Water management key to development

by Peter Ennis

The study prepared by the Fusion Energy Foundation (FEF) in 1979, *India in the Year 2000: A 40-Year Program To Make India An Industrial Giant*, shows India's capacity to become a modern industrialized nation—if the latest, most advanced technologies are used. But the labor-intensive, and gradual, "organic growth" approaches advocated by the Club of Rome and the World Bank can only perpetuate economic backwardness. Nothing but a sharp, well-defined shock delivered to the entire economy, especially to the dominant but at best marginally productive rural and so-called unorganized sectors, will break the cycle of underdevelopment.

The key to Indian economic development is water management—the huge but unavoidable task of harnessing the subcontinent's immense water resources to break the deadly, centuries-old cycle of droughts and floods and create a modern agricultural industry to replace one of the world's least-productive rural economies. The irrigation and power reserves in India's river and hydroelectric balance are enormous, and an equally enormous effort is needed to develop them. To develop India's water resources would cost, according to the FEF study, $180-$200 billion over a 30-year period, as the single largest industrial construction project for the entire subcontinent.

This water development program would make India able to more than quadruple its electricity-generating capacity. At present, 8,000 megawatts, approximately 28 percent of India's total installed generating capacity of 28,000 megawatts, comes from hydroelectric power. The potential, even according to conservative estimates, is over 40,000 megawatts.

No region in the world is better suited for large-scale agricultural production than the Ganges-Brahmaputra river basin. While India today produces 120 million tons of grain per peak monsoon year, experts estimate that India could be producing over 1 billion, and perhaps 2 billion tons of grain per year! With the necessary fertilizer, mechanization and—most important—water. India could become a breadbasket for the world within 15-25 years. At present 43 million hectares are irrigated; the FEF plan would irrigate at least three times that area.

To manage its water resources, India must build a grid of canals linking the major river systems, to divert water from surplus to deficit areas, and at the same time develop groundwater storage recharge and extraction sites. The FEF proposed a two-stage approach and timetable for the project, which incorporates some of the outlines for a National Water Grid first proposed by former Indian Irrigation Minister K. L. Rao.

The first stage of the program, 1984-2000, would construct a diversion canal from the Brahmaputra River, which carries a surplus of water, especially during the monsoon season, near Dhubri, to the Ganges River, near Patna. The canal would include outlets for irrigation releases to Bangladesh. A second diversion canal would be built from the upper Ganges and Yamuma Rivers in Haryana (north of Delhi) with groundwater recharge and extraction facilities en route to convey surplus water into the Sutlej Basin to the Western Desert through an enlarged Rajasthan Canal. Near Bikaner in western Rajasthan, a pump-lift canal facility would convey Himalayan water to the porous sandstone aquifers about 105 kilometers northeast of Jodhpur as a regulating storage facility. The dam, canal, and groundwater systems of each individual river basin will be developed in coordination with the anticipated facilities of Stage Two.

Groundwater recharging and extraction systems must be improved. With the storage capacity of dams in the steep Himalayan river valleys limited, surplus runoff during the July-October monsoon season must be stored in groundwater systems, particularly in the Ganges Delta, where 65 percent of India's runoff flows.

The third priority is construction of flood control embankments and other means to improve the navigability of the lower Ganges and Brahmaputra Rivers. River training techniques developed by the U.S. Army Corps of Engineers on the lower Mississippi River would be effective. A competent master plan for Bangladesh, prepared by an engineering company in the United States in 1964, is being slowly, partially carried out by the Bangladesh government.

The FEF study proposed a crucial addition to this plan: a seawater barrier at the mouth of the Ganges, with saltwater-clearing navigation locks and sediment sluiceways similar to the Zuider Zee reclamation project in Holland. This feature is necessary to fully utilize the fresh water potential of the river system, especially during the low flow season.

Stage Two, 2001-15, would complete the groundwater recharge and extraction and the river diversion plans, and build the Ganges-Cauvery Link Canal. This canal, from Patna to the Cauvery River in the South, was originally proposed by former minister Rao, but the ultimate capacity of the canal proposed here would be 24 billion cubic meters per year, 10 times greater than the project he proposed.

The Ganges-Cauvery Link Canal will connect the major river basins of most of the states in the Southern peninsula into a nationally regulated economic unit by providing inexpensive barge transportation for ores, grains, and bulk products from the south to the north. Of the total length of 1,640 miles, 440 miles will be in pump lift reaches of national rivers and 1,200 miles in gravity-flow canals or rivers.