Seeking Viable Solutions to Water Security in Bundelkhand

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Traditional tanks, village ponds, and farm ponds are time saving, cost-effective, environmentally benign, and viable solutions to ensuring water and food security in drought-prone regions such as Bundelkhand. Expensive mega projects with large reservoirs such as the Ken–Betwa link take decades to plan, design, and implement, and cause enormous environmental damage.

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Two successive years (2014 and 2015) of less than normal rainfall resulted in a nearly unprecedented situation for water supply and agriculture in India. Newspaper reports focused on the steady decline of water levels in the major reservoirs, many well below the dead storage. For people to get relief from the government, 234 districts in 10 states were declared drought affected. As some states delayed the declaration or did not consider all affected areas, the matter was discussed in the Supreme Court, which analysed the definition, classification, and criteria for a drought in great detail, referring extensively to the 2010 National Disaster Management Guidelines for Management of Drought.[1]

A drought situation, with its multiple consequences, begins with a deficiency in precipitation from the expected or normal levels over an extended period of time. This is known as a meteorological drought. Such droughts are not new phenomena, but their frequency has been increasing in recent decades with changes in climate. The unpredictability of monsoon precipitation and a short period of rain are normal features of our climate. People in South Asia have lived for many centuries with the vagaries of the monsoon, which is still not fully understood by meteorologists. The traditional response has been water harvesting in tanks, which intercept the surface runoff and small lower-order streams. These tanks also served as flood control structures for downstream areas. Rainwater harvesting structures were innovated in many parts of India where rainfall was both erratic and scanty. More important were also the traditional water management practices that avoided wasteful use and pollution. Floods, whenever and wherever they occurred, were often considered welcome phenomena despite some losses because they recharged ground water and renewed soil fertility (D'Souza 2002; Singh 2008).

The people's perspective of water management changed drastically with the advent of engineering interventions, which regulated river flows behind large dams, created extensive canal systems, and controlled floods by restricting rivers to their embankments. The second onslaught on our water resources came from drills and pumps that facilitated

exploitation of groundwater and now confined deep aquifers as well. Our traditional structures and practices for managing limited water resources were thus gradually abandoned.

The general response of the government to frequent droughts and water scarcity is dominated by engineering solutions. The Central Water Commission says that more reservoirs need to be constructed to "develop" the country's untapped water resources. This is a euphemism for building dams and large reservoirs without examining their effect on downstream areas and communities, and without ensuring last-mile connectivity of the canal system (Marothia 2005). These reservoirs have failed to solve our problems. This was expressed succinctly by the Chief Minister of Maharashtra, Devendra Fadnavis, in the state assembly on 21 July 2015,

> Maharashtra has the country's 40% large dams, but 82% area of the state is rainfed. We have moved away from our vision of watershed and conservation … We did not think about hydrology, geology and topography of a region before pushing large dams everywhere. But this has to change.

Situation in Bundelkhand

We will elaborate on the current situation with the example of Bundelkhand where India's first river interlinking project—the Ken–Betwa link project—was planned 20 years ago. The feasibility report for this was prepared in 1995, based on a 1992–93 survey. It formed the basis of a memorandum of understanding (MoU) between Madhya Pradesh and Uttar Pradesh in 2005, and preparation of the detailed project report (DPR) began in 2006. Its approval took several years and, in 2010, the project was divided into Phases I and II. The estimated cost of the project increased from less than ₹2,000 crore in 1995 to ₹10,000 crore in 2008 (for Phase I alone), and is likely to exceed ₹18,000 crore at current estimates. This does not even account for the economic value of the river's ecosystem services lost due to the project (Gopal and Marothia 2015). The project would take nine years to finish even if work begins in 2016. There has been no effort to examine changes in hydrology in the last 25 years and its effect on the project's viability. Meanwhile, several smaller projects are coming up in the catchment area upstream of the project site, and downstream tributaries have been dammed to create a network of reservoirs and canals.

Has anyone thought of what has happened to the people in the area over the last 20 years while the river-linking project has been in planning? Do we think of the fate of the people over the next 10 years? Are they to survive with dreams of water flowing in the canal for 10 years or more? Rarely are such mega projects completed in the stipulated time. For whom is the big project being planned? The next generation? But, by then, the people would have migrated. Data suggests that there have been 30 years (out of the last 50) with rainfall below normal, and 15 years, when rainfall was lower by more than 25% of the normal (Jain et al 2014; Murty et al 2013). M K Jain et al (2012) conclude that the severity and duration of drought events have increased in the basin compared to the first half of the 20th century, and the probability of receiving normal and 75% of normal rainfall is decreasing at an alarming rate. If the trend continues as predicted by climate change models, the project may never achieve its targets.

