

## India's Narmada Valley Hydro Project

*by Veena Gokhale*

India's Narmada Valley Project - a series of 3,200 dams to be built over a century on the Narmada River in the western part of the country - is the country's biggest irrigation scheme. And, according to many environmentalists, it is also its most controversial. At a cost of Rs. 135 billion (C\$10.4 billion), the project will displace more than a million people and submerge 350,000 hectares of forest and 200,000 hectares of cultivated land in exchange for providing irrigation, electricity and the economic opportunities both will bring. As always, development comes with a price; the Narmada Valley Project is under worldwide scrutiny to determine how big its human and environmental price will be.

### HISTORICAL PERSPECTIVE

The Narmada River, which originates at the town of Shahdol in the state of Madhya Pradesh, flows for 1,300 km through Gujarat, Maharashtra and Madhya Pradesh - the three states of western and central India and empties into the Arabian Sea. It has 41 tributaries and its basin is home to more than 20 million people.

After India's independence in 1947, the river became the inevitable source of interstate water disputes, with each of the three states proposing their own schemes to harness its irrigation and power potential. (The Narmada Water Dispute Tribunal was set up in 1969 to distribute these river resources equitably among the states.) The plans became increasingly ambitious, eventually leading to the current goal of building 3,200 dams within the next 100 years.

Of these, the largest and most important are the Sardar Sarovar and Narmada Sagar dams, approved by the Indian federal government in April 1987. To assist the project, the World Bank came forward with a loan of Rs. 7 billion (C\$455 million), of which the sum of Rs. 650 million (C\$42.25 million) has already been given to the government. The rest is stalled because of the outcry from environmentalists and social workers. This is not the first controversy over major development in India; the 1980s saw a number of people's movements protesting against the building of big dams and hydroelectric projects. Despite the opposition and stalemate on the loan, work on the dam sites continues.

### FUTURE GAINS

The Sardar Sarovar dam, under construction in Gujarat, will irrigate an estimated 1.8 million hectares and generate 300 MW of electricity in the initial phase, later dropping to 150 MW in the final phase. The Narmada Sagar dam, being erected in Madhya Pradesh, will be slightly smaller, irrigating 123,000 hectares and generating at first 220 MW, and then 150 MW. Project planners expect the country to enjoy spin-off benefits such as flood control, increased fish cultivation and tourism, and more water for domestic and industrial use.

## SOCIAL CONSIDERATIONS

The Institute of Urban Affairs in New Delhi estimates the Narmada Valley Project will eventually displace more than a million people. The Narmada Sagar and Sardar Sarovar dams alone will necessitate the resettling of 300,000; since nearly half of these are tribal populations, whose beliefs and lifestyles are intricately woven into the forest and the land, environmentalists fear for their survival outside their traditional territory.

S.C. Varma, chairman of the government's Narmada Valley Development Agency (NVDA), admits that such displacement will be painful; to compensate the 'oustees,' as the displaced farmers and tribals are called, the government is offering cash settlements or, increasingly, "land for land." However, there are concerns that if their existing assets are undervalued, the oustees will end up with even less money in their pockets or land of poorer quality than before.

Fair compensation is one issue; having the resources to provide compensation in the first place is another. State officials concede that there is simply not enough land to meet the needs of the displaced. Inevitably, increased demand will inflate the price of what is available in neighbouring villages. Even so, landed farmers are better off than those who have no property to swap. Plans for the landless are as yet undefined beyond the government's intention to absorb these people into activities other than agriculture. In analyzing the resettlement situation, the World Bank reports, 'The odds are high that the oustees will be worse off following the removal.'

## ENVIRONMENTAL FACTORS

The Narmada Sagar dam will submerge 40,332 hectares of forest land, not including the 1,500 hectares needed to build staff housing and other construction facilities. The Sardar Sarovar dam will submerge 13,744 hectares of forest land. (Satellite data show that India is losing 1.3 million hectares of forest land every year.)

The federal Department of Environment and Forests originally stated that for every hectare of forest destroyed for dam construction, an equivalent amount of non-forest land had to be afforested. But because of the scarcity of land even for cultivation, the terms were modified to accept replanting on 'degraded forest land'. As a remedial measure, this is far from satisfactory in the opinion of environmentalists, who say that reforestation cannot replace a natural forest. Instead, it creates a plantation of trees lacking in biodiversity, devoid of wildlife and tribal populations.

Environmentalists are even more alarmed about the fate of the existing ecosystem, already fragile and overstrained. With the submerging of forest land, a wealth of flora and fauna will simply disappear. There are no forest corridors enabling wildlife to cross over from the submerged areas to other forested regions since the patches of forest are surrounded by agricultural and barren land. Once the dams flood the land, the animals will either drown or be driven into the fields where they could destroy crops.

The Sardar Sarovar and Narmada Sagar areas now shelter panthers, tigers, sloth bears, antelopes, barking and spotted deer, sam bars, black buck, wild boar, porcupines, wildcats, foxes, hyenas, wolves, black langurs, flying squirrels, rare reptiles, marsh crocodiles and freshwater turtles. Their future is in question, along with that of large numbers of birds, including the Indian parakeet, the rose-ringed parakeet, the grey partridge, jungle fowls, quails, eagles, babblers, green pigeons, common mynahs, paradise flycatchers, bulbuls,

kingfishers, vultures, cattle egrets, herons and woodpeckers. "The successful relocation of wildlife is never easy," states the World Bank report, 'and much death is unavoidable.'

