Taming the Teesta

Dr. Kalyan Rudra warns that ecological disturbances in the Teesta basin are unwarranted.

" … anyone who diverts streams or who amuses himself by damming them up… to be strenuously excluded." – The Law of Manu.

The importance of power and water in the economic development of a country is undeniable. As a nation, India is currently going through a period of fierce debate on the issue of the mode of power generation and water storage. The proponents of hydel projects and big dams who claim to be champions of 'development' label their opponents as being anti-development, while the latter, belonging to the weaker lobby, search for alternatives. The spatial and temporal inequality of rainfall has compelled human society, since the dawn of civilisation, to explore means of water storage and transfer to areas that suffer from a paucity of the life-giving liquid.

In all the hydel projects built so far, siltation has been a major problem, with projected capacities decreasing at alarming rates, often before the project is completed.
Picture: Kalyan Rudra

Human history has been and continues to be an ongoing relationship between the human race and the natural world, each moulding and remoulding the other. The first precondition of agriculture was the ruthless destruction of native biodiversity and the introduction of new species. Today, human modification of nature continues with the application of chemical fertilisers, pesticides, crossbreeding, genetic modification of plants and the expansion of irrigation.
During the second half of the 20th century, dams were synonyms for development. Only recently has it been widely acknowledged that the communities bearing the social and environmental cost are invariably tribals or other disadvantaged sections of society, who rarely receive water, electricity or any of the other benefits from the project. President K.R. Narayan expressed his concern on Republic Day, 2001 when he said, "Let it not be said by future generations that the Indian Republic was built on the destruction of the green earth and innocent tribals who have been living there for centuries." In the post-Independence period, the number of victims who

have been displaced from their homeland due to the construction of large reservoirs is, at a conservative estimate, 50 million. Many more are, at this very moment, being rendered homeless due to ongoing and proposed projects.
India's dam-building spree owes its origin to Pandit Nehru who once described big dams as the 'temples of modern India'. He later lamented that as a nation we suffered from the 'disease of gigantism'. But unfortunately, modern day planners mostly forgot this. Nehru, in the 29th annual meeting of the Central Board of Irrigation and Power (held on the November 17, 1958) advocated for a multitude of smaller projects, but his successors remained fixated on gigantic projects. An inclusion in this series is the ongoing Teesta Barrage Project (TBP) in Jalpaiguri district and hydro power projects of the National Hydro Power Corporation (NHPC) (stage III and IV) in Darjeeling district of West Bengal.
In all the hydel projects built thus far, siltation has been a major problem, with projected capacities decreasing at alarming rates, often before the entire project is completed! Evaporation from the reservoirs and seepage of water from canals deprived the marginal land of the command area from the water that it was assured during the planning of the project. The dams that were designed to moderate floods have created floods by releasing excess water at the peak of the monsoon.
The snow-capped peaks, precipitous cliffs, fast-flowing rivers and green slopes of the Himalaya attract tourists from across the world. The road journey to north Sikkim holds one enthralled with the beauty of the dancing and roaring Teesta as it flows through deep valleys with thick green cover. But if the eight hydroelectric dams proposed on the Teesta (six in Sikkim, two in West Bengal) are to be built, the dancing river will be silenced. Further downstream, a mighty barrage at Gajoldoba in Jalpaiguri district already exists.
While the project proponents and the government paint a rosy picture, there are many questions about the project and its potential impacts that need to be answered. How will these projects upgrade the standard of living of the local people? Will the tectonically fragile area be able to support such massive structures and the reservoirs they create? What will be the effects on the region's rich biodiversity? Can the security of the livelihoods of people in both the upstream and downstream regions be guaranteed? These and several other valid questions raised on issues of social justification, ecological sustainability and economic viability of this project remain unanswered.

Dams on the Teesta

The Teesta descends from a height of about 6,200 m. at its source in Sikkim to the coast of Bangladesh in the course of its 414 km. journey to the sea. This descent offers huge potential for hydro power generation, especially before it debouches on the terai plains at Sevoke. The slope of the river in this stretch varies between 4 to 35 m./ km. and the velocity is about 6 m./second. The NHPC has proposed the establishment of eight hydro power stations in Sikkim and West Bengal. This article deals with the possible impacts of two proposed dams and the ongoing giant Teesta barrage project in West Bengal.

