

Water harvesting: community-led natural resource management

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India is in water crisis despite its relatively high average rainfall. Water harvesting can offer a solution. If 5-10% of the land were used for rainwater collection there would be enough water for irrigation and household needs. Recent initiatives, both at community and government level, have made use of long-neglected water harvesting traditions. The results show that reviving water harvesting systems stimulate rural development and restores local ecosystems. This article discusses some of these initiatives and explores how community-led natural resource management can be facilitated.



Photo: S. Rajan / CSE

Tanks (eris) once watered one-third of the irrigated land in Tamil Nadu.

Water crisis

Forty percent of the world's population currently experience serious water shortage. India is one of the 80 countries bearing the heavy social, political, economic and environmental costs of this crisis. Water quality problems affect some 44 million people in the subcontinent and there is widespread pollution. Fluoride, arsenic and iron have entered the groundwater and seawater pollutes groundwater aquifers. In the summer when the situation is particularly acute, women and young girls have to walk long distances to fetch water. Wells are dug deeper and deeper lowering the groundwater table still further and gradually wells dry out. Fifty years ago there was twice as much water available per capita as there is today.

Water is not only vital for human survival, it is also essential for sustainable biomass-based economy. Although India has made substantial investments in an effort to exploit river and groundwater resources to service large-scale irrigation systems and urban water supplies, these systems have rarely reached the rural poor. Often large-scale water developments have led to inefficient and inequitable distribution

of water resources and to forced re-settlement.

Decline of water harvesting

There are water-harvesting traditions in many parts of the (developing) world. India's traditional water-harvesting structures are treasures of ingenuity. Over the centuries, people in different types of ecosystems throughout India have used basic engineering skills to develop a wide variety of techniques to meet their water needs. Today, when the art and science of 'collecting water where it falls' is needed to help ensure an adequate, sustainable and equitable distribution of fresh water, it has become a dying wisdom. Serious efforts must be made to combine water-harvesting traditions with the insights of modern science and technology (Agarwal and Narain, 1997).

Decades of British rule ravaged the peoples' water knowledge heritage. The consequence of British determination to maximise its exploitation of India's riches resulted in impoverished rural communities and the destruction of their resource management systems. Water management structures were also seriously disrupted.

Technological changes such as the introduction of tubewells put richer farmers in command of the tank area. Those who could afford to install these wells no longer have an interest in cooperating with the rest of the community in managing the tanks. Many central and southern Indian cities like Hyderabad, Chennai (Madras) and Bangalore grew up around traditional water harvesting systems. In the urban areas these systems have either disappeared because of pressure from real estate lobbies or have become heavily polluted. Today, traditional water harvesting systems are only important in remote areas such as the Himalayan states which are beyond the immediate reach of water bureaucracies.

Learning from experience

During the 1980s, several successful community-based resource management ventures emerged in response to the water management crises. Some of these are described below. They show the policies needed to turn ecological poverty into sustainable economic wealth. Today, these initiatives are particularly important because they have now matured. An advanced level of ecological succession has been reached and their economic impact is clearly visible.

Sukhomajri village

Sukhomajri, near the city of Chandigarh, is the first village in India to have income tax levied on earnings from the ecological regeneration of its degraded watershed. In 1979, when the nation was facing a severe drought, the villagers built small tanks to capture rainwater. They agreed to protect their watershed to ensure the tanks did not get silted up. The forest department's assurance that they would have the right to use forestland and its grass was a major incentive. The villagers had argued that they should benefit from the biomass



In Konkan region water flows from one farm pond to the other during rainy season.

Photo: Ganesh Pangare / CSE



A bihar (rectangular catchment basin with embankments on three sides) still used by farmers in Bihar.

Photo: Ganesh Pangare / CSF

produced in return for protecting the watershed. The state forest department agreed to give the villagers these rights if they paid the forest department a royalty equivalent to the average income it had earned before the villagers started watershed protection.

The combination of public, private and community investments and the participatory efforts of the villagers have resulted in a rate of return of 19% according to one cost-benefit analysis. The tanks have resulted in a threefold increase in crop production. The amount of grass and tree fodder available to cattle in the protected forest has increased considerably and as a result more milk is being produced. As prosperity increases, Sukhomajri's economy has also changed. "Who could imagine that televisions, tractors and bicycles could be had for mere grass and water?" asks one of the villagers.