Has the government seriously considered alternatives to provide water to the people of Bundelkhand in the shortest possible time? Only the mega project is spoken of every time there is a drought. Centuries ago (at least since the 10th century), several thousand large and small tanks were built by the former Chandela and Bundela rulers. A vast majority of these historical tanks in Mahoba, Chhatarpur, and Panna have been neglected, turned into dumping sites for municipal waste, and encroached on. Even the reservoirs constructed by the irrigation department in the past 50 to 60 years have degraded with silting, never having been filled to capacity. Interestingly, the Bariyarpur barrage, along with its 59.34 km canal and 960.6 km-long distribution system, which was designed to irrigate a command area of 2,29,360 hectares, has been able to irrigate only 66,000 ha with a maximum 86,000 ha in 1994–96.[2] It is ridiculous to think that the river, which could not feed the command area of one canal system, has so much surplus water that it can be diverted through a 78 m-high dam to irrigate an additional 3,00,000 ha.

The Viable Speedy Alternative

The viable alternative, which can be implemented speedily with the active participation of the people at a very low cost, is returning to traditional tanks and farm ponds. Recognising the importance of common pool resources (CPR) in general and waterbodies in particular, the Supreme Court noted in a judgment on 28 January 2011,

> Our ancestors were not fools. They knew that in certain years there may be droughts or water shortages and water was also required for cattle to drink and bathe. Hence they built a pond attached to every village, a tank to every temple.

It directed all state governments to prepare schemes for the eviction of those occupying waterbodies and other village commons and to restore them to the community. Unfortunately, there has been almost no compliance with this directive so far.

In recent years, there have been many successful examples of ensuring water security based on the tank system—many *johads* (storage tanks) built by the Tarun Bharat Sangh (led by Rajendra Singh) in Alwar; farm ponds and renovated tanks in Dewas, Madhya Pradesh, and farm ponds in Mahoba promoted by Apna Talab, a voluntary organisation. During the Jal Manthan II organised by the Ministry of Water Resources in Delhi on 22–23 February 2016, the Telangana minister for water resources spoke about his government's efforts to renovate tanks by dredging silt and transporting it to fields. Stressing on the gains, he said that the renovation of tanks increased their water storage capacity, and the silt improved productivity in the fields, benefiting farmers as well as the state through reducing the use of fertilisers, which means lower subsidies.

In Chhattisgarh, the government promotes and subsidises the construction of *dabris* or waterbodies in farms (Marothia 2004, 2010), and encourages micro-irrigation (sprinklers and drip). The Ministry

of Water Resources has a scheme for repair, renovation and restoration (RRR) of waterbodies with both domestic support and external assistance. Progress has been quite slow though a larger irrigation potential can be achieved at lower costs. According to the Ministry of Water Resources, domestic support will cover "about one lakh waterbodies having a CCA (culturable command area) of 9 lakh ha at a cost of ₹4,000 crore" whereas World Bank Assistance in Tamil Nadu, Andhra Pradesh, Karnataka and Odisha will cover 8,22,000 ha at a cost of ₹3,734 crore.[3] These figures speak for themselves against mega projects such as the enormously expensive Ken–Betwa link with far lower benefits. Water conservation at the farm level can only be achieved by promoting small farm ponds that harvest rainwater from there and utilise it.

There can be no better strategy for water management and improving water security than promoting farm ponds and restoring traditional tanks. This will facilitate groundwater recharge and/or retention of water, which improves soil moisture, helps increase the green cover, and traps silt and nutrients that can be recycled to fields at intervals of three or four years. Planting fruit and fodder trees around the ponds will prevent evaporation losses, and yield income from fodder or fruit. They can contribute to the national effort to mitigate climate change through long-term carbon storage. Water can be withdrawn from deeper tanks (4–6 m) by installing solar panels to energise small pumps. This will not only save energy from the grid, but may also be able to feed the grid. The use of micro-irrigation will help reduce water consumption and optimally use the harvested water. Fish can also be raised in ponds where the water stays for several months (Marothia 2012). Once the ownership of farm ponds and their benefits are assured, farmers will readily adopt new measures.

Restoring large tanks and village ponds must be accorded high priority. For centuries, village communities managed them as common pool resources. In recent decades, however, they have degraded due to weak property rights relations, institutional arrangements, and a breakdown of local authority systems, whether they be community-based organisations, local resource users' groups, or village panchayats. Property rights/tenure security can effectively influence incentive structures for sustainable use of the commons (Marothia 1993, 1997, 2010, 2015), and appropriate property rights and an institutional hierarchy have to be established to restore and manage common waterbodies under the RRR scheme and Pradhan Mantri Krishi Sinchayee Yojana.

