

# The Narmada Valley Project— Development or Destruction?

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The Narmada Valley Project is typical of World Bank-funded mega-projects. It involves building 30 large dams, 135 medium size dams and 3,000 associated irrigation schemes. Its cost has been estimated at 16,000 million pounds. It will involve depriving over a million, largely tribal, people of their land. The future for them is grim. They will, in effect, be sacrificed on the altar of political and economic expediency. The World Bank is fully aware of the environmental devastation their project will cause and the human misery and impoverishment it will give rise to. *But it still insists on financing it.* The following detailed report (which is also included in the second volume of "The Social and Environmental Effects of Large Dams", just published) exposes the full iniquity of this project. Everything must be done to prevent The World Bank from going ahead with this totally cynical project.

This report is based on the findings of a team of university students who covered the entire length of the Narmada, largely on foot, in the months of July and August, 1983. The aim of the trip was two-fold: to study the possible environmental impact of the massive hydroelectric and irrigation complex planned for the Narmada Valley, and to see and document the existing natural and cultural heritage of the river. During the 50-day trip we visited several of the proposed and existing dam sites, travelled extensively in the area to be flooded and in the catchment areas of the proposed reservoirs, and talked to a wide range of people.

Inevitably, an extensive survey such as this cannot involve much intensive study. Many gaps in information remain, and parts of this report are necessarily impressionistic. We submit, however, that this does not make our findings any less valid.

The conclusions we reach in this report are at two levels. At one level, we consider various problems in the planning and implementation of the project, most of which can (at least theoretically) be eliminated by proper 'management'. But at another level, we question whether the project *as a whole* (even if successfully implemented) and the broad policy behind it, are really 'development' in the true sense of the word—for they may well lead to a chain reaction which would unleash environmentally destructive forces that could negate all the short-term gains made by the project. The environmental, socio-cultural and economic sanity of the project is thus questionable.

## The River

The Narmada is the largest west-flowing river in the Indian peninsula, arising on the plateau of Amarkantak in Shahdol district of Madhya Pradesh. Originating in a holy tank in the midst of Hindu temples, the Narmada winds its 1,312 kilometre course to the Arabian Sea through lush forested hills, rich agricultural plains and narrow rocky gorges in a series of falls, rapids, twists and slack waters. As many as 41 major tributaries augment its waters along the way. Its basin, bounded on three sides by mountain ranges (Satpura, Vindhya and Maikal) and on the fourth by the Arabian Sea covers an area of 98,796 square kilometres. Dry and moist deciduous forests cover some 32 per cent of this basin, and black agricultural soils about 60 per cent. Its climate is humid and tropical. There is a fairly high average rainfall of 1,178 millimetres, 65 per cent of which is received in July and August.

According to the 1971 census, about 16 million people reside in the basin, 81 per cent of them in villages. Most are engaged in agriculture and related businesses. There is a sizeable tribal population, divided into several distinct tribes—Bhils, Gonds, Baigas and others. Most of these have now taken to settled agriculture (or been forced into it). Land distribution among the tribals is fairly equitable. This is in sharp contrast to the peasants in the plains of the basin, among whom unequal landholdings are common. In some districts in the lower reaches of the river, 70 per cent of the land is owned by 20 per cent of the farmers. The main crops grown in the valley are wheat, paddy, millets (mainly jowar, bajra, maize and some minor ones), pulses (mainly gram, tuar, teora), oilseeds (groundnut, sesamum, linseed, rapeseed, mustard and niger), cotton and sugar cane.

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For Hindus, the Narmada is possibly the most important river in peninsular India. It is held to be far more sacred than the Ganges, which is said to come to the Narmada every year as a coal black cow, wash off her sins and return pure white. The Narmada is supposed to have originated from the body of Lord Shiva and along its entire course, Shiva worship in various forms has long dominated. In fact, every stone found on the bed of the river is said to be a 'Shiva-linga'. Towards the upper reaches there has also been some amount of Shakti worship; Jainism too has spread in some parts.

So deeply ingrained is the Narmada in the religious lives of the inhabitants of the valley, that each one of them is supposed to walk the entire length of the river valley at least once in a lifetime. This 2,600 kilometre long *parikrama*, originated by Rishi Markandeya, is undertaken under strict rules—moving only on foot without any footwear, carrying only the bare minimum of possessions, observing chastity, allowing hair and nails to grow throughout the journey, eating no food cooked in oil, sleeping only on the ground. Along the entire course, pilgrims are looked after by villagers and small centres of worship exist in each village. Over the centuries, millions of pilgrims have devotedly undertaken the long and arduous journey, providing an important link between various regions and communities along the entire river.

Several large and important pilgrimage centres are situated on the banks of the Narmada. For example, Amarkantak, Omkareshwar, Nemawar, Maheshwar, Shuklatirth and several other Hindu centres have ancient temples and monuments which are visited every year by hundreds of thousands of pilgrims from all over India. Jainism too has a few important centres, including Bawan Gaja, an awesome 84-foot tall statue of Adinath, Jainism's first Tirthankar, carved out of a vertical cliff near Barwani in Madhya Pradesh.

#### The Narmada Valley Development Project

While the basin has extremely rich natural resources, it has remained, in the eyes of India's planners, largely 'backward'. In their opinion, the lack of widespread irrigation; the inadequate exploitation of mineral and forest wealth; the under-utilisation of hydroelectric potential; and the shortage of infrastructural facilities has not been conducive to the 'development' of the region. All the indices of 'under-development' are present—low electricity consumption (50 per cent of national average), little industrial activity, slow urban growth, below-average agricultural yields, lack of modern medical, educational and banking facilities, and so on. (For the time being, we will use the official and popular indices of development. We shall argue, however, that the concept of development on which those indices are based needs to be questioned.)

The lack of 'development' in the valley does not stem from neglect or absence of planning. There are political reasons behind it. The idea of tapping the waters of the Narmada was mooted way back in 1946 by the various concerned provincial governments. But after extensive studies had been conducted, those provinces (later the



PHOTO: PALLAVA BAGLA

Queen Ahilyabai's memorial and bathing ghats at Maheshwar, a pilgrimage town on the Narmada river.

states of Madhya Pradesh, Gujarat and Maharashtra) quarrelled among themselves—mainly over the sharing of water, the areas to be irrigated in each state and the level of one of the major dams (Sardar Sarovar in Gujarat). After several years of stalemate, the Narmada Water Disputes Tribunal was set up in 1969 to attempt a resolution. Ten years later, the Tribunal submitted its report. Final planning and work was started only then—over 30 years after the project was first conceived.

The Narmada Valley Project is the largest single river valley project in India to date. Its 'Master Plan' envisages the construction of 30 major dams, 10 on the main river and 20 on tributaries. Of these, 5 are hydroelectric schemes, 6 multipurpose and 19 irrigation schemes. In addition, 135 medium and 3,000 minor irrigation schemes are planned. (Minor schemes have a cultivating command area of below 400 hectares; medium schemes of 400 to 10,000 hectares; and major schemes of above 10,000 hectares.) The cost estimate for the whole project is at present Rs. 9,000 crores\*, but according to one of the chief engineers of the Narmada Central Authority, it may go up to an incredible Rs. 25,000 crores by the time the project is completed. Even this seems to be an underestimate, since by late 1983, the official cost of just one of the 30 major dams, Sardar Sarovar, had been revised to Rs. 7,200 crores. Since the Government of India and the State Governments cannot afford such a cost, financial aid from the World Bank is being sought. It was earlier planned to complete the project in 22 years in 2 phases, but under an accelerated programme, it is now expected to be finished in 15 years—that is by 1996.

Almost 50 lakhs hectares\*\* of land are expected to be irrigated, a considerable part of this in the drought prone areas of Gujarat and Madhya Pradesh (and a little in Rajasthan). The project will also create an installed power capacity of 2,700 Megawatts (MW) with an output of 800 MW at 100 per cent load factor. Some 11,500,000 people in villages and many more in cities are expected to benefit. In addition, the project is

\* 1 Crore = 10,000,000

\*\* 1 Lakh = 100,000

One hundred hectares = 1 square kilometre

expected to check floods; generate pisciculture in the huge reservoirs; give employment to hundreds of thousands of people; supply water for domestic and industrial use; and promote tourism. Overall, it is hoped that the project will bring about an agricultural and industrial revolution which will usher in an 'era of prosperity' for the valley.

#### Planning and Implementation: Shamefully Inadequate

Any river valley project requires meticulous planning and careful implementation, involving complete and accurate information on all the important variables to be dealt with: economic, socio-cultural, environmental, and political. This is especially true of a gigantic scheme like the Narmada Project. Although the project authorities claim to have undertaken a 'systems analysis' which takes into account these variables, the validity of this analysis is doubtful. We have come across serious inadequacies and distortions in the information base.

#### Environmental and Geological Factors

The project will entail the large-scale exploitation of natural resources, thus engendering a host of environmental problems. Vast tracts of forest will be submerged, in addition to agricultural and grazing lands. The extension of canal irrigation to several million hectares of land will bring attendant risks of water-logging, salinity, waterborne disease and the growth of weeds. Air and water pollution from new industries and growing urban centres will also prove a problem. Ecological disruption is possibly the most serious aspect of the project, yet it is also one of the most neglected. There is, for instance, no comprehensive information on the extent and diversity of flora and fauna in the valley. Although a study was carried out by Maharaja Sayajirao University on the ecological impact of the Sardar Sarovar Project in Gujarat, the study was only commissioned *after* the project had been sanctioned: moreover, the six months over which it was conducted allowed little time for field work to be carried out. Indeed, much of the information in the study derives from Government sources rather than from fresh empirical studies. We wonder whether an objective study is possible in such circumstances—particularly when the research had been commissioned by the State Government, the very body which wishes to implement the project.

