Hydropower in Uttarakhand: Is 'Development' the Real Objective?

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A perusal of environment impact assessments for hydel projects in Uttarakhand brings out various deficiencies in the reports, and the unstudied manner in which such projects have been embarked upon. That many more of such projects have been proposed points to the muddled direction adopted for energy supply, reminding us of the hydropower story in the United States.

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Almost 200 hydel projects are being proposed in Uttarakhand, all on the Ganga and its tributaries. These projects are being called "run of the river" (ROR) schemes. But the rivers are actually being diverted into tunnels from weirs and dams and one tunnel follows another in a sequential cascade. Hence, the water of entire valleys will no longer flow through the rivers, but through tunnels, and will only be seen intermittently when it appears for power generation.

The real ROR scheme is one in which the impeller is driven by the flow of the natural stream. There are only 26 such schemes proposed in the state. The remaining cannot be called ROR and they shall generate about 18,000MW of electricity. Currently the state generates about 3,000MW (with another 2,000MW available from the centre) for a total population that is about two-thirds that of Delhi, which receives almost the same amount of power. So it is not the shortage of power that is the main concern for Uttarakhand – 90 per cent of whose energy requirement is met from traditional fuels.

In 2007, the governments of Uttarakhand and Himachal Pradesh had commissioned Hydro Tasmania to review the hydroelectric projects in both states. This New Zealand firm has no experience of Himalayan ecology, yet their specialists assessed that the three challenges facing the projects were geological (earthquakes, etc), hydrological (flow, flood, etc), and very large silt loads – that forces even big "ROR" projects like Nathpa Jhakri (1,000MW) in Himachal to shutdown during the rainy season.

Technical "experts" have, of course, dismissed these concerns. But if even 1 per cent of the projected Rs 50,000 crore investment is earmarked for technical advice, then Rs 500 crore is enough to produce many "expert" supporters. At stake also is the $ 300 million "facility" provided by the Asian Development Bank (ADB). According to Hydro Tasmania, most of the private firms which have bid for the projects are not only unfamiliar with Uttarakhand but have no experience with hydroelectric projects.

Impact Assessment

Data for the 200 projects is not available in the public domain. But Environment Impact Assessment (EIA) reports for six hydel projects of Bhilangana, Tapoban-Vishnugad, Vishnugad-Pipalkoti, Loharinag-Pala, Pala-Maneri, and Kotli-Behl (three sub-projects) have been acquired and examined by independent analysts. Of these three are storage schemes. These EIAS have been prepared by firms like Acres International Corporation (Amherst, NY), Water and Power Consultancy Services (WAPCOS), RITES, for firms like Swati Power, Tehri Hydro Development Corporation, Uttaranchal Jal Vidyut Nigam, National Thermal Power Corporation, and National Hydro Power Corporation.

What do these six EIAS have in common? Firstly, all of them have clearly been prepared for obtaining the requisite environmental clearance. But in half the cases, the project as implemented is not the same as was designed for environmental assessment. Capacity has doubled, with corresponding increases in costs, discharges, siphon and tunnel lengths, weir heights, number of turbines, lengths of desiltation chambers, but without any new EIAS. The basis for establishing the structure, capacity, and technology of the dam, spillway, and drainage are not mentioned in most EIAS.

All the dam sites fall within Seismic Zone IV bordering Zone V, or in Zone V near central thrusts, where even hard quartzites and granite gneisses are found to be shattered, jointed, and sheared. The tunnels (two, 13 km long) pass directly through seismically disturbed and geologically active zones comprising quartzite with biotite schist, interbedded and interbanded with grey slates and dolomite/limestones. Generally, other sites or a "no project" option have not been considered. There is no mention of reservoir-induced seismicity or documentation of existing or potential seismic or geological damage.

Considerable amount of muck will be generated from the excavation of tunnels, adits, desiltation chambers, roads, and power houses, but it has not been specified in any of the EIAs where it will be disposed. In some cases it is stated that the muck filled area will be covered with fertile soil, but the source of the fertile soil is not given. Similarly, the transport of massive amounts of cement, boulders, sand, equipment, steel, machinery, and explosives to the construction sites, the building of access roads, blasting, quarrying and crushing are likely to create significant amounts of dust, but this has not been mentioned.