Feasibility and risks

The NHPC has declared that the two proposed dams, stage III at Samco ropeway and stage IV at Coronation bridge are 'low and run-of-the-river dams'. However, as both are more than 15 m. in height, they cannot be categorised as 'low' since the International Commission on Large Dams (ICOLD) criteria for a large dam is anything above 15 m. in height. Dams between 5-15 m. with a storage capacity of more than three million cubic metres are also considered to be large dams. To classify these two projects as 'run-of-the-river' is also a misnomer, as both projects will submerge riverine forests.
Together, these projects are expected to generate 332 MW of power. This amounts to less than

five per cent of the installed generation capacity of existing power plants in West Bengal. The total installed capacity of all power plants in West Bengal is 6797.29 MW and the transmission and distribution loss of power was estimated to be 28% in 2000-2001. A substantial reduction in these losses is possible, which will negate the need for these additional projects and would cost much less.

The Teesta is a rain and snow-fed river. The permanently snow-covered area of the basin is about 158.40 sq. km. The upper catchment receives a total annual rainfall of 1,328 mm. while the middle of the basin receives 2,619 mm. It has been recorded that about 77-84% of the annual rainfall is received between June and September. The heavy concentration of rainfall within a short period is common in the eastern Himalaya. Gangtok recorded 1,500 mm. rainfall between October 2 to 5, 1968. The highest one-day rainfall recorded at Darjeeling was 521 mm. The mountains have been extensively deforested with increasing population since the mid-19th century. This has altered the infiltration run-off ratio (the amount of rainwater absorbed by the soil relative to the amount which runs off) and slope failure has become a menace. Infiltration is generally high and run-off little in a forested tract. The Teesta basin is now one of the most landslide prone areas of the country, contributing a huge sediment load to the river. The mean annual discharge of the Teesta at Anderson bridge is about 580 cumecs and it declines to 90 cumecs in the lean months. The peak discharge may be as much as 4,000-5,000 cumecs. It was estimated that the peak discharge of the river at Jalpaiguri during the devastating flood of 1968 was 19,800 cumecs. The sediment load in the river increases with high monsoon discharge. It was observed that 72% of the suspended load is transported between July and August when the bulk of discharge flows through the river (Starkel et al, 1998). It seems certain that the dynamic equilibrium of the river will be impaired with the construction of a series of dams and the sediment load will be trapped within the reservoirs, reducing their capacity. This, in turn, could compel dam managers to release water during heavy rainfall, causing sudden flash floods downstream. On July 20, 1993, a severe cloudburst in and around Kathmandu generated 540 mm. of rainfall within 24 hours and brought down five million cubic metres of sediment into the reservoir of the Kulekhani dam (Dixit and Ahmed, 1998). This risk will exist for any dam constructed in the Himalayas.

The entire Himalaya is tectonically unstable. The Indian plate continues to subduct under the north Asian plate and rocks lying in between are severely compressed. The crust has broken up in a series of faults along the southern front of the Himalaya. These thrust faults are collectively termed the Main Boundary Thrust (Valdiya, 1998). The stretch between the two dam sites selected for stage III and stage IV is geologically fragile and already identified as seismic zone IV. There is a very real fear that the massive construction works and the reservoirs created would increase the risk of seismicity.

The estimated life-span of the dam is 50 years only as admitted by the Chief Engineer of the project. The total cost at September 2001 price levels amounts to Rs. 2,173 crores. While further reduction of the life-span and cost escalation cannot be ruled out (in fact, such escalations are to be expected), the cost-benefit justification of the project becomes questionable taking into account the recurrent maintenance cost.

The eastern Himalaya is endowed with rich biodiversity and is a botanical wonderland. The stage III and IV reservoirs would submerge 156.41 ha. and 359.89 ha. of forest respectively. Moreover, the stage IV project would cause the realignment of NH 31A through the Mahananda Wildlife Sanctuary for about 2.50 km. As per Supreme Court orders in an ongoing case on protected areas, the Indian Board for Wildlife will have to be consulted. The proposal prepared by the project proponents to 'compensate' for the loss of biodiversity is theoretical and, quite simply, absurd.

The Teesta projects will add to the 50 million environmental refugees already created in post-Independent India. The Kalijhora village with 115 families is threatened with submergence by the stage IV reservoir, yet the NHPC is silent about any rehabilitation programme.

Teesta barrage project

"We construct reservoirs to store water and we abstract water from streams and apply it to the irrigation of land without any regard to the apparent intention of nature. We protect the banks of rivers from natural erosion and we dredge up sand and mud from places in which nature intended it to remain. There are, of course, limits within which we must confine our efforts, and success depends on a due apprehension of these limits, and on a just sense of proportion." – W.A. Inglis (1909).