There is no overall study on the existing state of catchment forests in the Narmada Valley, the present and future pressures on them, or the existing and future demand-supply position for firewood and other forest products. In short, no attempt has been made to find out whether the valley's forest resources can withstand the impact of the project and its ancillary activities.

There is as yet no study on the possible geological impact of the large bodies of impounded water in the reservoirs which will be built—despite the knowledge that the Narmada Valley is a seismic zone. Indeed, Madhya Pradesh's former Environment Commissioner, Mr Sharma, has warned that 'a chain of reservoirs on Narmada could create seismic after-effects'. Given

that earthquakes have been triggered off by dams in the past (Koyna in India is one example) the lack of geological studies is shocking.

Whilst extensive areas of 'black soil' in Madhya Pradesh are to be brought under irrigation, there is as yet little data on the conditions under which water-logging occurs in such areas, nor on how to reclaim fields which are affected.

With regard to health effects, a senior official of Madhya Pradesh's health ministry has admitted that neither State nor Central Government officials can evaluate the likely impact of the planned irrigation schemes—or, indeed, the impact that pollution and deforestation will have on the health of the local population.

A glaring example of faulty planning recently came to light when it was found that the original estimates of water availability in the basin were wide off the mark. Three technical consultants were asked by the Narmada Planning Agency (NPA) to look into this, but they were asked to leave before their work was over, reportedly due to serious differences with the NPA. One of the consultants, R.L. Gupta, claims that the method used by NPA ('generated river flow data') yields an overestimate of water availability. The more accurate method ('observed flow data') shows that the basin holds 22.5 million acre feet (maf) rather than the 28 maf originally estimated, or the 26 maf as estimated by analysing 'generated river flow data'. This would imply drastic changes in the design of the major dams.

#### Socio-cultural factors

Since any development project is ultimately aimed at the good of the people, it is imperative that detailed sociological and anthropological studies be done on the existing socio-cultural features of these people and the likely impact of the changes brought about by the project. This is all the more necessary for the Narmada Valley which has a large number of culturally diverse tribal and peasant societies. Yet, hardly any such studies exist for the valley, though belatedly the project planning authorities have commissioned a few.

As many as one million people will be displaced by the project; many will be forced to move against their wishes. There exist no studies on the possible social repercussions. Even assuming, for the moment, that such a change is necessary, there are no serious plans to help those who are resettled in adopting and adapting to their new environment. Most of the officials we met (even those responsible for rehabilitation) had little concern for (or knowledge about) the socio-cultural life of the people they were planning to move.

At no stage have local people been involved in the planning of the project. When asked about this, some officials seemed amused—their unstated attitude being one of scorn for the abilities of the villagers. Involving them in planning seemed quite absurd. Other officials admitted, however, that this was a serious fault in planning, and that the 'we know-best-for-them' attitude had resulted in the failure of several past projects. A case in point is the Tawa Project in Hoshangabad district of Madhya Pradesh, where some



PHOTO: KOTHARI

Submergence zone of Sardar Sarovar Dam in Gujarat—bringing destruction of valuable forests, loss of agricultural land and displacement of thousands of people.

planners who were quite unaware of ground conditions decided to introduce canal irrigation. If they had only asked the farmers, they would have told them that many of the 'black cotton' soils in the region do not need irrigation since this soil has considerable water retention capacity. But irrigation was brought in, and serious waterlogging resulted.

#### Administrative factors and implementation

The Narmada Development project is a single project. Or, at least, the name suggests so. In reality, planning has been highly compartmentalised and fragmented, and the implementation is likely to be the same.

Firstly, there is no single body which is responsible for overall planning and execution. If the Narmada Project is stated to be a single integrated project, one would have at least expected such a body to be set up. There is a 'Narmada Control Authority' situated in Delhi, but its major function (as one of its top officials told us) is merely to act as a liaison between the Governments of Madhya Pradesh and Gujarat, and between the Central Government and the World Bank. There is also a Narmada Planning Group in Gandhinagar, and a full-fledged ministry for the project in Bhopal, but the former is restricted to Gujarat, the latter to Madhya Pradesh. There seems to be little cooperation between them—in fact, there still remains a feeling of distrust, possibly a hangover from the long-standing dispute between the two states as to how the waters of the Narmada should be shared. One official

in Madhya Pradesh complained that 'the Gujarat Government never gives us adequate information on the progress of the Sardar Sarovar dam, which hinders our own planning'. The Gujarat Government on the other hand, claims that Madhya Pradesh is dragging its feet with regard to the sharing of costs for the project.

The absence of a single planning body has meant the absence of a comprehensive plan for the project. Although the 'Master Plan' gives details of the constituent dams and canal systems, it hardly deals with other crucial aspects of the project, such as the preservation of catchment forests, the education of farmers, the provision of medical facilities, the existing and future demand-supply positions for firewood and other forest products, the treatment of pollution or the rehabilitation of those who will be resettled.

The same is true for implementation, which has been entrusted to various departments among whom there is hardly any coordination or cooperation. As of today, the Forest Department, the Soil Conservation Department, the Tribal Welfare Department, the Irrigation Department, the Agricultural Extension Services and various others, work in isolation and often in conflict with each other. A classic example is the clash between the Forest Department trying to reduce the incidence of grazing and the Tribal Welfare Department trying to encourage goat-rearing! Interdepartmental rivalries and lack of coordination are compounded by frequent and irregular transfers, and, of course, the ubiquitous phenomenon of corruption.

Moreover, the various planning and implementation bodies are as open to political interference as any other body, and responsibilities are so divided that ultimate control usually rests in the hands of politicians.

Whilst the project is claimed to be a single integrated one, clearance is being obtained from the Planning Commission and the Department of the Environment for each dam *separately*. The combined effect of all the dams (especially on geological stability and forest cover) is likely to be far greater than the adjudged impact of each individual dam. It is strange that neither of the two bodies at the centre have realised this.

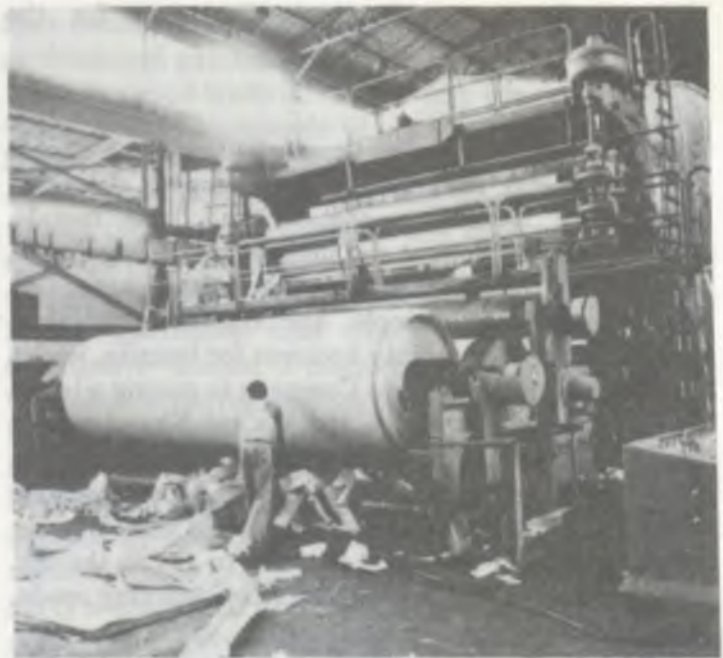
#### Catchment Forests—Under Attack

The life span of a dam depends upon its storage capacity which, in turn, depends upon the silt load of the river. If the silt load exceeds the amount calculated during the planning stage, the storage capacity is correspondingly diminished, thus reducing the life-span of the dam. So as to ensure the continuity of a dam, soil erosion in the catchment areas has to be prevented, and this is possible only by preserving the catchment forests.

The Narmada Basin is one of the most densely forested river basins in India. According to the Agricultural Commission as much as 32 per cent of it is covered by forests, in the upper reaches almost 45 per cent. But our observations indicate that this situation may not continue for long, as rapid deforestation is taking place.

#### Paper Mills

We visited three mills in Madhya Pradesh: the state-owned Nepa Mill in Khandwa District, the Security Mill in Hoshangabad District, and the privately-owned Orient mill in Shahdol District. The massive Nepa Newsprint Mill, producing 15 per cent of India's newsprint requirements, turns out on an average 180-200 tonnes of paper every day. As raw material, it uses mainly bamboo and the hardwood 'salai' (*Boswellia serrata*), along with small amounts of thermo-mechanical pulp, agricultural wastes, waste paper, and the weed *ipomea*. Annually, 75,000 metric tonnes of bamboo, 60,000 tonnes of salai and 40 million litres of fresh water are used. The effect of this mill—which has operated since 1956—on the surrounding forests has been catastrophic. Khandwa bamboo—considered a 'weed' till the early twentieth century—has now been almost exhausted within a radius of 200 kilometres of the mill. It is now being brought mainly from the Balaghat District of Madhya Pradesh, with supplies supplemented by imports from Maharashtra. The condition of salai is even worse, partly because of an extremely low royalty of Rs. 40 per tonne that the mill has to pay to the Forest Department, but mainly because it is now facing genetic isolation and has negligible regeneration. As a result, in 1983, the Forest Department had to put a ban on the felling of these trees for 3-4 years. Much of the area under salai has already been laid bare despite the fact that, being able to withstand drought and fire, the tree is ecologically very important. Belatedly, the Forest Department and



The Nepa newsprint mill, Nepanagar, Khandwa district (Madhya Pradesh)—one of Asia's largest mills and a serious threat to the Narmada catchment forests.

the Mill authorities have recognised this and plan to replace salai with some other hard wood, for which experiments are going on.