One of the most impressive results of the project is that the cost of desilting Lake Sukhna, which supplies water to downstream Chandigarh, has fallen dramatically. The inflow of sediment has been reduced by more than 90% saving the government Rs7.65 million (\$0.2 million) each year in dredging and other costs (Chopra et al., 1990).

Ralegan Siddhi village

Ralegan Siddhi is a village in a drought-prone area of Maharashtra. The annual rainfall is between 450 mm and 650 mm. Villagers could never confidently rely on a regular harvest. In 1975, the village was poverty stricken and there was less than half a hectare of irrigated land per family. Krishna Bhaurao Hazare, a retired driver from the Indian army, began constructing storage ponds, reservoirs and gully plugs. Due to the steady percolation of water, the groundwater table began to rise. Simultaneously, government social forestry schemes were used to plant 300,000-400,000 trees in and around the village. Because of the increased availability of irrigation water, fallow land was brought under cultivation. The total area under production increased from 630 to 950 hectares and average yields of millets, sor-

ghum and onion increased substantially.

The village made every effort to ensure equitable access to the resources generated. Water is being distributed equitably and only crops with a low-water consumption are grown. Today nobody in the village is dependent on drought relief. Incomes have increased substantially and income distribution is more even than in other parts of rural Maharashtra.

Ralegan put more emphasis on participatory democracy than representative democracy. The village created an impressive system of decision making and some 14 committees ensured that people participated in all decisions. A *Gram Sabha*, a participative democratic institution, was established to take community decisions and ensure that each household was involved in the development process. It was also able to exercise social pressure when necessary. (Mahapatra, 1997).

A dead river back to life

Rainwater harvesting has brought the River Arvari in dry and drought-prone Rajasthan back to life. (see Shree Padre p14). The river flows through a drought stricken region - villagers living on the margins of survival are desperately poor and find sustenance by migrating to cities to look for work. According to historical records of the region, the river Arvari used to provide groundwater recharge to wells in the area. But nobody can remember seeing it flow except during the short monsoon period. The river - in its 45km journey to its confluence in the reservoir of a dam on the River Sainthal - flows through about 70 villages. Its source lies in the degraded hills near the village of Bhaonta-Koylala.

In 1986, working with a local NGO, the Tarun Bharat Sangh (TBS), the villagers of Bhaonta-Koylala built a rain-water harvesting structure or *Johad* to trap the rainwater and use it to recharge the groundwater. Since then many more water harvesting structures have been built in the Arvani catchment. These small dams have helped to recharge the river and since 1995 it has been perennial.

Jhabua District

Transformation of rural ecosystems with people's participation, such as the cases described above, has remained isolated and scattered, and usually led by remarkable NGO leaders. Government efforts in afforestation and watershed management have rarely been able to reproduce these successes. The problem is often that the devolution of power to local communities has been half-hearted and inadequate. People's participation has remained largely stuck in the 'you participate in my programme' mode.

In Madhya Pradesh, however, the government's watershed management programme (the Rajiv Gandhi Watershed Development Mission) has become an outstanding example of government interventions promoting public participation in environmental management. The state-wide programme was initiated by the chief minister Digvijay Singh who was inspired by Krishna Bhaurao Hazare's work in Ralegan Siddhi. The programme is integrated and participatory in its approach. Today trees are flourishing in a district that 15 years ago looked like a moonscape and wells are literally overflowing with water in a place that was described as chronically drought-prone (Agarwal and Mahapatra, 1999)

The programme created several tiers of institutions: policy coordination at state level; implementation and coordination at the district and macro-watershed level, and work at village level to ensure that all villagers are involved in the effort. Some 1748 women's groups, for example, have been created in 374 villages in Jhabua and together they have 25,506 participants. Most important, however, serious efforts have been made to give local communities power over decision making and control over resources. Villagers play an active role in the management of watershed programme funds. Nearly 80% of the programme's funds are put in a bank account managed by Watershed Development Committees made up of village people. The Watershed Development Committee brings together the important interest groups in the village in a way similar to the *Gram Sabha*.

