the Global Debt Campaign Beyond 2000", retrieved from http://www.deudaecologica.org/modules.php?name=News&file=article&sid=53.
Pasztor, J. (undated), "Climate Change and Sustainable Development", retrieved from http://www.jaysquare.com/resources/globaldocs/global08.htm.
Patnaik, S. N. (2001), Address at the 49th National Development Council, New Delhi, 01 September 2001, retrieved from http://planningcommission.nic.in/plans/planrel/pl49ndc/orissa.htm.
Patwardhan, A. (undated) "Dams and Adivasi People in India", retrieved from http://www.dams.org/docs/kbase/contrib/soc207.pdf.
People's Union for Civil Liberties or PUCL (2005), "Atrocity on the people of Kashipur", A Fact-finding Report, retrieved from http://www.pucl.org/Topics/Dalit-tribal/2005/kashipur.htm.
People's Union for Democratic Rights or PUDR (2005), "Halting the Mining Juggernaut", mimeo.
Raj, F. (undated), "Globlisation and Plight of Adivasis", mimeo.
Rijnhout, L. (2004), "Ecological Debt emerges from the London Fog", retrieved from http://jades.socioeco.org/en/edito_2004_11.php.
Sainath, P. (1996), Everybody Loves a Good Drought, Penguin Books: New Delhi.
Scherer, E. M. (2004), "Sukinda Valley, Orissa, India", retrieved from http://www.pollutedplaces.org/region/south_asia/india/sukinda.shtml.
Simms, A. (2001), "Who owes who? Ecological debt: The biggest debt of all", retrieved from http://ww.jubilee2000uk.org.
Singh, K. (1999), "Industry Flocks to 'Backward' Indian State", retrieved from http://www.twnside.org.sg/title/1907-cn.htm.Stanley, W. (2002), "Land does not belong to us - We belong to the land: Mining in Orissa, India", Echoes Issue No. 21, retrieved from http://www.wcc-coe.org/wcc/what/jpc/echoes/echoes-21-09.html.
Sinha, B. N, (1999), Geography of Orissa, National Book Trust: New Delhi.
Sudhir, S. N. V. (undated), "NALCO trip fails to impress Adivasis", mimeo.
TARU (1996), "Assessment of Environmental, Economic and Social Impacts of Bauxite Mining and Alumina Processing in Orissa", mimeo.
Tata Energy Research Institute (2001), "Overview of Mining and Mineral Industry in India", Report Commissioned by the Mining, Minerals and Sustainable Development Project of the International Institute for Environment and Development, retrieved from http://www.iied.org/mmsd/mmsd_pdfs/185_teri.pdf.
United Nations Development Programme or UNDP (1998), Human Development Report, UNDP: New York.
Wysham, D. (1997), "Talcher Angul – Coal Mining Destroying Orissa, Fuelling Climate Change", retrieved from http://www.50years.org/factsheets/orissa.html.
Wysham, D. (2003), "Climate Change and Policy Coherence in Global Trade and Financial Flows", Sustainable Energy and Economy Policy Network, retrieved from http://www.seen.org/PDFs/climate_policy.pdf.