Assessed impacts of the proposed Bodhghat Hydroelectric project

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INTRODUCTION

The purpose of this paper is to present a select Indian case of environmental appraisal of a hydro-power development project. An attempt has been made to focus on the implications of the Bodhghat Hydroelectric project for the wilderness values of the project area. The paper also presents an account of how public pressure, legislative framework and EIA procedures and practices have been effective in arresting a major ecological disaster even when EIA was not a mandatory requirement in India for determining the project feasibility. This case represents a situation that is unique in the way in which the development projects are generally pursued in developing countries, India included. In most cases, once a project is conceived, there is generally no looking back. At the most, what is really attempted is the mitigation of the impacts. The mitigation planning rarely takes into consideration the formulation of strategies that can be effective in mitigating all of the social and ecological impacts that are considered to be significant. These assessments which ignore the socioeconomic concerns and biodiversity impacts of the project often fail to produce a timely decision on the project implementation. For such projects, attempts are made to compensate for the delays in environmental clearance by advancing construction work and other preparatory activities in anticipation of the clearance which then tends to become the overriding justification for the clearance of the projects. This project has been an exception to the approach that is adopted in the case of many water projects. This project has been amongst those few projects in the country that was abandoned even after the project had made a sufficient headway on the grounds that the environmental appraisal failed to justify its recommendation.

See Topic15

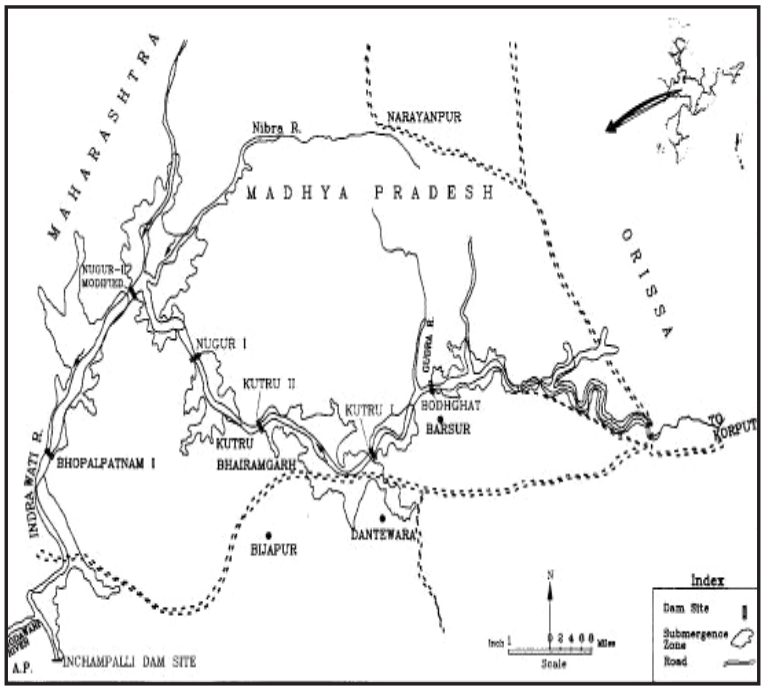
UNEP EIA Training Resource Manual

Future directions

PROJECT BACKGROUND

The Bodhghat project is a river valley project, involving the construction of a major dam on the Indravati River in Bastar district. This project, conceived as a precursor to a series of dams, (Kutru I and II, Nugur I and II, Bhopalpatnam and Inchampalli) was planned on the Indravati River near Barsoor a village (19°12′ latitude and 81°24′ longitude) situated about 100 km from Jagdalpur, the headquarters of the Bastar district (Figure 1).

Figure 1: Bodhghat and other proposed dams on the Indravati River



The project involved the construction of the following :

- A composite dam of a total length of 1720 m at the dam top level consisting of a 855 m long and 90 m high concrete gravity dam and fill dams of 500 m and 365 m lengths on the left and right flanks respectively.
- A 3 km long (with 12.5 m diameter) head race tunnel.
- A 5 km long tail race canal.
- A surface powerhouse to support 4 generating units, each of 125 MW.

This project was designed as a peaking station with an installed capacity of 500 MW (4 units of 125 MW) to provide a large peaking potential to the power station of M.P. State. The total land requirement for the project was 13 783 147 ha of which 5 704 332 ha comprised of forest land. The forest area was made up of areas under Reserved Forest, Protected Forest and Undemarcated Forest (also referred to as Orange Areas). The project involved the displacement of nearly 10 000 tribal people from 42 villages.

