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Thematic Section

Future Water Solutions for India

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ABSTRACT *Himanshu Thakkar looks at the daunting challenges that future water demand places on India and proposes a number of solutions.*

KEYWORDS *dams; disasters; government responsibility; rivers; pollution silting; policy options*

The challenge

There are a number of challenges that face India today: the increase in population that could be anywhere between 1.4 and 1.65 billion in 2050. Foodgrain demand could go up to 450 million tonnes per annum. The per capita water demand will increase for industries and cities almost on a daily basis. Power demands will be three to four times what they are today, even if half the households remain without access to electricity, pollution and looming climate change, making the rainfall (the primary source of water), droughts and floods more and more destructive and yet more and more frequent and at unusual places and times. Then, there are the problems of diversion and damming of our rivers upstream by China.

But the response of the Indian government of more big dams, more Big Hydropower projects, more long-distance water transfer, interlinking of rivers and desalinization on a grand scale is completely off the mark.

The Union Water Resources Minister Saufuddin Soz, speaking at a public function in Delhi on 13 December 2006, stated that the government is going ahead with a river-linking plan. According to him, Ken Betwa is a success story (in reality even the detailed project report of that project is yet to be done and the differences between Uttar Pradesh and Madhya Pradesh seem insurmountable). He sees Polavaram as a good dam project and should go ahead even when the Central Water Commission is yet to give its final clearance and when Orissa and Chhattisgarh are yet to agree to the project and strong movement is taking shape on ground. The Minister's statement, no doubt crafted by the bureaucrats in the Water Resources Ministry, was founded on few facts or ground realities.

India has the largest irrigation infrastructure in the world, but as the Union Finance Minister said in his last budget speech, the performance of this infrastructure is possibly the poorest in the world. The World Bank's report card on India's water sector in June 2005 (interestingly titled: *India's Water Economy: Bracing for a Turbulent Future*) stated, 'the cost of replacement and maintenance of India's stock of water resource and irrigation infrastructure would be about $4 billion a year, which is about twice the annual capital budget in the Five Year Plan', and nothing of this amount is allocated to the maintenance of existing water infrastructure.

In 2006, the International Water Management Institute found that the proportion of canal-irrigated areas is decreasing across the country. In a number of states (e.g. Tamil Nadu and Andhra Pradesh), the actual area irrigated by canals has been going down for a decade. India's reservoirs are silting up: the latest data from Central Water Commission, analyzed by us, showed that capacity equal to at least two-thirds of the additional storage capacity that we are adding annually through new large dams at huge economic, social and environmental costs is silting up. And little is being done.

The generation of electricity per MW installed capacity from large hydropower projects has reduced by over 20 percent in the last twelve years as a result of aging machines, silting reservoirs and overdevelopment in some of the river basins.

The clearest sign of how poorly India is dealing with water resources development and management is the growth of water-related conflicts. But what is the response of the government to this reality? More of the same. There is no democracy in water resources development. And the solution lies in changing that situation in fundamental ways.

Options in agriculture and irrigation

Understanding the ground realities of Indian water resources has to be the first step towards effective future solutions:

- The average foodgrains yield from irrigated areas in India is around 2.5 tonnes per hectare. This can be increased to 4 tonnes per hectare.
- Indian water use efficiencies are at best around 25–35 percent in canal-irrigated areas and a slightly higher for groundwater-irrigated areas. As the mid term review of the tenth Five Year Plan showed, a 10 percent increase in irrigation efficiency can add 14 million hectares of additional irrigated area. This is higher than the target of the entire Bharat Nirman Yojana. The cost of each additional hectare of irrigated area in this way will be much less than the cost from such benefits from new projects.
- The gap between the irrigation potential created and actual irrigation is around 10 million hectares. Bridging this gap would be more cost effective than hankering for more storage capacities.
- Arresting the siltation of storages of all sizes and desilting them where feasible would be more cost effective with multiple spin-offs; precious little is being done in that direction.
- While over 90 percent of the additional irrigation in the last decade came from groundwater and while about two-thirds of Indian irrigated foodgrains output comes from groundwater, we do not seem to understand the dire implications of plunging aquifer levels and the irreversible nature of pollution of the aquifers. One major consequence of depleting aquifer is the rising energy costs. This can be arrested and in fact reversed if groundwater is recharged on a massive level.

India has the largest number of huge dams under construction today, more than any other country. The most important justification provided for large dams in India is to store water available in monsoon to use it in non-monsoon months. However, there are many options available for storing monsoon water. One of the most important one is storing water in the underground aquifers. Another option is to store it in small, decentralized projects, nearer to where the water demand is. Another important issue to keep in mind here is to assess the performance of large storages that have been already created.