The Orient paper mill at Amlai produces high-quality 'bond' paper, and it too consumes a massive amount of raw material. In a year, the mill needs 44,000 tonnes of bamboo and 60,000 tonnes of hardwoods (any species that does not contain colouring matter is acceptable). Having already finished off the locally available resources, it is now obtaining bamboo from Assam.

At both Nepa Nagar and Amlai, plantations have been started but they are still at an experimental stage and very limited in scale. The Nepa authorities plan to acquire extensive areas around Nepanagar for this purpose. Also, the plantations of the State Forest Department have started to give heavy priority to bamboo. Despite all these efforts, however, it is highly doubtful whether these paper mills can be made ecologically viable in the long run. The Conservator of Forests at Nepa insists that they can be made 'self-sustainable'. Forest officials at Khandwa take a more realistic view: "The fate of Nepa hangs in the balance. It may last for another five years or so but not more because there is hardly any wood left." The management of the Orient Mill is frantically trying to acquire land for plantations in order to have an assured supply of wood.

But even if large-scale commercial plantations provide for the demands of paper mills, such plantations cannot serve the same ecological functions as the natural forests in the catchment. Nor will they solve the problems of the local people, especially tribals who are critically dependent on bamboo and other native trees of the area, and who are already facing serious shortages. Deprived of their traditional source of livelihood, many tribals have turned—or are turning—to ecologically destructive occupations like farming forest land or selling 'headloads' of firewood in towns. The direct and indirect effects of the valley's

paper mills may well prove disastrous for the Narmada's catchment area.

### Mining

The Narmada Basin has extremely rich exploitable reserves of coal, iron ore, limestone, copper, dolomite, manganese, bauxite, soapstone and base metals. Mining—both open cast and underground—is going on at several places in the catchment area. At Amarkantak, for example, the Bharat Aluminium Company is mining eighty hectares for bauxite, whilst the Hindustan Aluminium Company is mining a lesser area. In Balaghat district, the Malanj Khand copper mines are to be extended for about 2.5 kilometres; the mine's massive spoil heaps are already causing serious ecological damage. Whenever an area is mined, some forest is inevitably cleared in order to get at the ore, but a far larger area is cleared for constructing roads, housing colonies and so on.

Whilst the scale of mining is at present relatively small, the situation is bound to change in the future. This seems inevitable given both the size of mineral reserves in Madhya Pradesh and the present emphasis on mineral-based industrialisation. The state has 10,000 square kilometres of coal reserves, another 14,000 sq kms of bauxite and a long list of other mineral reserves. Most of those reserves are covered by excellent forests or lie beneath farmland. The implications for the catchment area are indeed frightening.

### Agricultural Extension and Soil Mismanagement

At several places in the valley (for example, the Rajpipla hills in Gujarat, or Mandla District in Madhya Pradesh), we came across agricultural land that had recently been cut out of forests. Typically, this land is not very fertile, and if it is on hillsides, it is highly prone to erosion. Farmers cannot cultivate it for long; within a generation or two (often less) they have to abandon it and cut more forest. Those cultivating on hillslopes have not developed the sophisticated terracing developed by farmers in the Himalayas; at no place did we see a properly terraced field. In fact, at Gorakhpur in Mandla district, we came across a farmer making vertical rather than horizontal contours on the slope. Naturally, erosion would be highly pronounced. At Chiraidongri, where agriculture has been extended right up to the Narmada, the river is gradually eroding away its banks.

It would, however, be too simplistic (and somewhat distorted) to blame this either on the ignorance of the farmers or their alleged 'population explosion'. The tribes living in the valley have been gradually pushed further and further into forests and onto marginal lands by external pressures and expanding peasant communities. A look at the landholding pattern in the valley shows the control of landlords over fertile lands. On the whole, landholding is considerably skewed, although the inequities are less pronounced in the upper reaches of the river than in the lower zone of Madhya Pradesh, where 80 per cent of the farmers own less than 30 per cent of the total land. Significantly, landholding in the tribal communities is fairly

balanced: for instance, in the Gujarat villages destined to be submerged by the Sardar Sarovar dam, 95 per cent of the local Tadavi and Bhil tribals own up to 5 acres, and only 5 per cent own more than 10 acres.

In the upper reaches of the river, we found another cause for the agricultural misuse of land. Tribes which once practised shifting cultivation, like the Baigas of Mandla district, have been forced by the government to settle down permanently. Officials defend the settlement programme by pointing out that shifting cultivation was causing deforestation. But why has an age-old, ecologically sound practice suddenly become destructive? The official contention that there has been a population explosion among the tribals is not supported by fact; the real answer is that the area where shifting cultivation was practised was artificially reduced by declaring most forest land reserved (reserved that is, for paper mills and other commercial interests), thus forcing the tribals into a smaller and smaller cultivation-fallow cycle. What is important here is that the land now given to them for permanent cultivation is forest land, which, since it is not very fertile, simply cannot be used for permanent cultivation. Inevitably, the tribals have to extend their fields illegally by taking over more and more forest land. The 'illegality' does not however remain for long: in a recent populist move in Madhya Pradesh, all pre-1977 encroachments on forest land have been legalised.

### Grazing

There is a heavy incidence of over-grazing in most of the areas. Almost no guidelines exist to control the seasonal migration of cattle, goats, sheep and camels. Whatever guidelines there are, are flouted with impunity. In fact, the influx of outside cattle into Madhya Pradesh has led to violent clashes between the Forest Department and the cattle owners, as well as between local farmers and nomads from 'outside'. A five kilometre-long caravan with thousands of cattle, goats and camels was seen heading towards Amarkantak in July 1982. These were owned by Kathiawaris from the Rann of Kutch. Recently 500,000 cattle are reported to have entered into Dhar, and another huge group into Khandwa. The influx of cattle from Gujarat and Rajasthan is in addition to the swelling population of local cattle. Overgrazing is as harmful as deforestation, for it brings regeneration of a forest to a complete halt.

In May 1983, the Supreme Court upheld the right of nomads to graze their livestock in Madhya Pradesh, regardless of which state they were from. This, of course, makes the task of controlling grazing very difficult. But the problem of those who are dependent on livestock is as real as the threat to forests—there seems no immediate solution to this dilemma.

### Firewood

Carts full of firewood, villagers carrying loads on their heads, and large Forest Department depots were a common sight on our trip. It is obvious that the forests of the catchment are an important source of firewood, though it is difficult to estimate how much

forest is cut down for firewood every year. A rough idea can be gained from looking at the picture of Madhya Pradesh as a whole. An incredible amount of firewood comes out of the State's forests, much of it to cater to urban demands both in Madhya Pradesh and elsewhere. A recent report by Anil Agarwal and Bhubanesh Bhatt of the Centre for Science and Environment (CSE) states that "Madhya Pradesh is today the biggest supplier of firewood to the cities of India". Delhi, for instance, receives over 150,000 tonnes every year from Madhya Pradesh. Assuming a growing stock of 82 tonnes per hectare, this in itself means the denudation of about 2,250 hectares a year or 6 hectares a day. Taking into account all the firewood coming out of Madhya Pradesh's forests, the destruction must amount to several thousand hectares per year.

Most of the twenty Narmada Basin districts already have a scarcity of firewood. Forest Department studies show that the only two districts that still have a surplus are Shahdol and Betul. Interestingly, as the CSE report points out, a map prepared by the State Government of Madhya Pradesh shows a strong correlation between firewood scarcity and the existence of railway lines: those districts that have an under-developed railway network have satisfactory firewood resources—or even a surplus.

Firewood sales in Madhya Pradesh are now totally controlled by the State Forest Department which has its network of depots spread throughout the state. Forest officials claim that most of the destruction of forests caused by firewood extraction is done by tribals. In Madhya Pradesh, 'headloading' (that is, carrying out of a forest a headload of wood) for personal use is still allowed. Officials claim that this right has been severely abused; people even often use wheelcarts to carry extra wood. At Khalaghat, Khandwa, the Ranger, Mr Vyas, complained that Bhill tribals go to the forests in parties of 50 to 100 people, extract much more wood than is allowed, and sell it off to a waiting contractor. It is very difficult for the Forest Department to catch them in such large groups, and contractors who are caught get away with minimum penalties due to political contacts.

It is undoubtedly true that thousands of tribals in the basin have turned to headloading as a means of livelihood, and illegal extraction too has engaged some of them. But again, it would be fallacious to place the entire blame for deforestation on their shoulders. In many cases, the tribals have turned to selling firewood precisely because the forests where they previously lived—and on which they were dependent for their livelihood—have been destroyed by commercial logging: so too, resettlement schemes and restrictive forestry laws have made it impossible for many tribals to pursue their traditional way of life. A study by the Xavier Institute of Social Service shows that headloading has become popular—despite the hard work involved and the low income it brings—because it provides the only source of income that can be relied on throughout the year. The study also points out that headloading gives women some independence from

their menfolk who often squander away their earnings on drink and gambling.