NATURE AND SCOPE OF ISSUES

- The Bodhghat Dam was particularly regarded as environmentally damaging because its functional effectiveness was directly linked to the projects proposed downstream. Together, these projects could

impose a great stress on the ecology of the Indravati Tiger Reserve, Bhairamgarh Wild Buffalo Sanctuary and other surrounding habitats of Indian wild buffalo (*Bubalis bubalis*).

- The dam would result in the forced displacement of some 10 000 tribal people whose sustainable way of life based on a mixed economy of agriculture, herding, fishing and forest use would be entirely destroyed.

- The project would also lead to the inundation of a large area of forest, a resource fundamental to tribal people and whose dependency on the resources from forest is almost total and complete. The consequential movement of people into the forest interiors that are currently free from biotic disturbance would pose the major threat to the relatively undisturbed tracts of the forest and the wildlife habitat.

- The project would result in a total loss of 20 000 hectare of wildlife habitats.

- The non availability of cultivable land and the wood lots for meeting the resource needs of people for fuel wood, timber, food and fodder would have adverse effects on people driven from the project area.

- The entire project area, which provides an ideal setting for designation as a '*Biosphere Reserve*' owing to its biological richness and its pristine nature, would become open to ecological destruction.

- The Bodhghat project would inevitably lead to the justification and the imposition of Bhopalpatnam, Inchampalli and the other projects located downstream.

PROCESS AND PROCEDURAL CONTEXT

At the time of development of the proposed project, legislation for mandatory EIA did not exist in India. The environmental appraisal of projects till the late seventies was based on a formalized scrutiny of proposals generally conducted by the Department of Environment (DOE). With the promulgation of the Forest Conservation Act in 1980 and the formulation of Environmental Guidelines by DOE for River Valley projects in 1984, and the enforcement of the Environmental Protection Act in 1986, the environmental appraisal of the river valley projects became a more focused effort to ensure the adherence of the developmental planning to the legislative framework that gradually emerged.

This project with an estimated cost of Rs.209.3 *crores* (equivalent to US$50 million approximately) was accorded investment approval in the year 1979

by the Planning Commission, Government of India. The project was subsequently granted clearance by the Department of Environment (DOE), Government of India, in 1979. The project was to be completed within a period of six years from the date of its approval by the Government of India but could not progress due to the paucity of funds. The Government of India subsequently decided to submit the project for financial assistance from the World Bank and accordingly a revised project report was submitted to the World Bank in April 1983 with revised cost estimates. In 1984, the World Bank approved the loans totalling US$300.4 million to the project after a brief appraisal mission had evaluated the financial and technical aspects of the dam. The project in its revised form was again submitted to the Government of India for clearance from the environmental angle. With the Promulgation of the Forest Conservation Act (FCA) in 1980, the project was also required to obtain clearance under the FCA. On the insistence of the Department of Forest, the DOE constituted a working group, which visited the site in 1985 for the environmental appraisal of the project. Subsequently, the DOE granted conditional clearance to the project with the provision that the project should be submitted to a professional agency for an independent evaluation of its impacts on the floral and faunal values that are critical for conservation.

In the mean time, the project also came to the limelight in the wake of belated concerns about the ecological balance voiced at the national level in different forums particularly after the controversy over the Silent Valley. The project also led to widespread discontentment amongst the people of the area because of the rehabilitation package that was visualized. Resentment against the dam also started building among the NGOs, the environmental lobbies, welfare societies and individuals who forwarded their representations for stopping the project to the Prime Minister of India. As a result, the Government of India (GOI) was forced to consider all the representations received by the Prime Minister's Office from different agencies/organizations. A special committee was constituted in 1987 under the then Secretary for Environment & Forests, Government of India, to re-look at the environmental and social issues related to the project.

At the same time DOE, Government of India, directed the Wildlife Institute of India (WII) to undertake the environmental impact assessment of the project with a view to provide an independent assessment of the impacts on the wildlife and forests. The study was initiated in October 1989 and was completed in April 1990.