Looking at the data from the last twelve years, on an average, 36.25 billion cubic meters (BCM) of storage capacity out of the 133 BCM storage capacity through large dams monitored by the Central Water Commission remains empty. This means that each year, capacity equal to 6.4 Sardar Sarovars is not used.

The concept of virtual water (water content of the products consumed, trade and export) is increasingly going to become important in the future. Can India afford to export sugar and basmati rice, produced after consuming so much water, even as large parts of India continue to be deprived of water for basic needs? It is important to understand the water content of the products consumed and exported and ensure optimum benefits without taking away water for basic needs.

System of rice intensification

Large-scale adoption of new methods like the System of Rice Intensification (SRI) can be hugely beneficial for India. One crop that is grown over the largest irrigated area in India is paddy and it is a very water-intensive crop. Under SRI, tried in dozens of countries over the last decade and also tried over thousands of hectares in states like Andhra Pradesh, Tamil Nadu, Karnataka, Kerala, Orissa and W Bengal in India, with some basic modification in the cultivation method (e.g. increasing the spacing between plants, transplanting younger seedlings and transplanting just one plant per location in place of two to three plants per location and no flooding of the fields to name a few), it has been shown that rice yield can be increased to up to 8 tonnes per hectare and in the process water requirements (as also other inputs like seed) are reduced by over 50 percent. Even if this method, endorsed by the Union Agriculture Ministry and the Andhra Pradesh Government (although not pushed wholeheartedly for some unknown reasons), is adopted over just half of the 24million hectares paddy-irrigated areas and even if India achieves half of the possible gains, it is possible to add 6million hectares to irrigated areas with the water saved.

Hydropower options

While the biggest projected USP of large hydropower projects is supposed to be provision of peak power, India fails to monitor what the power generation from such projects is during peak hours, nor do the consumers have to pay anything extra for consumption of power during peak hours. Charging more for peak hour power consumption, management systems to ensure peak hour power demand management and enusuring optimum power generation are some of the measures that can help reduce the peak hour power demand also reduce the need for such projects significantly.

Similarly, regular independent assessment of the performance of large hydro (and also large irrigation projects) would help us understand why the generation per MW installed capacity is going down and what we can do to arrest and reverse the same.

Ninety percent of existing dams in India do not have a hydropower component, where we have the water storage and heads available for generation of hydropower without additional social and environmental costs. It is important to assess how many such existing dams can incorporate a hydropower component. Similarly, hydropower can also be generated through small projects. According to a United States Department of Energy study published in January 2006, the US has the potential of generating 300,000 MW through small hydropower projects of lower than 30 MW installed capacity. It was assessed that 100,000 MW of that is feasible even according to the feasibility norms of 2005. This capacity is three times larger than existing projects in the US currently. India has not even comprehensively assessed the potential. India also needs to consider the Chinese experience. China already has more than 88,000 small hydro projects.

A system of transparent and accountable project appraisals would eliminate some of the unviable projects, saving the society in terms of economic, social and environmental costs.

Some other options are demand side management (DSM – potential of 25,000 MW as per a Power Ministry study), off-shore wind power, solar and biomass power, use of decentralized power generation systems, reducing transmission and distribution losses, time of day metering and increasing end use efficiencies. A study by the Prayas energy group recently showed that if every electrified household in India replaces just one 60 W incandescent bulb with a compact fluorescent lamp of sufficient wattage to give the same light, the peak load demand of electricity can be reduced by 5,000 MW. This should open up many eyes and minds.

Water supply options

In the years to come, the water requirements for Indian urban and industrial use are going to increase considerably due to the increasing population, increasing per capita demands, increasing urbanization and industrialization. This will further add to pollution in rivers and aquifers, many of which are already unusable currently. The big unexplored options in this area include DSM, pollution control, reuse of water after adequate treatment and local supply-side solutions like rainwater harvesting and decentralized water treatment.

Global warming and climate change

Global warming will lead to more disasters; it is important to put in place better systems of monitoring now so that the impacts of such natural disasters can be minimized. Adaptation is required. The damage caused during the 2005 and 2006 monsoons could have been avoided had there been better systems of forecasts and preparedness. The flood forecasting done by the Central Water Commission currently is highly inadequate, non-transparent and unaccountable.

Conclusion

It is clear that India has a large number of technological, management and institutional options. What is needed is the political will to put systems into place to make it happen.