The rate of sedimentation is high in these areas with sandy soils in most parts. This silt will settle behind the dam where there are storage schemes. In the case of diversion schemes, silt flushing from desiltation chambers is mentioned but it is not specified where the silt will be disposed. It will most likely be discharged on to dry river beds downstream of the diversions, and, in both schemes, will subsequently be carried away by peak monsoon flows with downstream impacts. Sludge disposal from settling tanks at crusher and construction sites is also not accounted for.

Diversion of river water into the tunnels would also adversely affect an unspecified number of local sources of irrigation ('kuhls') and power ('gharats'), as well impact on groundwater recharge.

The water that will run through underground tunnels will receive no light and air circulation and so the quality of the water will deteriorate. But these issues find no mention in the EIAs. The EMPs only state that minimum flow will be maintained but do not stipulate what these flows are and whether it will be feasible to drive the turbines in lean season after releasing the minimum flow. The EIAs are marked by the total absence of hydraulic data, including maximum observed flood, flood frequency, and design flood.

There is no listing of aquatic flora and fauna that would be affected, or of the felling of trees for fuelwood and construction and power evacuation. In some cases, the area of submergence lies within biosphere reserves and reserve forests. Where species diversity indices have been given they indicate the well-being of the ecosystems but losses have not been computed except for timber. Some species with medicinal value have been listed but there is no plan for their inclusion in compensatory afforestation. There is no data on the impacts on fish productivity or primary productivity because of stream disturbance. No management measures have been proposed for conservation.

There is no specific mention of the number of labourers required, how many will be local labourers, and what will be the housing and sanitation measures adopted for them although in two cases soak pits and lavatories are mentioned. There is no socio-economic profile of the local population or existing land use details – particularly of potential submergence areas and resettlement and rehabilitation of all affected persons from construction and submergence areas. There is no assessment of the impact on health and environmental diseases. The likely losses of fuelwood, pasture, and other common resources have not been estimated.

In most of the EIAs, the quarry locations are not specified, nor is there any accounting of release of oils, greases, PCBs, and heavy metals, and possible impacts. No measures for reservoir management or catchment area treatment or restoration of quarries have been specified. There are no disaster management plans and the resultant cumulative effects of river water diversion for various hydroelectric projects have not been assessed for the river valley as well as for downstream projects, although structures have existed now for several decades on both the Yamuna and Ganga to begin assessing these impacts.

Sops to Promoters

On the other hand, liberal tax holidays have been offered to the promoters, along with protection of dividends and equity and full repatriation of profits and liberal power purchase agreements. The principal promoters stand to make substantial profits with comparably low investments. Cheap sources of energy have been promised for local consumption (without specifying how many villages are connected to the grid), but there is no cost benefit analysis. Even the direct economic benefits to the local people in terms of employment and other facilities have not been computed.

The US Story

It should be instructive to examine the record of the United States in this regard because much of the Indian "development" agenda is based on what the US has done. "Cadillac Desert", authored by Marc Reisner in 1986, effectively documents the competition in dam building between the Core of Engineers (1794), and the Bureau of Reclamation (1902), who have built over 2,50,000 dams in the US alone, of which 50,000 are "major" works, and 2,000 are really big dams. As the book vividly illustrates, most of these came up because of the nexus between politicians, bureaucrats, and construction companies, ignoring all economic and environmental considerations.

The first imperative was for irrigation (for "reclamation" of arid lands). For instance, by 1918, the irrigated area in the San Fernando valley had increased from 3,000 to 75,000 acres. But by 1927, the bureau realised that one-third of reclamation farmers had sold out because water bills were too high and speculators had taken over the land. Also, in 1928 the St Francis Dam collapsed and Los Angeles had to pay $ 15 million in damages. It was at this time that hydroelectricity revenues were used to subsidise irrigation, although studies revealed that the bureau was really working on behalf of the wealthy and powerful.

Franklin Roosevelt was elected president and announced the "new deal" in 1933 to authorise multiple construction works at one go, many of them river basin projects. The bureau expanded almost overnight from 3,000 to 20,000 employees. And by the 1940s the bureau had conceived of "river basin accounting" – that is, pooling the revenues from all projects in a basin into a common fund, including irrigation, power, navigation, recreation, etc, to enable one to subsidise the other. However, a similar approach was not adopted with regard to environmental and social impacts. Between 1932 and 1962 the bureau built 228 such river basin projects.