APPROACHES TAKEN

Besides adherence and compliance with environmental regulations and guidelines, proactive and participatory methodology on and off field was adopted. For the preparation of EIA report, primary and secondary data and

information were generated through systematic field studies. The field studies primarily focused on:

- assessment of the impacts of the project on biophysical environment;
- assessment of the status of wildlife habitats with special reference to wild buffalo habitat;
- assessment of the human dependencies on natural resources of the project area;
- review of the impacts of the project on wildlife values and the socio-economic status of the resource dependent community; and
- review of the rehabilitation policy for project-affected people.

Field investigations were made at all sites likely to be impacted by the construction of the proposed dam. These included areas under submergence, downstream areas of the dam, and the sites of powerhouse location and the access roads and areas outside the submergence zone, which could ultimately become the receiving area for displaced wildlife and human population.

Consultation with local and national agencies, both governmental and non-governmental, was used as an aid to supplement the field based data and information.

RESULTS AND IMPLICATIONS

This section highlights the significant findings of ecological assessment and socioeconomic surveys conducted by the team of the Wildlife Institute of India.

Conservation values of the project area

Forests of Bastar fall under 'Southern moist tropical deciduous' and 'Southern tropical dry deciduous' forest types (Champion & Seth, 1968). Bastar forests are unique in the country where sal (*Shorea robusta*) & teak (*Tectona grandis*) mixed with bamboo forests occur together on an easy terrain with favourable growing conditions. The forests of the project area are predominantly composed of miscellaneous forests. The upper canopy is distinctly composed of *Anogeissus latifolia, Buchanania lanzan, Lagerstroemia parviflora, Garuga pinnata, Chloroxylon swietenia and Cassia fistula*. The average height of the forest ranges between 18 to 20 metres and the average tree density is 695 per ha. The dense forests on the slopes and valleys and riparian forests and grasslands along the Indravati and its tributaries form excellent habitats for diverse wildlife.

The forests of the project area are home to a wide variety of wild animals. The area offers an excellent habitat for the carnivores such as tiger (*Panthera tigris*), leopard (*Panthera pardus*), hyena (*Hyaena hyaena*), and jackal (*Canis*

aureus) and the herbivores such as spotted deer (*Axis axis*), four horned antelope (*Tetracerus quadricornis*), barking deer (*Muntiacus muntjak*), Indian bison or Gaur (*Bos gaurus*) and the critically endangered wild buffalo (*Bubalis bubalis*). Some of the other mammalian species of conservation importance occurring in the project area include the giant squirrel (*Ratuffa indica*) and the smooth Indian otter (*Lutra perspicillata*).

The Indian wild buffalo is an endangered species listed in Red Data Book (IUCN 1994). Its numbers have dwindled dramatically since the early forties in the Central India. Today, four relict populations are known from Bastar district. Of these, two populations occur in the Protected Areas located in the vicinity of Bodhghat and other projects proposed downstream. The largest is in the Indravati National Park with a little less than 100 individuals recorded in 1988. A second population is 60 km upstream on the Indravati river at Bhairamgarh Wildlife Sanctuary comprising of about 10-20 individuals (Divekar & Bhushan, 1988). The wild buffaloes of Bastar are considered to be the purest wild genetic stock and their conservation is therefore critical.