The firewood trade is, thus, a very important factor in the lives of thousands of poor villagers. A ban on headloading, as was emphatically suggested by several of the Forest Department officials we met, would only worsen their situation. Nor, in any case, will it ensure the safety of the forests, for it might only mean a change from private to Government extraction. There is no guarantee that the latter will be less destructive—indeed, it might be more. Recently, after the defeat of the ruling Congress<sup>1</sup> party in a by-election in Sagar in 1982, attributed partly to the shortage of firewood in the city, the Chief Minister ordered Forest Department officials to see to it that Jabalpur (where another by-election was due) got all the firewood it needed before polling took place. Apparently, the party's candidate distributed free firewood to local people and gave them full permission during the campaign period to take as many headloads of firewood from the surrounding forests as they wanted. The 1980 ban on exporting firewood from Madhya Pradesh has never been implemented. Large contractors who buy stocks of firewood at Forest Department auctions are given transit passes which permit them to carry the firewood across the border.

#### Commercial Forestry

There are excellent teak and sal forests throughout the length of the Narmada Valley. With the rising national demand for a wide range of wood products and the steady depletion of timber resources throughout the country, these remaining forests are under increasing pressure. Already there are several wood-based industries in the valley. Plywood, veneer and fibre-board manufacturers siphon off the best teak. Sawmills in Jabalpur, Itarsi, and other towns supply sawn timber not only to Madhya Pradesh but also other states. The Madhya Pradesh Government accords great importance to commercial forestry; indeed, 52 per cent of its non-tax revenue comes from selling forest products or from forest-based industries. Huge depots of commercial wood can be seen at Betul, Mandla, Budni, Khirkia, and several other places. The official claim that commercial extraction is based on 'scientific' practices and causes no reduction in stock, rings quite hollow if one takes into account the scale of industrial use, paper mill consumption and the official firewood trade.

With such a multi-pronged attack on the valley's forests, the future of the catchment area is far from secure. Certainly, under the present inefficient administrative system, the forests cannot be saved from encroachment by various powerful vested interests. Moreover, the project (and its various subsidiary processes) will itself increase the pressure on the forests. The biggest blow will be the submergence of 11 per cent of the forests in the basin. Furthermore, thousands of hectares of forest will have to be cut down to make way for resettlement schemes, to provide fuel for the multitude of workers on the project site, and to provide construction timber for the project. Such destruction will inevitably cause erosion

and subsequent siltation problems with unknown effects on the life of the dams. Indeed, the Government of Gujarat has candidly admitted that 'no decision' has yet been taken on how the siltation problem is to be handled. In the present situation, no decision *can* be taken.

### Submergence

A colossal area is to be flooded under the network of reservoirs that will emerge in the Narmada Valley. One serious aspect of submergence—the displacement of people—has been dealt with below. Detailed here are the other aspects.

### Forests and Wildlife

Over 150,000 acres of forest land in the valley will be submerged by the various dams on the main river. The total area of forest which will be flooded due to the entire project may amount to 350,000 hectares (875,000 acres), according to Mr S.D.N. Tiwari, Advisor to the Madhya Pradesh Environment Planning and Coordination Organisation. This amounts to 11 per cent of the basin's forests. Some of India's best deciduous forests, like the rich teak and bamboo forests of the Chandgarh and Punasa ranges in Madhya Pradesh, will be destroyed.

It is very difficult to calculate the *real* long-term costs of flooding the forests of the Narmada Basin. In their cost-benefit analysis, the project authorities took account only of the *direct* economic losses which would be incurred through the destruction of such *tangible* economic assets as timber, firewood and minor forest products. They totally ignored the *intangible* ecological benefits which the forests provide and which will be lost once they are flooded—benefits such as soil preservation, water conservation and replenishment, climatic stabilisation, air purification and wildlife shelter. As mentioned elsewhere, the Forest Research Institute Dehradun estimates that, over a 50-year period, the value of those intangible benefits amount to Rs. 1, 570,000 per tree. But even if the intangible ecological benefits are quantifiable, the social value of forests may not be. Yet, for a tribal, the forest is of great cultural and psychological importance, and its destruction represents a serious disruptive event. Moreover, there is no way of calculating the loss of the economic and genetic potential of a forest, for there may be dozens or hundreds of species which have not yet been even identified. No systematic survey of the plant resources of the valley has yet been done.

The submergence of so much forest area is bound to increase all kinds of human pressures on adjoining forests. So far, such pressure has not been too great in the Narmada Basin (thus the abundance of forests) but submergence coupled with the other impacts of the project (see conclusion) is certainly going to increase it. In all probability, this increase will exceed the carrying capacity of the basin's forests.

It is claimed by the authorities that compensatory afforestation will be carried out to plant the same amount of forest as is being lost. But this is, to say the least, a suspicious claim. The total money allocated for compensatory afforestation in the Narmada Sagar



One of many state-owned firewood depots in Narmada valley, Madhya Pradesh.

Project Report is Rs. 3,100,000. Taking an average cost of Rs. 2,000 per hectare for replanting, the total area that can be covered with a budget of Rs. 3,100,000 is only 1,500 hectares, which is less than one twentieth of the area to be submerged by Narmada Sagar! Even if, with extra finances, all the lost forest is replaced, the afforestation programme will not necessarily replace the same species as those which will be lost. In other cases, there has been a pronounced tendency to plant commercial species of little ecological value. Even if commercial plantations are avoided (and so far, the authorities have pursued a responsible plantation policy) it would be impossible to recreate the diversity and richness of the existing natural forests.

Besides, where is all the land needed for afforestation going to come from? According to an official of the Madhya Pradesh Environment Organisation, there is just not enough government land. Private land will have to be acquired. This would inevitably mean a certain amount of agricultural land—what will be the consequences for the affected farmers?

Some of the forest tracts coming under submergence are extremely rich in wildlife. But, characteristically, there is no plan to relocate this wildlife. The Narmada Sagar Project Report claims that "impact of the Project on wildlife shall be nil, since wildlife has got natural characteristics of shifting to nearby jungles whenever it is felt unsuitable for them". In other words, wildlife will relocate itself. Such an assumption, however, seems to us to be more a convenient excuse, than a serious proposition. Other than birds and possibly a few alert mammals, how many animals really stand a chance of 'relocating' themselves when the waters come their way? How much adjoining forest is there, anyway, for them to move into? Will not such a movement increase competition between animals (especially the strongly territorial ones) in the new habitat? Will the influx of animals not stretch the carrying capacity of invaded areas to the limit? And, if one includes wild flora in the category 'wildlife', how are all the plants going to 'naturally relocate' themselves? Or, for that matter, the micro-organisms?



Incredibly, for some government departments, 'wildlife' seems to mean only tigers and deer and other big mammals. In an answer to a query of the Department of Environment, the Government of Gujarat says, "At present there is no wildlife in the reservoir area of the proposed Sardar Sarovar Dam and its vicinity". To the very next question, the reply is: "After construction of the dam and the creation of the reservoir, it will be possible to develop a wildlife sanctuary or safari park in its vicinity". Where, pray, is all the wildlife suddenly going to come from? When it comes to costs, there seem to be none; when it comes to benefits, there are suddenly a lot. And when asked to specify which rare and endangered species are present in the submergence zone, the Gujarat Government has kept silent. Why?

#### Agricultural Land

In terms of area, the loss of agricultural land due to the dams on the Narmada itself is even greater than that of forests. Nearly 200,000 acres of cultivable land will be submerged. The valley as a whole may lose up to 500,000 acres of agricultural and other non-forested land under the dam's reservoirs. Since most of this land is situated very close to the rivers, it is highly fertile and productive. Those farmers whose fields will be flooded will not necessarily receive equally (or more) fertile land in return for the land they lose, since there is as yet no requirement for displaced farmers to be rehabilitated in the command areas.

As in the case of the forests, the true value of agricultural land is very difficult to determine. The official estimates take into account only the market value of the crop being produced. The value of the topsoil on such land—which is of greater importance—is underplayed. Considering the already alarming rate of soil degradation and erosion in India, further destruction of topsoil through submersion must be considered a serious matter. Nor has the value of the organisms living in the soil been taken into account—or the socio-psychological significance of ancestral lands to farmers.

#### Culturally-important Sites

Apart from culturally-significant forest and agricultural land, several sites of significance will be submerged. While the more famous pilgrimage spots (Omkareshwar, Maheshwar, Mandleshwar, Nemawar, Amarkantak, etc.) have been spared, hundreds of less well-known sites will go under water. These include those temples which are present in each village or group of villages to be submerged, several well-frequented bathing ghats, and other small sites of historical interest. While such places are not of national importance, locally they play a crucial role in the life of the peasant or tribal. The Surpaneshwar temple in Gujarat, for example, is the most important pilgrimage spot for villagers from several kilometres around—it will be submerged by the Sardar Sarovar Dam. The same dam will also inundate the Shiva temple at Rajghat near Barwani in Madhya Pradesh and the temple in Brahmangaon, also in Madhya Pradesh. And yet the Gujarat Government has told

the Department of Environment that no culturally-important sites will be submerged.

The Narmada Sagar Dam will submerge the Joga Fort, a small 500-year-old fort built by King Hoshang Shah on an island in the middle of the Narmada; it will also inundate the Singhajiki Samadhi, where a big religious fair has been held for the last 450 years.