North Bengal is endowed with 60% of the state's water resources but this remained 'unexploited' until the construction of a barrage across the Teesta at Gajoldoba of Jalpaiguri district. The Teesta barrage project is designed to bring many of north Bengal's rivers into a single network.

Critical appraisal

The ongoing TBP is an overtly ambitious multipurpose project. It plans to irrigate 9.22 lakh ha. of land in six districts of north Bengal without any storage system. Three pick-up barrages are to divert river water towards agricultural land. The system may be successful for kharif cultivation when the soil is naturally wet and rivers are full. Since the rivers of north Bengal are much reduced in the lean months, it would be impossible to ensure water to dry variety paddy over 90,000 ha. The cumulative irrigation potential achieved by the project till June 2001 from its inception in 1976 was 12,6110 ha., which is less than 14% of the ultimate target (Ray, 2001). The TBP is excessively optimistic in its projections, especially considering that it has no reservoir and depends exclusively on diversion barrages with no storage capacity.

The Teesta was untamed in its upper catchment when the TBP was formulated. The series of proposed dams in the upper reaches will reduce the available discharge for irrigation as each hydro power project is expected to consume at least five per cent of the running water in the river. The lack of coordination between NHPC and TBP has further complicated the situation. The time taken for the project to get off the ground and delays due to problems such as non-availability of land, land acquisition disputes and clearances from the environment and forest departments have caused cost escalations and the spillover cost during the ninth plan was estimated to Rs. 502 crores.

The reservoir that was planned to be constructed during the second phase of the Teesta irrigation project cannot be now undertaken since the NHPC has already started working towards the implementation of the 'low dam' just 400 m. upstream of the Coronation bridge. So the plan to generate an additional 600 MW power under the TBP will probably never take off.

The proposed Ganga-Brahmaputra navigation canal is a further indication of the government's preoccupation with gigantic schemes. This envisages damming the Manas and Sankosh rivers in Bhutan (no agreement has yet been signed between India and Bhutan). The Indo-Bangladesh treaty (1996) over the sharing of the Ganga waters accepted a proposal to connect the Sankosh with the Ganga at Farakka by a 300 km. long canal. But such a canal along an east-west alignment, if excavated, would have to negotiate a large number of south-flowing rivers and will severely impair the delicate hydrological balance of north Bengal. Additionally, 770 ha. of forest and 530 ha. of tea estates would be destroyed.

The evaporation and seepage losses of water in other major irrigation projects of West Bengal is very high.1 In the canal network of the Kanshabati project in southern West Bengal, for example, the seepage loss varies between 11 to 66% depending on the texture and structure of the soil. So the land lying at the tail end of the command area hardly receives any water during lean months. There is no reason to believe that the experience of the TBP would be otherwise. Irrigation projects in West Bengal have suffered from the 'disease of gigantism'. If the monumental cost of construction and maintenance, environmental impacts and efficiency are taken into account, the justification for such mega-projects is doubtful.

Alternatives ignored

The Planning Commission of India and its counterpart in West Bengal – the Irrigation and Waterways Directorate – have never seriously considered the option of smaller, decentralised reservoirs. Such projects would be farmer-centred, less destructive from the environmental point of view and cost-effective. Mathematician and scholar Professor D.D. Kosambi (1972) put this best when he stated: "Neither the engineers nor the Commission would consider a more important suggestion, namely, that many cheap small dams should be located by plan and built from local materials with local labour. Monsoon water would be conserved and two or three crops raised annually on good soil that now yields only one."

Similarly, the installation of a multitude of mini hydro power projects and the utilisation of solar and wind power would help meet local needs. At a time when western countries are moving to such renewable energy options, Indian planners need to realise that with the abundance of sunshine in the tropics, we have a unique opportunity to avoid repeating the mistakes of the 'developed' world. Ironically, when 'small is beautiful' is becoming a paradigm adopted in the west, the disease of gigantism still occupies the minds of the Marxists of West Bengal. Perhaps the words of Fredrick Engels might change their minds "Let us not flatter ourselves overmuch on account of our human victories over nature. For each such victory, nature takes its revenge on us. Each victory, it is true, in the first place brings about the results we expected, but in the second and third places it has quite different, unforeseen effects which too often cancel the first."

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