Ecological issues

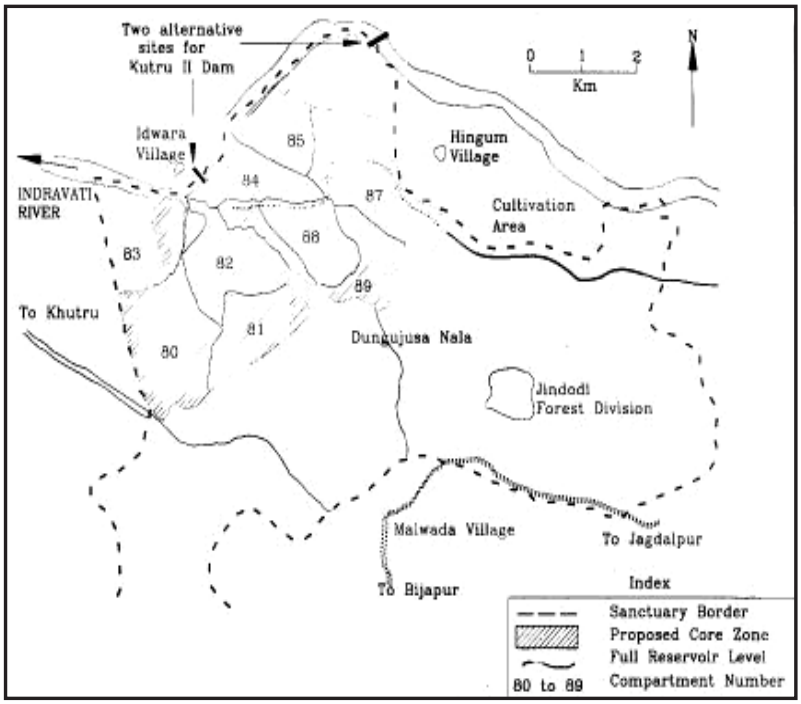


Figure 2: Submergence of the wild buffalo habitat within the Bhairamgarh Wildlife Sanctuary would be an immediate consequence of the Kutru 11 project

Bodhghat Hydroelectric project is expected to cater to the peaking power requirements in the evening. All the four turbines will operate together during the evening hours resulting in heavy discharges that would be many

times the rate of normal lean summer discharge. This sudden increase in water discharge would result in the flooding of the grassland habitats within Bhairamgarh Wildlife Sanctuary located 60 km downstream of the project location. Based on daily schedules of the turbine operations and discharges into the river, it is anticipated that the grasslands in Bhairamgarh Sanctuary would be flooded between 8 pm and 11 pm. This would coincide with the main foraging time of wild buffalo in summer, when such river bed grasslands are their critical food resource. The changed water discharge regime due to the project will thus severely jeopardize wild buffalo habitat in Bhairamgarh Sanctuary. This is particularly so because, out of the total areas of the Sanctuary the prime wild buffalo habitat is only about a fourth of this area falling in compartment numbers 80 to 85 and 87 to 89 (Figure 2).

The enormous quantity of water held here in the reservoir of Bodhghat project will naturally be the justification for more downstream hydroelectric projects. It is also a known fact that five hydroelectric projects (Kutru I, Kutru II, Nugur I, Nugur II and Bhopalpatnam) are planned on the stretch of Indravati that is upstream of the proposed major multi purpose project at Inchampalli on the Godavari near its confluence with the Indravati (Refer Fig. 1). From the preliminary details that were made available for these proposed projects (Anon, 1988), it is seen that if Kutru II Dam were constructed at the site proposed near village Idwara, it would almost entirely submerge the prime wild buffalo grassland habitat along the river in the compartments numbered 84 and 85 (Figure 2).

Further, all these five projects are so planned that the discharge level from the tail race of the upstream project would be nearly at the same level as the Full Reservoir Level (FRL) of the immediately succeeding downstream project (Fig. 3). This would mean that almost the entire length of the Indravati River from the location of Kutru 1 project to Bhopalpatnam Dam would no longer remain natural. The series of reservoirs that would be constructed would completely isolate the areas to the north and west of the Indravati River from those on its south and east. Moreover, almost the entire stretch of the rich riparian wildlife habitat would be submerged. Thus, both from the point of view of the prime habitat loss and the disintegration of movement corridors, this series of dams would cause irreparable damage to the ecology of the area and to the wildlife buffalo in particular.

Socioeconomic issues

The Tribes of Bastar, as any other hill tribes, have an affinity to the forests in which they live. Their sustenance is closely inter-woven with the forests. Over 90 per cent of the people inhabiting the watershed belong to the tribal community that comprises the Bison Horn Maria, Jhoria Muria and Raj Muria Tribes. These tribes inhabiting the project area predominantly derive sustenance from forest resources. A calendar of the activities of the people of the project area establishes the intricate relationship that the people of the project area have with the forest in their immediate surrounds (Table 1).