In some cases, the government plans to relocate the temples, or build new ones at the resettlement sites. The Bargi Dam oustees, for example, will get a new temple at the resettlement site. This will, of course, reduce the loss, though not eliminate it completely.

#### Grazing and Other Lands

Over 100,000 acres of 'other' land will be submerged by the dams on the Narmada and a much larger area by the project as a whole. The land which will be lost includes grazing lands, human settlements, barren areas, and so on. Undoubtedly, the inundation of grazing lands will have the most serious repercussions.

As we have noted elsewhere, there is already considerable pressure on grazing land in the valley due to the massive seasonal influx of cattle from outside. In such a situation, large scale loss of grazing land can only be disastrous. The project plan, of course, envisages an increase in stall-feeding and decline in free grazing by cattle, but this seems quite an impractical 'solution'. In the guidelines for rehabilitating the oustees, there is not even any requirement to provide alternative fodder sources. The cattle, their owners, and the remaining grazing lands are all likely to be sufferers of the submergence.

The impact of the Narmada Sagar Dam near Punasa in Uttar Pradesh will be particularly serious. This dam will have a full reservoir level (FRL) of 560ft; at this level, the reservoir will spread over an incredible 910 square kilometres, or 90,820 hectares (224,000 acres) of land. This will be the largest reservoir in India. Alone, it will submerge over 100,000 acres of agricultural land, and about 85,000 acres of forests. Some 120,000 people from 326 villages will be displaced, including the entire Tehsil town of Harsud in Khandwa district. The compensation to these oustees alone is estimated to amount to Rs. 2 billion, a little more than £1,000 per family. In addition, a 32 kilometre stretch of railway track will be submerged; building a replacement track will cost over Rs. 650 million.

The social and environmental implications of this massive reservoir have not gone unnoticed. Very recently, a member of the Madhya Pradesh planning board and former irrigation minister, Mr Ramchandra Singhdeo, asked for a review of the project. In a note submitted to the Chief Minister, Mr Singhdeo stated that the economic and environmental cost of the dam may well 'spell disaster' for the state's economy. Nonetheless however, the late Prime Minister, Indira Gandhi, laid its foundation stone in September, 1984. For purely 'sentimental' reasons, it may now be difficult to get a serious reappraisal made!

No objections have been raised against the other dams. This is possibly because *individually*, their reservoirs are likely to have less of an impact than the reservoir at Narmada Sagar. But we would like to



PHOTO: PETER STALKER

Bhil tribesman and son—threatened by disappearance of Narmada forests.

stress that the *combined* effects of the other reservoirs is bound to be highly detrimental to the social, environmental and cultural health of the valley. This in itself is reason enough to undertake a serious reappraisal of these big dams.

### Displacement and Rehabilitation

The network of reservoirs that will accompany the project will displace a vast number of people—possibly a million in all, according to the National Institute of Urban Affairs. Many of the oustees will be tribals. Considering the sheer magnitude of the required rehabilitation programme and the present state of the rehabilitation 'machinery', the situation is alarming. We found several faults in both the planning and implementation of the resettlement programme.

The Narmada Water Disputes Tribunal has laid down a series of directives for the resettlement of oustees from the Sardar Sarovar project. As was repeatedly emphasised to us, the directives are a marked improvement on past rehabilitation policies. Since the Sardar Sarovar Dam will displace people in Gujarat, Madhya Pradesh and Maharashtra, the Tribunal was principally concerned with ironing out the problems of interstate relations. Nonetheless, it is likely that its directives will form the basis of the independent rehabilitation policies pursued by each of the three states. It is thus important to review the Tribunal's recommendations in some detail.

The most important directive is that all landowning families who lose at least 25 per cent of their land to flooding must be allocated as much land as is lost—with a minimum of 5 acres. In addition, a resettlement grant (transportation costs, etc) of Rs. 750, plus a

grant-in-aid to those receiving total compensation of less than Rs. 2,000, is to be given. In the resettlement villages the oustees must be provided certain civic amenities—including primary schools, panchayat ghars, dispensaries, seed stores, children's parks, a drinking-water well, a main linkroad, and house sites. As far as possible, culturally-important sites are to be relocated. No area can be submerged till compensation and expenses are paid and rehabilitation arrangements complete.

Some of the steps taken so far are indeed commendable. Compensation for houses has been generous, transport costs have been met by the Government and bank accounts opened so that oustees do not quickly fritter away the compensation money. But we found that current rehabilitation efforts are still far from satisfactory. This is both because the directives have not been always adhered to, as also because their recommendations contain serious loopholes and omissions.

For one thing, the Tribunal's directives relate only to oustees from Madhya Pradesh and Maharashtra, not to those from Gujarat itself. A study shows that only about 20 per cent of the farmers are likely to shift to Gujarat; the rest preferring to stay in their home states. In other words, the Tribunal's directives, even if adhered to, will be effective for less than 12 per cent of Sardar Sarovar's oustees!

In fact, the state rehabilitation policies of Gujarat and Madhya Pradesh have not as yet been modelled on the Tribunal's directives. Thus the 'land for land' policy has totally failed in the case of the Gujarat oustees. The Gujarat Government has just not bothered to find adequate land for them. Most of the people (Tadavi tribals) of the 6 villages shifted so far have instead received cash compensation. But while these villagers obtained what seems to be a reasonable compensation of Rs. 4,600 per acre (and that only after sustained public pressure and a court case), the policy of cash compensation is in general a rather callous one. As T. Scudder notes in a report submitted to the World Bank, on rehabilitation in Sardar Sarovar: "Cash compensation usually results in lower living standards and reduced quality of life among the large majority of relocatees".

There are several reasons for this, including the fact that assets held by the oustees are generally undervalued while the value of assets in the adjacent areas where oustees want to move is inflated. The rest of the Gujarat oustees are being offered only Rs. 3,200 per acre, while land of equivalent quality is available at a minimum of Rs. 6,000 per acre. Cash compensation also exposes oustees, especially tribals, to the exploitative practices of money-lenders, lawyers and landowners. To make matters worse, the Gujarat Government has refused to act as intermediary between the tribal oustees and landsellers. Yet another problem of cash compensation is that the planned rehabilitation villages exist only on paper, since the oustees have been forced to scatter over a wide area—instead of being relocated together. In fact, the Madhya Pradesh status report on land acquisition and rehabilitation (with regard to Sardar Sarovar) states:

"It is expected that much of the land will be bought by oustees themselves with compensation paid to them. It is not expected that many new rehabilitation villages will have to be set up."

Both the agencies contracted to study the rehabilitation problem, the centre for Social Studies (Surat) and the National Institute of Urban Affairs (New Delhi), strongly recommended against a policy where oustees were expected to purchase land on the open market. Yet both Madhya Pradesh and Gujarat are following this policy. Scudder notes that, due to this, "the odds are high that the majority of (Sardar Sarovar's) oustees will be worse off following removal".

The scattering of tribals into far-flung areas is likely to have serious socio-cultural repercussions. Scholars at the Centre for Social Studies, Surat, told us that the Sardar Sarovar oustees have a marriage circle consisting of several neighbouring villages. Being forced to resettle outside this circle could itself be a major jolt to their social and personal lives.

The problem of social disruption is exacerbated by the system of land registration. In tribal areas, many large, joint family holdings are registered in the name of the household head. Under the Land Acquisition Act, however, only this titleholder gets compensation. Scudder notes that this policy is sociologically devastating since it creates tensions and ill-will between fathers and sons, between brothers, and between other kin with joint rights in land. The policy throughout India to compensate only the individual title holder actually exacerbates community tensions and disintegration. This disruption has occurred in the case of the tribals already shifted in Gujarat, as documented by the Centre for Social Studies. And as the Chattra Yuva Sangharsh Vahini, an organisation working among the Sardar Sarovar oustees, points out, 2,109 families in the 19 Gujarat villages which will be submerged are dependent on the use of only 624 holdings. Consequently, the existing policy "will leave the majority landless, and will also disrupt the social relationships between those involved".

Two other policies will add to the problem of social disruption. One is to pay compensation only for land that is *actually* submerged. This has meant an overall loss for those whose land is only partially submerged but who will nevertheless have to abandon the whole of it. One oustee we met, Natwarbhai, had 27 acres, but only 15 of these were to be actually inundated—he did not get compensation for the remaining 12 acres. In the first five Gujarat villages which have been shifted, almost 100 acres has already been lost due to this insensitive policy. However, in some cases, the new land bought has been more productive, which has partially compensated the loss. Otherwise, villagers have had to make up the loss by working as temporary labourers on the dam site or elsewhere.

A second policy is to compensate only that land for which the cultivator has a legal ownership lease. In those tribal villages of Gujarat which have still to be shifted, as many as 1,095 out of 1,721 families cultivate some 'forest land'. Since this land legally belongs to the Government, no compensation will be paid even

if it has been cultivated for a few generations. For many families this will obviously be a severe blow. The problem in Madhya Pradesh may, however, not be so acute since all forest encroachments prior to 1977 have been regularised.