By then, citizens' protests had begun mounting over environmental issues. In 1952 the Sierra Club appointed its first paid chief executive officer and by early 1960s data showed that the Colorado was carrying an incredible 6300 ppm of salts as a result of overexploitation of its waters – a fact that led to extensive political negotiations with Mexico. In 1965 a Sierra Club report indicated that the bureau was capturing revenue from older large dams to pay for more expensive new ones, and it launched a massive public advertising campaign against the Grand Canyon dam in particular and large dams in general. Many communities were sending petitions against the degradation of the rivers.

Consequently, in 1966 Congress passed the Wild and Scenic Rivers Act and in 1969 the National Environmental Policy Act was enacted requiring all projects to prepare EIAs, when Texas voters rejected an appropriation of $ 3.5 billion for the Texas Water Plan. In the early 1970s farmers voted against a diversion scheme, analysts began writing critiques of these projects, and Jimmy Carter, as governor of Georgia, had to veto a large dam on environmental grounds, while Ronald Reagan, governor of California, shot down another one.

These environmental issues eventually translated into economics. By the time Carter became president in 1977 the US debt had crossed $ 1 trillion and the federal water bureaucracies alone were spending $ 5 billion per annum. Carter tried to cut funding for water projects, Congress even rejected the list of dams for funding, but the pressure from the construction companies was so high that Carter had to finally sign the bill. He mustered up enough strength to veto some projects only in 1979.

In response, by 1967 the bureau had begun moving out of the US to build dams all over the world through USAID programmes – a forerunner of what many financial institutions such as the ADB and World Bank are doing today. But the environmental costs kept piling up. The starkest example was the Teton dam that was authorised in 1967 for $ 3 million, postponed because of environmental protests in 1971, renewed in 1972 with another $ 10 million, critiqued heavily by the Idaho Environmental Council in 1973 when it received yet another $ 10 million, and finally built in 1976. But it collapsed within 10 weeks of the filling of the reservoir.

Protests through the 1970s and 1980s highlighted how the nesting places of the bald eagle and Indian reservations were being damaged, the snail darter was threatened, rates of sedimentation were much higher than anticipated, and how large corporations were acquiring most of the irrigated land. Natural wetlands dried up and were encroached, preventing them from acting as flood cushions and embankments began breaching. Around 30,000 acres were inundated by the Kern river alone and 1,000 gallons of Rotenone were poured into the river to prevent carnivorous white bass from reaching the delta and eating the salmon.

The desalination of the Yuma river was estimated to cost $ 300 million, with energy costs pushing that to $ 1 billion in a few years. While a combination of lies, rumours, and money was used to divide protestors, a 1985 government report conclusively showed that substantial costs had been written off by project managers as fish and wildlife "benefits" while the biggest state subsidies had gone to the biggest farmers. Eventually, Reagan had to threaten to veto several Core of Engineer projects on the ground that the national debt could not take the burden any more. By 1990, the US abandoned efforts to build large dams.

Alternatives

The lessons that we have to learn from the US have to focus around the fact that we need not make the same mistakes they made as a society in order to become "developed". We can begin accounting for the social and environmental costs right now in order to pave the way for a better future. There are "alternatives" available right now for energy as well as water (and a host of other resource uses) provided we think of development in a different way.

The example of a pregnant woman in need of care is often given to argue for roads and power plants in Uttarakhand. However, the alternative to transporting the patient to the clinic is to take healthcare to the patient, through the appointment of trained 'dais' and auxiliary nurse-midwives in every village. Otherwise, the "needy woman" can be invoked to legitimise a "development" that would displace thousands of people and ruin hundreds of villages. Consequently, when rivers dry up, 'naulas', kuhls, 'ghats', gharats and 'devtas' also become useless, agriculture is adversely affected in the valleys, fodder for animals vanishes, the land erodes away, and migration from the hills becomes even more acute.

In the fragile ecology of the Himalayas, where landslides are a regular phenomenon and earthquakes are imminent, is it a wise decision to make so many long tunnels and large dams with deep reservoirs? And when the water flowing through the tunnels will not interact with the air and the sun, will it retain its natural "purity"? Will fishes and frogs survive in those waters? Will animals and birds be able to drink there? On the other hand, if the same capital were invested amongst the people of Uttarakhand then Rs 40,000 could be put into every acre of land; each family could get a loan of Rs 2.5 lakh; each village would have a corpus of over Rs 3 crore to plan for its future.

A different way of using money, land, water, trees, and all natural resources, that permits the earth to live, and for us to live along with it, is clearly the challenge that technologists and scientists have to respond to if they wish to preserve the civilisational values that are deeply embedded in the psyche of all humanity.