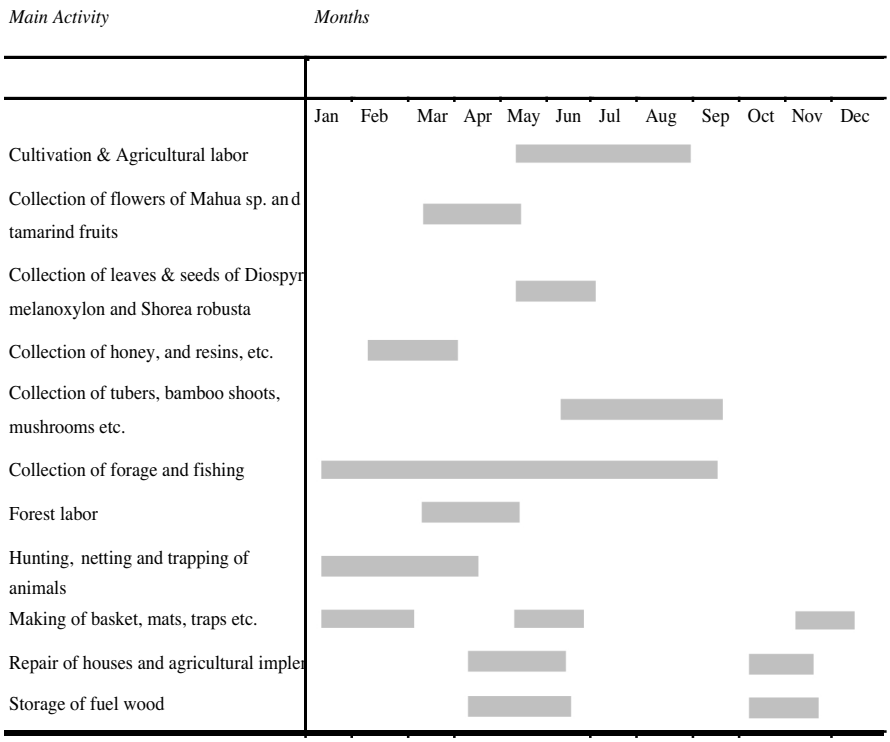


Table 1: Seasonal calendar of the activities of the people in the project area

The results of the socio-economic surveys further indicate that agriculture provides only about 50 per cent of the sustenance. The remaining 50 per cent of sustenance is based on consumption of forest resources and on goods and services provided by the common property resources (Figure 4).

The combined income from the sale of Minor Forest Produce (MFP) and products like baskets, mats, ropes and plates made out of the raw material collected from the forest is insignificant and is variable among the villages located in the forest interiors and the distant villages.

The resources of prime importance for consumption are the fuel wood and the forest food (Figure 5). Fish and meat obtained from hunting gathering lifestyle and also through the traditional practice of community hunting (locally referred to as '*Parad*') additionally supplements the food resources from the forest.

Dependence on the forest for livestock grazing is almost complete as the total livestock population belonging to the villagers of the project area graze in the forests of the proposed submergence zone. Although estimation of fodder in terms of quantities removed from the forest was not made during the course of our study, fodder beyond doubt constitutes the single largest forest resource on which the people who own the livestock heavily depend.