For the forest-dwelling tribals, possibly the most serious aspect of displacement (apart from social disruption) is the break from their natural surroundings. The forests and the river play a central part in their cultural and economic life—neither will be available where they resettle. The tribals are especially dependent on locally abundant trees like mohwa (*Madhuca indica*), teak (*Tectona grandis*) and bamboo. Already, those who have been resettled are facing a shortage of fuelwood and fodder which were plentiful in their previous environment. Unable to afford or obtain enough fodder and firewood, oustees settled at Khadagda village travel 25 to 30 kilometres with their cattle to their original village (Khalwani), where the forests are still intact. But even this is only a temporary source—firewood will have to be *bought* once Khalwani is submerged. There is no move yet to provide alternatives. Promises by the Forest Department to start plantations have not yet materialised and will in any case not solve the problem for another 8 to 10 years. At some resettlement sites, there is also a shortage of water, a situation never before faced by villagers living on the banks of the river.

The Tribunal's Directives—indeed the rehabilitation policies in general—show a callous disregard for the landless. While they will be paid compensation for their houses, there is no plan to provide them with alternative employment, or with facilities to continue their current occupations in their new villages. What is usually ignored is that these people are intimately tied to a community by the services they provide to it—the displacement and dispersal of their community thus inevitably leads to loss of livelihood. At Bargi Dam, oustees are being given priority in employment schemes, but this is an exception. At Sardar Sarovar (and possibly elsewhere too?) the landless (and those who cultivate only forest land) have not even been counted as oustees. There is as yet no detailed training programme which could ensure these people a secure economic future.

While the Gujarat oustees have been able to organise themselves and demand better rehabilitation (with the help of Chattra Yuva Sangharsh Vahini, a voluntary activist organisation), there is no sign of this among the Madhya Pradesh oustees of the Sardar Sarovar and Narmada Sagar dams. Our talks with oustees in Madhya Pradesh revealed that until now they had only a vague idea that they 'had to move', with no clue as to when, where, how and with what compensation. In fact, not even the officials we met knew these details—everything was still 'under preparation'. In the tribal area affected by Narmada Sagar, there was a firm belief that nothing could stop the flow of 'Narmada Mai'; the dam just could not be built.

The rehabilitation of the citizens of Harsud, a town in Khandwa district, which will be entirely submerged by Narmada Sagar, has caused considerable controversy. The site chosen for resettlement, Suktapur,



Protest rally by tribal peoples ousted by Sardar Sarovar Dam, March 8th 1985

is claimed by the citizens to be too rocky. They want land near Ashapur, which is just a few kilometres away from Suktapur and which is more accessible. But this land is forested and the Forest Department refuses to relinquish it. Harsud's citizens argue that if the Government has no qualms about submerging 80,000 acres of forest, why cannot it give 1,500 acres more for rehabilitation? No final decision has yet been taken.

Meanwhile, the nature of the government's priorities becomes clear when one looks at the temporary colonies that are being built to house the staff working on the dams. The buildings at Kevadia Colony, which houses 5,000 staff members working on the Sardar Sarovar Dam, have cost the princely sum of Rs. 230 million. This is not surprising, considering the VIP rest houses and circuit houses that have been built. Add to this sum, the cost of building roads, supplying electricity and setting up a communications network and the total cost comes to Rs. 330 million—more than has been allotted for the permanent resettlement of the 67,000 people displaced by the dam. At the staff colony being built at the Narmada Sagar site, dense forest has been cut down to make way for an airstrip, presumably for use by World Bank officials (and the Prime Minister during the inauguration?). To top it all, the authorities have little idea of what to do with most of the facilities created in these colonies once the dam is completed. The colony of the now completed Tawa dam in Hoshangabad district, was built to accommodate 10,000 people—today only 2,000 use it. If these colonies are so temporary, why not use

cheaper material that can be dismantled? What is the need for VIP rest houses and circuit houses?

Rehabilitation is a delicate matter, requiring a good deal of understanding and dedication. Scudder argues that it is a callous mistake to let officials from the Irrigation and Revenue Department handle it, as is the case at Sardar Sarovar. "The strengths of (these) officials relate to land acquisition and compensation but not to rehabilitation . . . Their approach to rehabilitation lays emphasis not on the future welfare of oustees but on their physical transference from the reservoir basin." The rehabilitation officials we met were usually quite indifferent to their work, barring some exceptional officials who were fairly well motivated. By and large, however, there was a general ignorance of the socio-cultural patterns of the oustees and an attitude of disrespect towards them. As the rehabilitation officer of Sardar Sarovar remarked, "they (the oustees) are in a 'Jungle' state, we are bringing them into civilisation".

Most of the oustees of the Narmada Project are still to be moved. If their rehabilitation is not to be a total disaster, it will be necessary to ensure that land *is* given for land: that *all* the land lost is replaced; that alternative sources of firewood and fodder be provided; that all members of a single village be resettled together; that land be given in the command area; and that the landless be looked after with special care. Most necessary, however, is that in-depth sociological and anthropological studies be immediately carried out to find out the special requirements of the oustees.

Without a total understanding of the cultural ethos and psychological make-up of the tribal and the peasant, rehabilitation is bound to be a failure. But given the massive scale of the resettlement programme necessitated by the Narmada Project, is all this feasible? Will it be possible to ensure that the above conditions are observed?

### Irrigation

Over the last few decades, India has gone in for large canal irrigation schemes on a massive scale. But there are indications that most of these schemes have not fully achieved their stated objectives.\* In fact, Dr B.R. Bhumbra, former Vice-Chancellor of Haryana Agricultural University, questions whether any irrigation project in India for the last 100 years has been cost-effective or beneficial to agriculture in the long run. According to him: "It is evident that the benefits (of large and medium projects in India) in arid areas though spectacular for the first 10-20 years, gradually get reduced and a considerable portion of the land deteriorates because of waterlogging and salinity. The life of buildings and roads gets reduced . . . the incidence of disease increases. In humid areas, benefits are doubtful and in many cases negative. *The programmes of major and medium irrigation works that have been envisaged for the future in humid areas, would not only lead to disastrous consequences in degradation of soil and environment but would also result in reduced agricultural production.*"

In view of the above, one must treat with suspicion the claims made for the Narmada Project. A total of 4,960,000 hectares are expected to be irrigated. Whether this will be possible within the stipulated time period is itself questionable, considering the present level of efficiency of Government departments. What is even more questionable is the expected increase in production after irrigation—in the case of Narmada Sagar Dam (Khandwa District), this has been put at an incredible 8-fold increase. Scepticism about such claims is further strengthened by a look at the experience of one of the few major dams already constructed in the valley—the Tawa Project.

The Tawa Dam, situated on the River Tawa in Hoshangabad District, was started in the late 1960s but the full canal system is yet to be completed. A revised estimate claimed that it would achieve full irrigation potential of 333,000 hectares by June 1983, but by then only one-third of this area had been covered, and an official at the dam site admitted that the scheme would take a few more years to complete. Meanwhile, the delay has already led to an escalation in costs of over 500 per cent—from Rs. 180 million (estimated in 1958) to the present estimate of Rs. 1 billion.

But the greatest controversy has been over the

\*Instead of increasing production to the expected 4.5 tons per hectare, irrigation has on the average increased it to only 1.7 tons, and most major schemes have fallen short of their stated irrigation potential.

\*\*There has also been phenomenal growth of all sorts of weeds and grasses along canals and on fields, some of them extremely hard to eradicate. Farmers also complained of increasing incidence of waterborne diseases, though we could not confirm this.

project's environmental effects, mainly waterlogging and the proliferation of weeds. Neither the main nor the subsidiary canals were given 'pucca' lining, and no importance was given to a proper drainage system. The result: instead of an expected 30 per cent seepage rate (which itself is atrocious), the seepage (according to the then Deputy Director General of Indian Council of Agricultural Research) was about 60 per cent. This, coupled with the water-retentive property of black cotton soil, has meant large-scale waterlogging and the threat of salinity. Opinions differ on the extent of waterlogging—official reports put it at 200 hectares, but farmers represented by the 'Save the Soil Campaign' claim that it is over 1,000 hectares, and steadily increasing.\*\* As only a part of the command area is as yet irrigated, the problem is bound to increase. Even five years after the waterlogging was first detected, no steps had been taken to reclaim the land. The Government claims it will do so in 1985.

The Tawa project is today held to be a classic case of faulty planning and mismanagement. One engineer who had been connected with the project told us that some officials with little field experience decided to provide irrigation in order that paddy could be grown during the dry season. They did not know that the black cotton soil of the area is unsuited to paddy. Experiments in the first year (at the farmers' expense) proved to be a failure, and it was later decided to convert the land to soyabean cultivation. Extensive areas are now under soyabean, and while this has increased monetary returns to farmers, it has caused problems typical of the conversion from food to cash crops. For one thing, such 'commercialisation' of agriculture makes farmers dependent on the vagaries of the market, from which they were previously relatively independent. Secondly, the crops that have been replaced are usually those amenable to immediate local use, which the new ones are not. In Hoshangabad, soyabean has replaced jowar, alsin, and tuar. Jowar provided food for humans and fodder for cattle from November to February. Soyabean cannot be used directly; it has to be sold to be processed. Is there any guarantee that the presently high market value of soyabean will be maintained? Moreover, large-scale conversion to non-food cash cropping (as is being promoted now in the valley) is bound to affect local foodgrain production. Farmers will have to buy more and more of the food they once produced for themselves. Moreover, the lure of materialism is strong and many families may be persuaded to spend their money on consumer goods rather than nutritious food—to the detriment of the health of both parents and children.

