Dammed to destruction

For most of the past century, dams have symbolised development, engineering ingenuity and national pride. Dams, it was always thought, could make huge contributions to economic growth. But now serious doubts are emerging, writes Md. Asadullah Khan

FOR most of the past century, dams have symbolised development, engineering ingenuity and national pride. Dams, it was always thought, could make huge contributions to economic growth. They help control floods, supply vital water to farmers and expanding cities as well as power to homes and businesses. People must take fancy for dams for it once seemed like power for free, a gift from the heavens. A dam creates electricity from nothing other than falling water through its turbines. The supply is replenished in perpetuity by the munificence of nature. Nothing is used up. Nothing is contaminated. No pollutants are belched into the atmosphere.

But now serious doubts are emerging. The World Commission on Dams formed in 1998 analysed the environmental, economic and social impact of world's 45,000 large dams and the result unveiled by South Africa's great leader Nelson Mandela in the later part of 2000 is quite bleak. Overall costs of dams, to both man and nature, are mostly negative. Dams have well-publicised vices. They are notorious for causing great environmental change. And they force massive human resettlements mostly of people who live where the lake is due to appear. The World Bank estimated in 1994 that 300 large dams - those over 15-metre high and some

Grim, not green, a future

of these over 10-metre high, though the biggest are ten times that size - built every year force some four million people to leave their homes, often ancestral lands. The resettlement is often badly planned and executed. The report on the World Commission on Dams concludes that all too frequently "an unacceptable and often unnecessary price has been paid to secure those benefits". Up till now 80 million people world wide have been forced out of their homes and settled elsewhere with paltry compensation and no viable means of earning a living.

The list of indictments is daunting. Other than the cost escalation, which has always exceeded estimates, ecosystems were destroyed or permanently damaged. Hydroelectric dams, once regarded clean, renewable energy source, turned out to be significant generators of greenhouse gases given off by decomposing vegetation in tropical reservoirs. Many of the worst environmental effects of dams stem from their supposed benefits. For instance, the constant and reliable irrigation a dam provides can waterlog the ground. The water brings underground salt to the surface, then evaporates and leaves it behind. Eventually the soil becomes too salty for crops to survive. Even the prevention of floods is a mixed blessing. The salt, which was once carried downstream by a swollen river replenishing the soil and nutrients, no longer makes its journey. Instead it clogs up the reservoir. The building of dams is often destructive. It usually means clearing forests or other habitats in areas to be flooded. Water in reservoirs, especially in water-storage dams becomes silted with vegetation and matters washed off land upstream. As that rots it emits carbon dioxide and methane contributing to the greenhouse effect already mentioned. How much is emitted is not known, but some estimates say reservoirs could account for more than a quarter of the "global warming potential" of gases in the atmosphere. It was assumed that hydropower by substituting for burning fossil fuels, would reduce emissions of greenhouse gases. This claim in tropical countries, where reservoirs appear to produce most gases, now needs reassessing.

There are other problems, too. Some large dams alter flood cycles and downstream flows, pollute rivers, remove nutrients and alter the water temperature. All these can affect the survival of plants, fish and animals. Reservoirs may serve as hosts for mosquitoes and diseases they spread. Blocked rivers disrupt the migration and breeding of fish, causing some species to become extinct. In recent years assessment about dam building indicate that the Aswan dam and Aswan high dam both on the Nile commonly held up as exemplars of planning now shows negative result. The arable land downstream is being eroded away, partly because it is not getting enough silt.

Dams once touted to be protection from floods often turns out to be one of their most troubling drawbacks. Traditionally much land near a river has been irrigated by floods and planted as they recede. A dam can stop this from happening and rob millions of people downstream of their livelihood. What was once commonly believed that the dam's irrigation of other land will make up the economic loss didn't come true. Study on the Kainji dam on the Niger reckoned that the dam reduced rice production downstream by 18 per cent and the fish catch by 60-70 per cent.

But the thorniest problem is the uprooting and resettlement of people. Those most likely to be evicted by a dam - ethnic groups that are not too querulous - are least good at adapting to new conditions. They often have to change their way of life as well as their location. The World Bank itself reckons that only in a handful of cases starting from Kaptai in Bangladesh to China and even the US residents displaced by a dam ended up better off. Thayer Scudder, an anthropologist at the California Institute of Technology, makes a depressing finding. His long running study of people ousted by the Kariba dam on the Zambezi, which separates Zambia from Zimbabwe, found that although their lives improved initially, the farmland they were given turned out to be poor and relations with their new neighbours worsened.