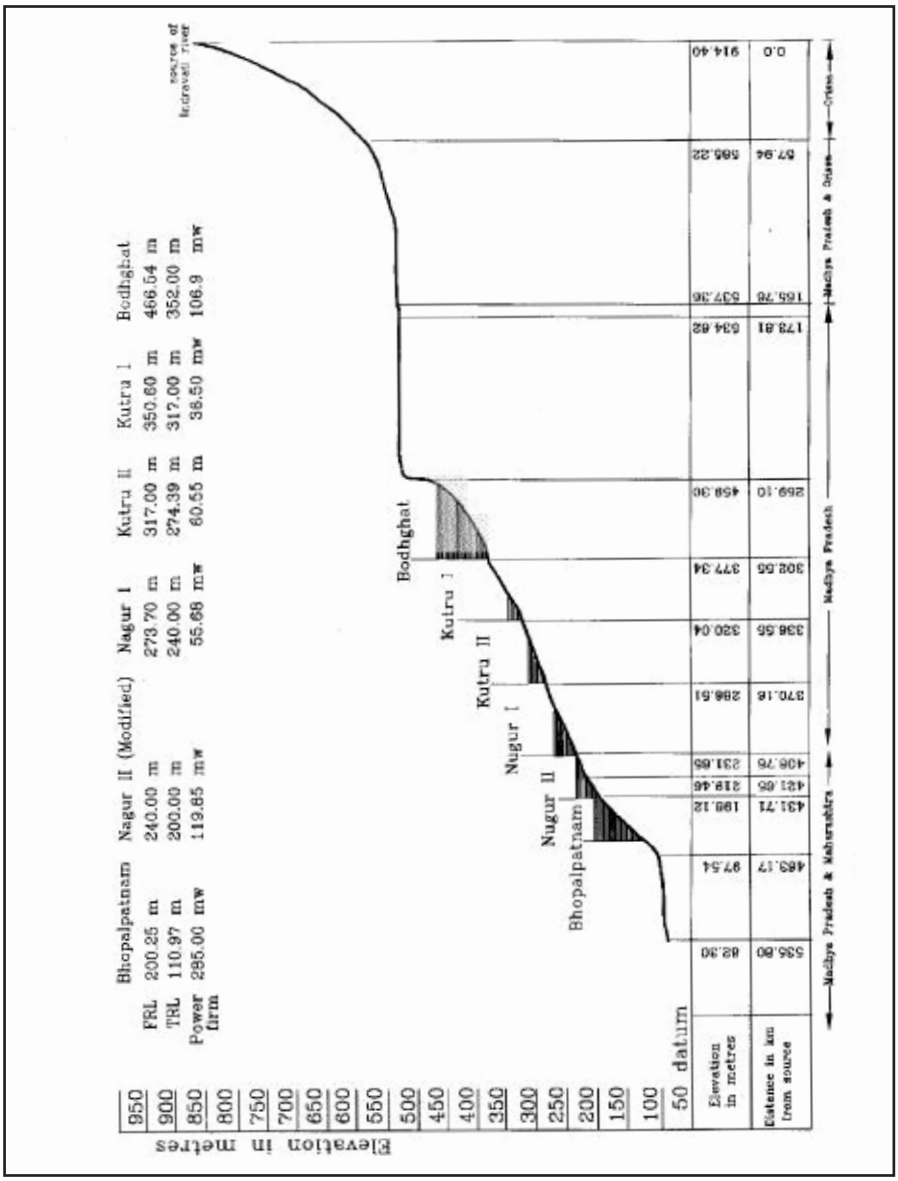


Figure 3: Proposed hydroelectric projects on the Indravati River

Since the economic well being of the people of the project area is dependent on the sustenance driven demands from the forest resources, the implementation of the Bodhghat Hydroelectric project would inevitably threaten the existing and intricate relationship of the people with the forest.

The fact that Bodhghat project does not have an irrigation component failed to evince any special interest among the people of the area who would have seen the project in the different light if it would have offered to them

irrigation possibilities in its command areas. The obvious scenario that would emerge in the event of the project being implemented is the generation of the power at the project site for transmission to northern industrial districts of M.P. that are completely removed from the project-induced impacts and the ground realities. While these northern districts would reap the economic benefits of power-driven industrial expansion, the people of the project would suffer from underdevelopment resulting from the lack of the political will to promote village development programmes in areas likely to be submerged in the event of the project's implementation.

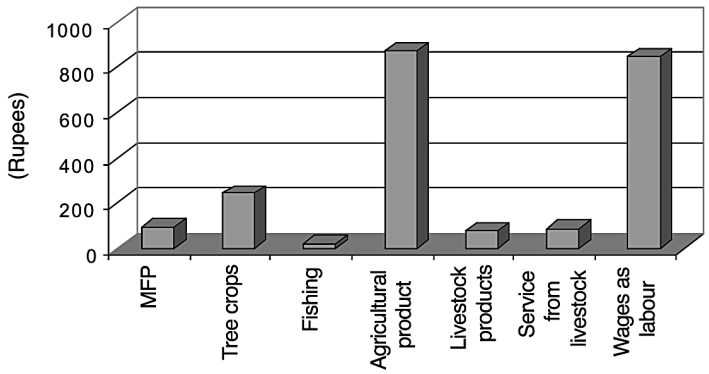


Figure 4: Average income of the people of the project area from different sources

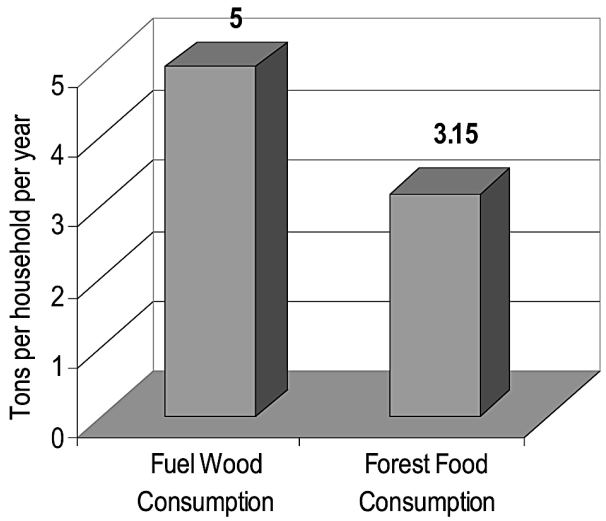


Figure 5: Consumption of major forest resources by the tribal population of the project area