The production of foodgrains was supposed to increase by 1,396,000 tons as a result of the Tawa project, but there are doubts about whether there has been any increase at all. The Auditor-General of India reported in 1981 that according to the findings of the State Land Record Commissioner, there had actually been a decline in the yield of every major crop in Hoshangabad. The average yield per acre of wheat fell from 3.14 quintals before irrigation to 3.06 quintals in 1978-79; of grams from 2.43 to 2.08 quintals; jowar

from 2.82 to 2.74 quintals; maize from 4.48 to 4.01 quintals; and paddy from 4 to 3.83 quintals. The ICAR Deputy Director-General pointed out that those areas that were the most productive under unirrigated conditions have been worst affected because they are low-lying.

Some officials claim that the Auditor-General's report is based on incorrect data, and that, in fact, there has been a great increase in production. A 1983 article in *The Statesman* claimed that production of HYV wheat and local wheat has increased by 146,900 quintals and 52,101 quintals respectively. But the article did not mention the source for those figures. If one is asked to disbelieve the Auditor-General's report (based on Government data), how is one to trust any Government data showing increase in production?

It is possible that the Tawa experience may be repeated at the other irrigation projects being set up in black soil areas with high rainfall, which includes most of the Narmada Valley. The Barna project in Raisen district is reported to be causing widespread waterlogging and the farmers are now rising up in protest. To a large extent, of course, lining of canals (required by the World Bank) in the new schemes will reduce seepage—but it will not necessarily eliminate it. Considering the high water table and the high average rainfall of the basin, waterlogging is a definite threat. To reduce the risk, it will be necessary not only to line the canals, but also to ensure large-scale utilisation of groundwater, proper field drainage, the education of farmers on irrigation methods, the strict implementation of canal-construction laws, and so on. Given the massive scale of the project, will all these requirements be fully met? We doubt it, considering the yawning gap between planning and implementation, the inefficiency of Government departments and the lack of coordination between them.

But at least planners seem to be aware of these problems and are promising to do something about them. In the plans for the Sardar Sarovar dam project (the biggest in terms of irrigation potential in the Narmada scheme), Rs. 40 million has been allocated for drainage measures, and only one-third of the water supplied in earlier schemes will be provided per hectare of the command area (which is in any case mostly drought-prone). Studies are being conducted to check the spread of weeds, disease, and pollution from fertilisers and pesticides. Grain production is expected to go up by 3.5 times—a more modest and realistic projection than that made for Narmada Sagar.

The case of Tawa and other such projects underlines the urgent need for a comprehensive, in-depth evaluation of all the irrigation schemes set up in the past in India. There is, moreover, the need to pay greater attention to alternatives to large-scale, river-based irrigation, such as groundwater utilisation and efficient rainwater management.

### Benefit-Cost Analysis

A project is sanctioned by the Planning Commission only when the benefit-cost ratio is over 1.5 to 1: that is, for every rupee spent there must be a return of at least Rs. 1.50. The assumption, of course, is that the ratio

has been honestly calculated by the project authorities. But this is rarely so—as one of the engineers of Sardar Sarovar dam admitted to us, the ratio is often distorted by exaggerating the benefits and underplaying the costs, so as to get the project sanctioned. Details about the benefit-cost analysis are often vague, incomplete and, at times, seriously faulty. Below, we give some specific examples.

### Costs

*Submergence of Forests:* The annual growth rate (the increment) of the forests to be submerged is multiplied by 100 to obtain the loss that would accrue to the Forest Department over a period of 100 years (the expected life of the dam). But when the standing forests which yield timber and firewood (the capital) are felled and sold, the Forest Department earns sizeable revenue. This is deducted from the earlier loss, and the figure obtained is taken to be the value of the forest lost to submergence. We feel that there are three things seriously wrong with this method of computation:

a) Why should the capital (the value of the standing forest in terms of timber, fuelwood and minor produce) be deducted from the total loss? Had the forests not been submerged, under proper management they would have yielded the annual increment while the capital would have remained intact even after a period of 100 years. Also, of course, the annual increment would have come indefinitely—not just for the next 100 years. But even if one accepts this artificial time limit, the total loss due to submergence would be the incremental value for 100 years plus value of capital, not minus it. Of course, if this was done, most projects which drown large areas of forest would become quite uneconomic!

b) Why should the value of a forest be calculated only in terms of commercial products—timber, firewood, and minor produce? Are not the intangible ecological benefits far more valuable? As we have seen, the value of benefits like soil conservation, climatic regulation, water recharging, and wildlife habitat has been calculated at 1,570,000 rupees per tree per 50 years! The loss of ecological benefits is never taken into account, because for our planners a tree is only timber and firewood.

c) Forest submergence also entails the flooding of diverse wild flora and fauna. This loss is never taken into account. 'Wildlife' is thought to refer only to a few large mammals, and even then it is assumed that 'natural relocation' will save such mammals from drowning.

*Rehabilitation and Land Acquisition:* The cost of these items is frequently underestimated. As a result, if officials keep to the estimated costs, oustees inevitably receive inadequate compensation. If, however, actual costs are allowed to exceed estimated costs, then the benefit-cost ratio is distorted. Usually, dam projects are characterised by both inadequate compensation to oustees and distorted benefit-cost ratios.

*Other Costs:* No account is ever taken of minerals lost to flooding, of administrative overheads, the costs of pre-impoundment studies or of maintenance operations in catchment areas.

### Benefits

*Irrigation:* The expected increase in crop pro-

duction is usually exaggerated and is rarely realised for two reasons—first, the dams often fail to provide irrigation to the entire stipulated command area and second, the per acre production rarely increases 4-5 times as expected. Also, a lot of land is often lost to waterlogging and salinity.

What is most glaring however, is that the expected increase in agricultural production is made out to be a result exclusively of irrigation, at least for the purposes of the benefit-cost ratio. In reality, the increase is due to various other inputs also, like fertilisers, HYV seeds, pesticides etc—yet, curiously, the cost of these inputs is omitted.

*Power:* Again, the expected benefits seem exaggerated, since power generation is usually below the expected rate, and an enormous amount is lost during transmission. Also, the cost of transmission of the power is not taken into account.

### Benefit-Cost Analysis of the Narmada Project

In the case of the Narmada Project, some of our findings indicate that the benefit-cost analysis might have been distorted for two of the major dams—Narmada Sagar and Sardar Sarovar.

It is claimed that the irrigation provided by Narmada Sagar will bring an 8-fold increase in grain production! In fact, according to Dr Sahni of the Indian Agricultural Research Institute (IARI), there has been no increase in grain production in Khandwa district despite the area under irrigation increasing from 3.4 per cent of the land in 1961 to 9.9 per cent in 1981. The reasons for this are being investigated by IARI. But certainly, the estimated increase in grain production under Narmada Sagar (from 97,000 tonnes to 802,000 tonnes) is highly questionable. Since increased food production is the major benefit claimed for the dam, the benefit-cost ratio itself becomes questionable. In the case of Sardar Sarovar Dam, a more sober increase of 3.5 times is expected, but there is no certainty of even this, for it will only be possible if a completely different pattern of agriculture is introduced.

The costs of *submergence* and *rehabilitation* too have been seriously underplayed. Scudder notes that Gujarat has underplayed relocation costs since it has to pay for relocation in all three States affected by the reservoir of the Sardar Sarovar Dam. The Project Report of Narmada Sagar, brought out in 1982, puts the cost of Unit 1 (the dam, *including* submergence and rehabilitation) at Rs. 3.45 billion. But according to a Senior Official in the Madhya Pradesh Environment Planning and Coordination Organisation, the purely economic value of the forest which will be submerged is alone Rs. 3.3 billion. Rehabilitation will cost another Rs. 2 billion and relocation of the 32 kilometre railway line that is to be submerged an additional Rs. 650 million. All this adds up to Rs. 5.95 billion—far more than the estimated cost of Unit 1 without even including the cost of dam construction or the loss of agricultural land. Moreover, in the case of both Narmada Sagar and Sardar Sarovar, the value of the forest lost is calculated in the illogical manner described above (i.e. the value of capital is deducted from the value of



Traditional boatman near Barwani, Madhya Pradesh, who will be forced out by the Sardar Sarovar Dam on the Narmada.

100 years increment). If the real value were calculated, the cost of submergence would be far greater—particularly in the case of the Narmada Sagar Dam which will submerge 33,000 hectares of prime teak forest.

The loss of wildlife is omitted from the benefit-cost analysis for both dams. In fact the Sardar Sarovar authorities have claimed that “there is no wildlife in the submergence area”! The Narmada Sagar authorities however cannot make such a claim, because some of the areas to be submerged are very rich in wildlife—especially the Punasa and Chandgarh ranges.

It is claimed for every acre of forest lost to submergence, an acre will be afforested. If however this is to be done for Narmada Sagar, over Rs. 66 million will have to be spent (assuming a per hectare plantation cost of Rs. 2,000). But the money allocated for ‘compensatory afforestation’ is only Rs. 3.1 million. Either the figure is distorted, or else afforestation will be woefully inadequate. The Sardar Sarovar plan, however, allots Rs. 50 million for afforestation, which is much more than is needed for compensating the forest loss.

Land acquisition costs have, in fact, been underplayed elsewhere too. For Sardar Sarovar, land acquisition for rehabilitation and for canal construction was estimated to cost Rs. 2,000 per acre. Yet the rehabilitation of the first five villages to be resettled has alone cost Rs. 4,600 per acre—and the laying of canals in Bharuch district has cost Rs. 3,200 per acre. No funds have been allocated to acquire arable land for resettling oustees. Costs for land acquisition will be much greater than estimated in the benefit-cost analysis—unless of course the remaining oustees are given abominably low compensation!