Opponents of the dams point to other serious repercussions: the possibility of earthquakes, increased siltation, waterlogging and salinity, and a higher incidence of disease. According to Dr. Herbert Tiedemann, a Swiss engineering consultant who has studied the Narmada Valley Project, there is a major geological fault at the Sardar Sarovar site. Contrary to project authorities, he believes the fault cannot be plugged with cement and so remains a permanent threat. Another expert at the National Geological Research Institute, who wishes to remain anonymous, says that an earthquake of magnitude 6 could occur in the Narmada River basin. Both arguments receive support in a report issued by the fourth meeting of the Dam Review Panel. The report says, 'An earthquake of the magnitude of 6.5 could occur anywhere in the Narmada-Sone-Damodar... [and] filling the reservoir might cause the earthquake to occur sooner.'

The annual rate of siltation per 100 km of catchment area of the Narmada Sagar dam is estimated at 5.62 hectometres. Siltation will shorten the dam's life span and limit its economic viability. A study by the Bangalore-based Indian Institute of Science concludes that at least 100,000 hectares of the irrigated land will be affected by severe waterlogging as well as salinization of the soil.

Further problems are expected from the elevation of the subsoil. These include alteration of subsoil levels of fluoride, calcium and trace metals, in turn causing water contamination. Consequently, says a preliminary note by the Madhya Pradesh Council of Science and Technology, the incidence of water-borne diseases such as malaria, filariasis, cholera, gastroenteritis, viral encephalitis and goitre will rise.

#### COST-BENEFIT ANALYSIS

In evaluations of the soundness of the Narmada Valley Project, its monetary, human and environmental costs must be measured against the government's projection of benefits from flood control, fish cultivation, tourism; electricity generation and irrigation. Critics, however, are questioning the true value and long-term implications of even these apparent advantages to the Narmada Valley.

For example, some scientists predict that instead of controlling flash floods, the dams will actually increase the likelihood of their occurrence. More frequent flooding would threaten two species of fish found in abundance in the waters of the Narmada: the Hilsa and giant freshwater prawn.

According to estimates in the Maharaja Iyajirao University's *Report on Ecology and Environment of Sardar Sarovar*, issued in 1983, the combined revenue loss from both species in the postdam period will be Rs. 1.63 billion (C\$105.95 million). In contrast, the Narmada Sagar project cost-benefit analysis factors in an annual revenue of only Rs. 400 million (C\$29.25 million) from fish cultivation. (Corresponding figures for Sardar Sarovar are not available.) While the economic potential of aquaculture compares poorly with that of harvesting existing fish resources, the argument is that dam development would encourage a flourishing leisure-tourism industry.

But against that monetary gain, one must weigh the cultural loss of India's centuries-old religious sites. Damming the sacred Narmada will submerge a time-hallowed pilgrimage circuit.

The Indian Planning Commission has stipulated that the cost-benefit ratio for mega-development schemes must be 1:1.5, or a return of Rs. 1.5 for every rupee spent. Authorities have estimated the Narmada Valley project's ratio to be 1:1.74. However, the intense and sustained resistance to the scheme has prompted the NVDA to prepare another cost-benefit analysis, still favouring dam construction. It has also led economists and engineers to calculate their own ratios, which differ greatly from the official numbers. Environmentalists Claude Alvares and Ramesh Billorey, in their book, *Damming the Narmada*, state that after consultations with both project authorities and independent experts, they arrived at the following cost-benefit ratios: 1 :0.17 for the Narmada Sagar dam and 1:0.38 for Sardar Sarovar.

### **ALTERNATIVE STRATEGIES**

Environmentalists have calculated that if the height of the Sardar Sarovar dam were reduced from 140 to 129 metres, 90 per cent of the population would not need to be relocated and 80 per cent of the agricultural land would not be submerged. If the height of the Narmada Sagar dam were lowered from 265 to 250 metres, the number of oustees would drop to 20,000 and thousands of hectares of forest and agricultural land would be saved.

Two other options, already working in many parts of India, are lift irrigation and small-scale reservoirs. The average cost of lift irrigation is less than Rs. 10,000 (C\$650) per hectare, while canal building for reservoirs averages Rs. 25,850 (C\$I,680) for the same area. In terms of water conservation and efficiency, single-purpose reservoirs are by far the best option. They are often connected to each other and to diversions from rivers and streams.

### **IS COMPROMISE POSSIBLE?**

Recently, the World Bank has begun to look more closely at the environmental costs of projects it supports, and its Operations Evaluation Department may undertake an independent analysis of the Sardar Sarovar dam plans. Meanwhile, its loan to the Indian government remains on hold, and the Japanese have suspended their shipments of equipment pending an inquiry into the dams' impact on local populations and the environment.

Within the country, state authorities are forging ahead with construction despite growing opposition from the 200 Indian and international groups that have rallied against the project. If the balance of the World Bank loan does not come through, Gujarat's chief minister is contemplating a bond issue to raise funds.

Given the immense anti-dam sentiment and the human and environmental costs at stake, the government's best course might be compromise, reducing the height of the dam by 25 metres but retaining its goal of development. As things stand, the fate of the Narmada Valley Project - and with it all whose lives it will affect - hangs in limbo.

**Author's note:** The way I had written the conclusion, I had said that this project was unfeasible on many grounds and should be scrapped. The Editors gave the article the present ending and tried to get in touch with me pre-publication, but as I was in transit, they were unsuccessful. In any case the case against the dam is laid out quite clearly here.