Eco-restoration is possible

These case studies show clearly that eco-restoration is possible even in highly degraded lands and that it can regenerate local rural economies and alleviate poverty in a sustainable and cost-effective way (Agarwal and Narain, 1999). In other words, helping the people to help themselves by improving their local natural resource base is a viable and effective strategy for poverty alleviation. The key to eco-restoration lies in good management and use of the local rainwater. This must be supported by community decision-mak-

ing systems and institutions. There must also be legal and financial structures to enable and promote community action.

Examples such as those referred to above remain scattered because the governance system needed to foster people's control over natural resources does not exist. Locally-led instances have emerged despite and not because of the system. Effecting change at the micro-level requires enormous perseverance and effort on the part of an individual initiator especially if the governance system does not empower local communities to improve and care for their resource base. However, the government of Madhya Pradesh has now shown that the state can reproduce community-based efforts if there is adequate political will and pressure on the technical and administrative bureaucracy to deliver. The transformation of Jhabua is a fine example of the results that can be expected when a government seriously starts working with people.

Conclusions

The potential of water harvesting is enormous. The cases mentioned here show that improvements begin with increases in the quality and productivity of croplands as available water increases. This leads to better grass production from the local grasslands and slowly increased produc-

tion of fodder and timber resources from tree and forestlands.

But for water harvesting to support sustainable rural development, there will have to be a change in the governance of water systems (Box 1). Decentralized systems of water management are needed. These in turn demand a community-based system of natural resource management. The only way this objective can be achieved is by deepening systems of participatory democracy and expanding people's participation at village-level. Every settlement must have a clearly and legally defined environment to protect, care for and use. It must also have an open forum in which all can get together to discuss problems and work to common solutions. By strengthening and emphasising the importance of open forums, common solutions and common natural resources, the developing world can make a determined bid to revive dying community spirit and to rebuild its devastated environment.

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Box 1. Steps towards a community-based system of natural resource management

- **Maintain water as a community resource.** Water as a common property resource is the crucial link for improving the productivity of private croplands. It is vital to maintain the use of local water as a community resource and not allow water distribution to follow the inequity in land holdings.
- **Adopt an integrated approach to village resource development.** Current rural development efforts are extremely fragmented, focusing mostly on agriculture, and often efforts are contradictory and counter-productive. Yet the 'village ecosystem' usually consists of several integrated components: crop lands, grazing lands, forest and trees, local water bodies, livestock and various energy sources. What happens in one component invariably impacts on the others, and all is maintained in a delicate ecological balance. Thus development must focus on the holistic enrichment of the ecosystem, whereby attempts are made to increase the productivity of all components, from grazing and forestlands to croplands, water systems and animals.
- **Ensure people's participation in the regeneration of village assets.** All new plantations and grasslands have to be protected, but this will need the support of the people. Without this support the survival rates for village assets like check dams and tanks will be poor.
- **Strengthen village institutions to enable people's participation.** Rational use and maintenance of village land and water resources requires discipline. Villagers have to ensure that animals do not graze in their protected commons and that local water body catchments are conserved and properly used. They must also ensure that the common produce from these lands is equitably distributed within the village. Villagers can only achieve this if there is an effective village-level institution to give them an impetus and involve them in controlling and managing their environment. Deepening democracy at the grassroots is critical in the process of ecological regeneration and local water management. The village-level institution must work with a high order of democracy and transparency in decision-making in order to engender cooperation and discipline within the group members. In India, village-level institutions have worked best when they are built along the lines of the Gandhian concept of a *Gram Sabha*, a village institution that empowers the adults of the village to take decisions.
- **Promote decision-making forums.** Open public forums are more transparent and accountable and promote more confidence in community decision-making than small, elected village councils. Resolution of intra-village conflicts and coordination are invariably easier in open village forums where equitable community decisions can be taken than when organisations are closed and secretive.
- **Develop a legal framework that supports local rights to manage resources.** The Indian government owns a substantial portion of the land and water resources. As a result village communities are often alienated from their management or protection. This can lead to massive denudation of forests, overexploitation of grazing lands and neglect of local water systems. Laws dealing with natural resources like land, water and forests will have to be changed to give people the right to improve and develop the village natural resource base. The legal framework should encourage people to take the initiative to develop their natural resource base without waiting for government to act first.
- **Channel government funds directly to village institutions.** In the present system, various functionaries and agencies of the government control the finances upon which village development depends. Ultimately, only a small proportion reaches the community and it is often spent on projects over which the village has little control and which are not local priorities.