Finally, but most significantly, there is the inevitable problem of cost escalation. At present the Narmada Project is expected to cost Rs. 90 billion—but the final cost may be over Rs. 250 billion. Of course, the value of benefits will also increase but there is no guarantee that they will increase at the same rate as costs. How will this affect the benefit-cost ratio?

To conclude, then, it seems to us that the benefit-cost analysis for the project (at least for these two

dams) has been inadequately carried out and in some cases the figures appear to have been deliberately distorted.

### Conclusion: Is this Development?

The sheer scale of the Narmada Valley Development project is mind-boggling. Thirty large dams, together with 135 medium-sized and 3,000 minor dams, are expected to be built in the valley in the next two decades or so. Thousands of miles of canals and power transmission lines are to be constructed. One million people will have to be rehabilitated, necessitating large-scale land acquisition in the command areas. At least 350,000 hectares of forest has to be compensated for, and a large-scale planting programme (as well as a strict policy for protecting forests in the catchment areas) will have to be undertaken. At least 5 million hectares of agricultural land in the command areas will have to be protected against waterlogging and salinity, and extensive measures taken to check the inevitable increase in waterborne diseases and the growth of weeds. Most importantly, thousands of farmers will have to be educated about the new agricultural practices that are to be introduced.

The authorities claim that all this will be smoothly carried out. From our observations we can assert that this claim is at best a delusion, at worst a blatant lie. As we have indicated earlier, the planning of the project has been grossly inadequate—implementation can be expected to be worse. There is a serious shortage of technically-qualified personnel, and existing personnel are often poorly informed. Many of the engineers we met at the dam sites knew hardly anything about the dam they were working on, and one top official admitted that he knew less than we did about the project. Simply integrating the hundreds of dams and their multiple functions into one single system is a stupendous task, yet no-one appears to have a clear idea how it will be achieved: inter-departmental rivalry and lack of coordination is common, transfers of officials frequent, and irregular political interference rampant. Worst of all, local people (both those to be displaced and those already in the command area) have not been involved in either the planning or the implementation of the project—yet they are expected to make drastic changes in their lifestyles, working patterns, attitudes and social relationships within a single generation.

Most of the problems noted above are really issues of 'management'—but the changes that the project will bring about are so immense, and so sudden, that 'managing' them in present conditions may well be impossible. On that score alone, the project appears to be sheer madness—or at best, a dangerous gamble.

But there are more serious implications. Even if the project is implemented successfully, the very nature of the changes that it will initiate may cause the environmental destruction of the valley and, consequently, the negation of any short term benefits the project might bring.

It is expected that with the completion of the project, the Narmada Valley and its adjoining areas will witness a dramatic agricultural revolution. Dairy

farming and pisciculture will be greatly boosted, a consumer economy ushered in, and rapid urbanisation will take place. An industrial revolution—based on the exploitation of mineral resources, forest products and hydroelectricity—is also expected. The scenario for 'prosperity' is thus complete.

But the scenario is also very frightening, for there is little forethought about the environmental and social consequences of all these 'revolutions'. The very forces which are causing destruction of the catchment forests today—mining, agricultural extension, urban firewood and timber consumption, demand from paperpulp and other wood-based industries, and so on—are precisely the same as those which will be encouraged by the project. The strain that this will place on the valley's environment is in addition to the direct and indirect impacts of the colossal submergence that the dams will entail. It is unlikely that plantations can fully mitigate these impacts—in any case, plantations rarely serve the same ecological and social functions that natural forests do. With the inevitable destruction of catchment forests the rate of siltation may become much higher than presently estimated, thus reducing the life of the dams. Soil erosion will also affect agriculture. In addition, the inputs of the expected 'green revolution' will take their toll, as they have done elsewhere in India and the world. Most of the valley has black soil, and a fairly moist climate—under such conditions, canal irrigation invariably leads to extensive waterlogging. Extensive monoculture and large-scale use of chemical fertilisers may prove counter-productive in the long run, for they reduce the fertility of the soil. Chemical pesticides may kill useful organisms and have adverse effects on human health; in addition, their benefits are only short-term since pests quickly develop resistance to them. The introduction of uniform high yielding varieties (HYVP) may lead to a dangerous decline in the genetic diversity of crops. All these negative impacts have already been felt where the 'green revolution' has been initiated. Nor can the proponents of the 'revolution' honestly claim to have substantially reduced, much less eliminated, hunger and malnutrition. In fact there has been a decline in per capita availability of cereals and pulses from 469 grams per day in 1961 to 452 grams in 1977-78. The picture is worse on the consumption side: according to the National Sample Survey, per capita calorie intake declined from 2,455 calories a day in 1961-62 to 2,170 in 1971-72. It is expected that grain production will increase to over 300 million tonnes by the turn of this century—this may well happen, but the long-term environmental impact (declining soil fertility, increasing pest resistance, narrowing genetic base etc.) may eventually offset this 'short-term' gain. Any human activity which is carried out *against* rather than *with* Nature is bound to backfire—and the 'synthetic' agriculture that is being promoted under the 'green revolution' will not be an exception.

Yet another assault on the valley's environment will come in the form of air, water, and noise pollution from the industries and town which are planned in the area. The Narmada is so far one of the least polluted rivers



in India—the project will see to it that it no longer remains so.

The cultural and psychological effect of the project on the people of the valley, especially the thousands of tribals who will be displaced, is as alarming as the scheme's likely environmental impact. There is little sociological understanding of the various tribes living in the valley. Even where there is the knowledge, there is little respect and sympathy for their spiritual or religious beliefs and values, their strong links with their physical environments, their social lifestyles and interrelations, and their unique integration of economic, social, cultural and political factors. With the advent of the project, these tribals are expected to be 'brought into civilisation' and to adopt commercial, materialist, consumerist, competitive attitudes. In one sudden move, they are expected to fit into a social and physical environment that is drastically different from the one in which they have lived for generations. The 'culture shock' will be massive. If there is nothing to re-establish their strongly integrated society (which will inevitably break down) these people will cease to live independent and dignified lives and will instead be transformed into an exploited and alienated mass.

Another adverse impact on cultural life will be the disruption of the 'parikrama'—a tradition which has through the centuries become deeply ingrained in the minds of the valley's inhabitants. With nine big reservoirs coming up along the Narmada, how are pilgrims going to circumambulate the valley on foot? What kind of changes will have to be made to the traditional rules? What will be the consequent socio-psychological effects? There is no clear understanding of these problems. The only positive aspect is that the Government will relocate many (though certainly not all) of the temples being submerged. But temples and other physical constructs are a small part of the cultural ethos of a region—the rest is being ignored or treated as lightly as wildlife relocation.

Deforestation, soil erosion and impoverishment, siltation of reservoirs, pollution, land scarring, wildlife destruction, cultural disruption—all these seem to us to be *inevitable* impacts of the kind of activities that the Narmada Project in its present form envisages. In the long run, *such environmental disruption is bound to reverse the temporary gains made by the project.* Indeed, the project appears to us to be nothing short of suicidal.

The destruction which the Narmada Scheme will cause is not isolated. In fact, destruction is the overwhelming characteristic of the present 'developmental' model that we in India have borrowed almost wholesale from the West, without paying heed to its possible consequences. Its typical components are: large-scale industrialisation, technological sophistication, commercialisation of agriculture, rapid urbanisation, mechanisation, consumerism and gross materialism. And its typical results? Large-scale resource depletion, ecological destruction, socio-cultural disruption and alienation, concentration of wealth and power.

In India, we have adopted this model without critically appraising its long term consequences and

implications, without learning at all from the experiences of the West. Just a couple of examples will suffice here. The proponents of the 'green revolution' are advocating the use of crop varieties dependent on chemical fertilisers, not realising (or conveniently ignoring?) the fact that these fertilisers are based on petroleum, supplies of which will soon run out. A consumerist economy and culture is being introduced without realising that the USA, with one-third of India's population, needs 40 per cent of the world's resources to maintain its consumerism. Many more such short-sighted and suicidal elements of our 'development' process can be cited.

The process we have embarked on is not only ecologically non-sustainable, it is also socio-culturally destructive. It has increased inequalities; concentrated power in the hands of a few; swamped valuable traditional cultures and knowledge systems; destroyed the spiritual part in us; broken integrative social relationships and isolated individuals from each other and from Nature. Most damagingly, our fixation with this 'Western' model of development has meant the neglect of all alternative forms of change, including the possibility of developing on traditional time-tested, ecologically-sound practices like organic farming.

Is this development?

#### Acknowledgements and Postscript:

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A follow-up trip was made in October 1983 to Amarkantak to start an intensive study on the source of the Narmada. This study will continue as part of a longer project on resource conflicts in some of the catchment areas of the upper Narmada, to be undertaken in summer 1984.

Meanwhile, as mentioned earlier, there remain several gaps in information in this Report, which has not allowed us to make as conclusive a report as we would have liked to. We request all those who may have further information on the project and its likely impacts to get in touch with us. And, of course, we eagerly await reactions to this Report. Please write to: Ashish Kothari, 1 Court Road, Delhi-110054.

**STOP PRESS. The World Bank has suddenly announced that it has suspended for three months further funding for the Narmada Scheme. But to suspend it is not enough. Funding must be irrevocably cancelled.**