The review of the rehabilitation policy provides another distressing picture because there appears to be a repetition of the blunders that in the past have

caused most rehabilitation programmes to suffer from inherent failure to promote productivity of land. The rehabilitation sites for people displaced by the project have been carved out by scarifying the existing areas under the village commons. This would obviously place greater demands for resources on remaining areas under the commons leading to the decline in the productivity of land. This would also lead to a fall in the per capita share of goods and services from common property resources as a larger number of people would be forced to share a much reduced area due to appropriation for rehabilitation.

The smaller agricultural holdings at the new sites would not be able to sustain the people in the long run. This is obvious as the agricultural income from still smaller parcels of land may not suffice to meet other resource needs (MFPs, fodder for livestock, timber for housing and forest food) of the people who would require financial investment in the changed scenario.

Common knowledge and experience of other projects suggest that stressed man-to-land ratio at the rehabilitation sites and resource crises would force people to encroach upon forest interiors that would inevitably become open to biotic pressures (Rajvanshi 1994). The direct impacts of submergence of wildlife habitats and the degradation of remnant habitats due to the sudden influx of people should be considered to be the most obvious implication of the project and one that would severely threaten the integrity of the wildlife habitats and the viability of the populations of some of the highly endangered species of central Indian fauna.

KEY CONCLUSIONS AND IMPLICATIONS

From the EIA studies conducted by the Wildlife Institute of India, it could be concluded that the ecological and social impacts of the Bodhghat project far outweigh its economic benefits. In view of the findings of the ecological and socioeconomic assessment undertaken by the WII team and the independent observations of the Special Committee of the Government of India that visited the project site in 1987, the project could not be granted clearance under the Forest Conservation Act (1980). As a result, even the environmental clearance that was granted on the condition that the project would have to first obtain clearance under the FCA (1980) was revoked in 1994.

The rejection of the project came in 1994 after a substantial progress was made in the construction activities at the proposed site in the anticipation of the forest clearance coming through. The construction work that was completed prior to the rejection of the project included the construction of storage facilities, township and residential colony, health and educational centre for the staff, downstream bridge across the Indravati River, approach channels to intake structures up to the head race and the two additional tunnels to the head race tunnel. The excavation works that were completed

prior to the decision on clearance of the project included powerhouse excavation and the dam foundation.

LESSONS LEARNED

- The importance of economic and engineering paradigms in development alone can not lead to sustainable development and economic prosperity. A better understanding of the interplay between development and the natural environment in which development takes place is necessary at the time of project planning to ensure environmental security and economic prosperity.

- The environmental impact assessment process highlights the need for paying greater attention to cumulative and synergistic impacts viewed from the standpoint of the ecosystem and the fact that the project will be a precursor to several similar projects in the area.

- The habitat trade-off analysis can be a significant issue in decision making.

- Sustainability principles need to be included in the methodological guidelines for the conduct of EIA and adequate significance needs to be given to biodiversity impact issues.

- Good EIA requires careful handling of the socioeconomic dimension particularly if these are linked to resources that are expected to be diverted to the project.

- The project has little chance of success if it runs counter to, or ignores, the traditions, values and social organizations of the intended beneficiaries or if its objective is too removed from fulfilling their every day needs.

- Public pressure can often help environmental conservation especially if political will is wanting or found wavering.

Acknowledgements:

Shri H.S Panwar, Former Director, Wildlife Institute of India is gratefully acknowledged for his unfailing support throughout the course of the study. Shri Parikshit Gautum, V.V. Murlidharan and Ajay Rastogi are sincerely acknowledged for their professional inputs in the field studies. Shri S.K. Mukherjee, Director, Wildlife Institute of India, is gratefully acknowledged for providing helpful suggestions during the preparation of this case study. Dr. V.B. Mathur, Scientist, Wildlife Institute of India, is sincerely acknowledged for his valuable comments on

the earlier draft of this case study. Shri Narinder Bist and Shri Mukesh Arora are sincerely acknowledged for their assistance in the word processing of this document.

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Key words

sustainable development

social impact assessment

cumulative effects