Evidently more often than not, projects failed to deliver the benefits that proponents promised. And in recent times dam building has been losing its allure. In the US more dams are being decommissioned than are being built; for instance, four dams across the Snake River in Washington, which are said to threaten the survival of salmon. In Japan, residents in the town of Tokushima voted ten to one to reject the construction of a billion-dollar dam across a nearby river.

Of the major projects already completed, Pak Mun dam in Thailand which the World Commission on Dams studied highlights serious shortcomings. The US$264 million project went ahead with little consultation with local residents and was completed in three years. It has now been found that the dam generates 20.81 megawatts of electricity - a sixth of 136MW capacity touted. Environmental assessments were poor. Consultants had predicted fish yields in the reservoir of 100 kg per hectare each year, but villagers netted just one tenth of that. Downstream catches declined markedly and fish species dwindled on both sides of the barrage. Impact on local inhabitants was quite higher than envisaged. Some 1,700 households were moved instead of 240 predicted.

The report reviewed the dam building works in China and India in the Asian region and assessments are not any better. The Asian giants account for 26,291 dams, 55 per cent of the world's total. China has built 22,000 since 1949 - almost one everyday since Liberation. But "this rush to construct so many and so large dams has led to serious safety concerns and costly programme to address these issues", the report notes. Some 12 million people have been displaced in that period. Yet China's irrigation and water supply problems persist.

The report does not include two of the most notorious dam projects in the world: China's Three Gorges Dam and Sardar Sarovar scheme in India which involves 30 large, 13 medium and 3,000 small dams along the Narmada river in Gujarat, India. The maximum height proposed for the large dams is 138m but the Indian Supreme Court has allowed construction of the dam to a height of 90m. The Sardar Sarovar dam, the proponents argue, will allow 18 lakh hectares to be irrigated, generate 1,450MW of power and will provide drinking water to 135 towns and 8,000 villages causing a displacement of 40,827 families. The estimated cost of building the dam would come to about Rs 21,600 crore as of 2000. Of all the dams so far constructed or proposed to be constructed, China's three Gorges Dam is the most ambitious as well as controversial. Three Gorges Dam to be built at a cost of US$ 25 billion when it is fully operational in 2009 will hold back an artificial lake up to 600km long, a kilometre across and 175 metres deep. The 2,150-metre wide barrier will stem the mighty Yangzi generating badly needed electricity, making the world's third longest river permanently accessible to large vessels and ending forever the flooding that has claimed tens of thousands of lives on its banks. Critics argue that the dam is a folly from environmental, technical and social points of view. It calls, for instance, for the resettlement of 1.2 million people. The *Strategy and Management*, a conservative journal in China, sees a crisis in the making. The Yangzi is considered among the world's most silted rivers and even government planners acknowledge that special measure will be needed to prevent excessive sedimentation building up at the dam base. These include running off large volumes of silt-laden water during the flood season from May to September. The river, experts say, will cause precisely the kind of surges that the dam is designed to end. Environmentalists warn that the accumulated silt will raise the reservoir's water level, overwhelming nearby Chongqings' municipal sewage and drainage systems.

Without contradiction, the impact of flood control interventions on the water regime, environment and society in a flood plain country like Bangladesh has become apparent in the meantime. Experts now realise that the water regime has also been significantly affected by the construction of 16,000km of highways and feeder roads, 12,000km of rural roads and 3000km of railways and a host of sluice gates here and there. In view of a consensus reached at the experts level about initiating a quick yielding small-scale projects the government in 1983 embarked upon a National Water Plan (NWP) with the objective to maximise agricultural growth and production and contribute to achieving food grain self sufficiency vis-à-vis flood control measures.

Noticeably, because of the intensive achievement in the flood control and drainage projects, on average about 120,000 hectares of land per year have come under flood protection resulting in a decreasing trend of approximately 80,000 hectares per year in the flooded area. But the experiences of flood control interventions have made one thing spectacularly clear: the stated objective could hardly be attained in absence of the due consideration attached to the hydromorphologic features of the flood plain and the socio-economic conditions of the people living in this area. And so the people continue to suffer relentlessly battered by the ravages of flood.