Water harvesting and storage in traditional tanks, village ponds, and farm ponds, as well as conveying it through canals, does not require acquiring land and paying compensation. They do not involve any displacement, and there will be no big or small environmental damage. The construction of farm ponds by farmers can be easily completed in a few weeks, well before the monsoon begins and the benefits can be reaped the same year. The government should promote these ponds by offering subsidies that are paid into farmers' accounts and also by offering technical assistance on location, according to geology, soils, topography, etc, through local/regional non-governmental organisations (NGOs) and the government departments concerned.

Similarly, restoring and renovating existing tanks and wetlands can be done in a short time, usually less than a year, if the work is entrusted to community-based organisations such as panchayats and credible NGOs. Restored waterbodies should be protected against degradation with appropriate institutional arrangements. They can often serve as multifunctional ecosystems that also contribute to livelihoods, aesthetics, and recreation, while meeting the goals of sustainable development and adapting to climate change. Mega projects with large reservoirs that take decades to plan, design, and implement are very expensive, and cause ecological and social disruption, which do not mitigate the problems of today or tomorrow.

NOTES

1 Supreme Court judgment, 11 May 2016, WP(C) 857 of 2015.

2 See http://irrigation.up.nic.in/pbr/bariyarpur.htm.

3 See http://wrmin.nic.in/.

REFERENCES

D'Souza, Rohan (2002): "Colonialism, Capitalism and Nature: Debating the Origins of Mahanadi Delta's Hydraulic Crisis (1803–1928)," *Economic & Political Weekly*, Vol 37, No 13, pp 1261–72.

Gopal, B and D K Marothia (2015): *Integrating the Economics of Wetland Biodiversity and Ecosystem Services in Management of Water Resources of River Ken: A Study*, Economics of Ecosystems and Biodiversity (TEEB)–India Initiative, GIZ, and Ministry of Environment, Forest and Climate Change, Government of India, New Delhi.

Jain, M K, V K Jain and R P Pandey (2012*)*: "Impact of Climate Change on Extreme Drought Events in Ken River Basin, India," 2012 ASABE Annual International Meeting Dallas, Texas, Paper No 12-1340846.

Jain, Vinit K, Manoj K Jain and Rajendra P Pandey (2014): "Effect of the Length of the Streamflow Record on Truncation Level for Assessment of Streamflow Drought Characteristics," *J Hydrol Eng*, Vol 19, pp 1361–73.

Marothia, D K (1992): "Village Irrigation Tanks: Institutional Design for Sustainable Resource Use," *Agricultural Situation in India*, Vol 47, No 6, pp 479–87.

— (1993): "Property Regimes and Institutional Arrangements: Concepts and Their Relevance in Managing the Village Commons," *Indian Journal of Agricultural Economics*, Vol 48, No 3, pp 557–65.

— (1997): "Property Rights, Externalities and Environmental Pollution," *The Challenge of the Balance*, Anil Agarwal (ed), New Delhi: Centre for Science and Environment, pp 290–98.

— (2004): *Minor Irrigation Water Storage Tanks (Dabries), in Chhattisgarh: A Case Study*, study undertaken as part of the ITP-SRTT Central India Initiative (CInI) and paper presented at the CInI Synthesis Workshop, Anand, Gujarat, 3–4 January, p 45.

— (2005): "Institutional Reforms in Canal Irrigation System: Lessons from Chhattisgarh," *Economic & Political Weekly*, Vol 40, No 28, pp 3074–84.

— (2010): "Decentralisation of Natural Resource Management in India: An Institutional Perspective, Presidential Address," *Indian Journal of Agricultural Economics*, Vol 65, No 1, pp 1–34.

— (2012): "Performance of Culture Fisheries under Alternative Property Rights Regimes in Chhattisgarh," *International Journal of Ecology and Environmental Sciences*, Vol 38, No 4, pp 163–207.

— (2015): "Improving Water Sharing through Fostering Institutional Creativity: Lessons from Multi-use Water Bodies Management," invited paper presented in Policy Challenges for Protecting Small Holders Session, 12th Agricultural Science Congress 2015, NDRI, Karnal, 3–6 February.

Murty, P S, Ashish Pandey and Shakti Suryavanshi (2013): "Application of Semi-distributed Hydrological Model for Basin Level Water Balance of the Ken Basin of Central India," *Hydrol Processes, doi: 10.1002/hyp.9950.*

Singh, P (2008): "The Colonial State, Zamindars and the Politics of Flood Control in North Bihar (1850–1945)," *Indian Economic Social History Review*, Vol 45, No 2, pp 239–59.