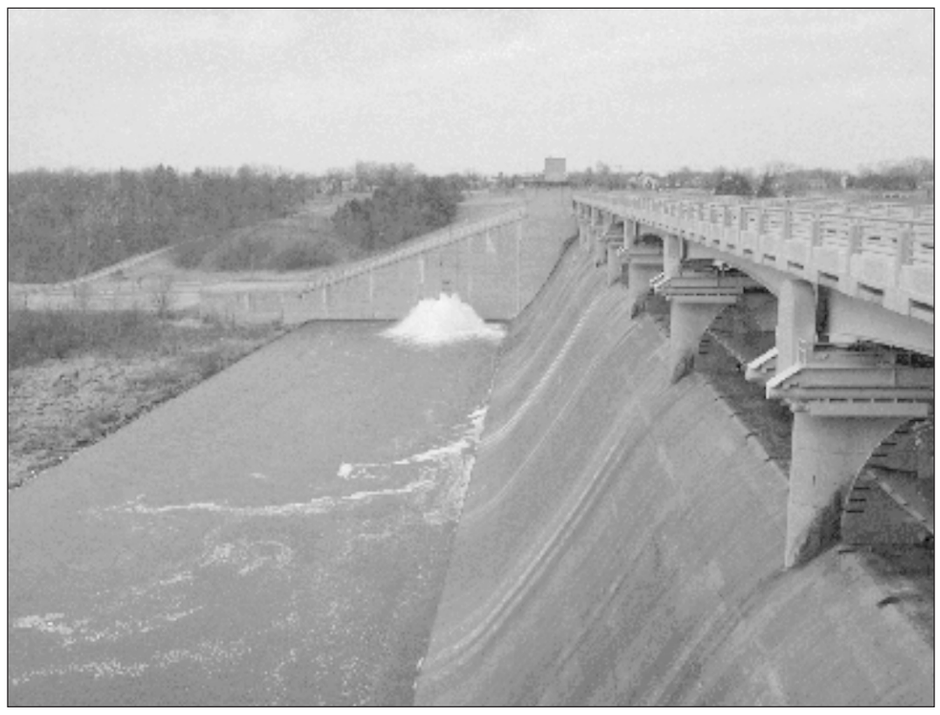
The objective of increasing rice production by providing flood protection to agricultural land got so much priority that the consequential stress on the flood plain ecosystem hardly received any attention. Interventions caused resulted in flood risk elsewhere, reducing post monsoon flow in the river and deteriorating morphology of the rivers. In consequence, the country experienced severe flooding almost every year and the South Western part of the country experienced the worst flood in 1998 with large parts of the country going under nine feet of water. Since Bangladesh is basically flood plain of three large rivers, namely the Ganges, the Brahmaputra and the Meghna, the flood hydraulics is dominated by them. These rivers carry about one billion tonnes of sediment each year, which can cover the country one-centimetre thick layer of sediment.

But there are evidences galore that human interventions in the flood plain have caused miseries in the past also. Williams, who was a superintending engineer of the Public Works Department of Bengal in 1919, concluded after examining the past history of tidal rivers in the Ganges delta that the construction of railways, roads and private embankments caused the death of many streams. He further observed that wherever embankments existed they posed problems defeating the purpose for which they were raised, to the extent that they in course of time raised flood levels or led to the extinction of rivers by causing silting and brought about waterlogging. Almost a similar effect is now observed in the southwestern region of Bangladesh where polders have been constructed to prevent tidal flooding. Review of polder embankments by Halcrow and partners, a foreign based consulting firm which prepared the master plan report of South West Area River Resources Management "Project" in the recent past, indicates that the effects of empoldering is clearly drainage congestion resulting in the rise of channel bed and tide levels relative to the land levels inside the polder thereby obstructing drainage. The committee observed that the development of roads and other infrastructures in the area prevented the spontaneous overland flow exacerbating the flooding condition.

SC Majumder, who was the chief engineer of Bengal in 194, also opined that the most effective preventive measure against floods was to prevent the harmful interventions within the catchment so as to reduce the rate of surface run-off, which determines the intensity of floods. He went on to say that after the flood entered the river channels, the most effective remedial measure was to allow the flood water to spread over as large a portion of its spill area as possible and not to oust it from what might be called the river's domain by human interventions.

Other than the ecological damage, the social penalties that dams impose are nowadays much better understood. Participants comprising dam builders, financiers, conservationists and anti-dam protesters meeting in Gland, Switzerland agreed as early as 1997 that if an international commission were created to set standards, if everybody affected by a dam were involved in the planning process, if the option of building a dam were weighed against all alternatives, if all the costs were accounted for and if everyone benefited from the dam, then it could go ahead.

Md. Asadullah Khan is controller of examinations at the BUET.



Dams dislocate people, damage vegetation and destroys ecosystem.