

MODERN PROBLEMS & TRADITIONAL SOLUTIONS

an experience of tarun bharat sangh

CLIMATE CHANGE: ADAPTATION & MITIGATION

Rain Water Harvesting

The climate change is affecting various aspects of the human lives and ecology. Water resources is among the most vulnerable sectors to be affected by the climate change; Warming trend over India, reported to be 0.57^o C per 100 years, is likely to affect the hydrological cycle. Annual rainfall variability from one state to another stretches from 10% - 60% or even more, characterized by heavy to low rainfall crucially affects crop production.

The changes in water cycle would result in:

- Reduction in frequency of rains but increase in intensity;
- More rainfall in lesser time;
- Increased glacial melt-runoff initially and then afterwards decrease;
- Increase in runoff but less ground water recharge;
- Increase in flood events particularly of flash floods;
- Increase in drought like situations; cyclones etc.

India's average annual rainfall is 1170 mm. It varies from 100 mm in the deserts of Western India to 15,000 mm in the high rainfall hills of the Northeast. Nearly 12 per cent of the country receives an average rainfall of less than 610 mm per annum while 8 per cent receives more than 2500 mm. But more than 50 per cent of this rain falls in less than 100 hours out of a total of 8760 hours in a year. The climate change is believed to exacerbate this scenario. *Therefore, it is very important to capture this rainwater, which just comes and goes in a few hours.*

An Experience of TBS

The TBS experiences reveal that promotion of traditional water harvesting structures through appropriate institutional mechanisms and financial arrangements would be the best intervention or adaptive mechanism to reduce the adverse impact of climate change on groundwater resources as well as farm economy based livelihood. Between 1984 to 2008, some 10,000 RWH structures are constructed with support of national and international donors. The rainwater harvesting through small structures consequently revived five rivers, Bhagani-Teldehe, Arvari, Jahajwali, Sarsa and Ruparel, which had been reduced to seasonal rivers, benefiting some 250 villages. The area was subsequently declared a "white zone" by the state government. The impounding of just three per cent of the rainfall is bringing about the economic and ecological miracle of regeneration in the region.

This turnaround in the region was due to revival of traditional water harvesting structures backed up by region specific institutional mechanisms.

Thus the issue of water is not about scarcity but about its careful use and about its equitable and distributed access. This will require reworking the paradigm of water management, so that it is designed to harvest, augment and use local water resources so that it leads to inclusive growth at all levels.

It is evident that freshwater resources and ecosystems are under great threat from non-climate related demands and problems, and water managers are focused on finding sustainable solutions to these pressing challenges.

In the above context, traditional community based water management systems, pave way for identification of appropriate adaptation and mitigation strategies to address the implication of climate change on economy and ecology. The Integrated Water Resource Management (IWRM) interventions of TBS shows the potential adaptation and mitigation measures at local/regional level that address the global challenges of climate change impact on water resources.

Forest Conservation

Conservation of biodiversity (both flora and fauna) along with its sustainable use and equitable benefit sharing is one of the major global concerns today. Protected Areas (PA), accounting for 11% of world geographical, are the core foundations of biodiversity conservation strategies and now even recognized as *last bastion of carbon sink on planet earth or a vital mode of sequestering carbon.*

An Experience of TBS

In this scenario TBS has continued to play a vital role in conservation of forest, wildlife and has spent its energy to promote community based biodiversity model. TBS maintains and encourage traditional methods of living and strengthen means by which local people could take ownership in conservation.

After successful community-based initiative of TBS in the village of Bhaota-Kolyala, a dense forest got conserved. In October 1998, villagers declared it as “Bhairon Dev Public Sanctuary” presenting an alternative to the non-participatory approach to conservation followed till recently by the Forest Department in near by Sariska National Park.

Villagers has defined their own set of rules to control deforestation and grazing. This is the first public sanctuary of its kind.

Also, TBS motivated village level intuitions to undertake afforestation work, protection of forest and construction of RWH Structures in both core and buffer zone of Sariska National Park. TBS has constructed 115 earthen and concrete structures in core zone and 600 RWH Structures in the buffer zones of Sariska National Park. On one hand, these efforts facilitated a rise in the groundwater levels and provided drinking water to wildlife during droughts. Moreover, the increase in soil moisture in downstream of RWH Structures provided excellent conditions for vegetative growth and thus helped in rejuvenation of degraded grazing land into productive one. The grazing land thus developed in vicinity of RWH structures and in their catchment provided immense relief in terms of fodder/forage availability to wildlife during mild to severe drought conditions. Thus the grazing land developed in buffer zone significantly reduced the pressure on core zone of Sariska National Park.

FOOD SECURITY

Agriculture Production

The anticipated population growth may be 15000 million by 2020. The food production has to be stepped up from 184 million metric tones during the year 1994-95 to 225 million metric tones by 2020. Large-scale losses in agricultural productivity may in turn give rise to malnutrition and micronutrient deficiencies.

It is important to realize that India's future food security even from its so-called Green Revolution areas will depend heavily on a nationwide groundwater recharge programme, which can only be taken by individual communities through rainwater harvesting. If this is not done, agriculture will suffer even in current irrigated areas because of the increasing overexploitation of groundwater and lowering of groundwater tables across the country.

And as areas irrigated by groundwater show higher productivity than those irrigated by canals, the contribution of groundwater to India's total agricultural output from irrigated areas is much more than that of canals.

Further lowering of groundwater tables can seriously threaten India's hard-earned food security at a time when India will need to produce more food to feed its growing population.

To address the above scenario, global and national discourses unanimously conclude that, among others, two crucial adaptation strategies should be adopted to enhance the contribution of rain-fed agriculture. *First, use strategies for efficient conservation of water* through - soil and water conservation, better runoff management, improved rainwater harvesting, improved management of irrigation systems and recycling wastewater. *Second, seek active participation of local communities* in promotion of innovative and productive technologies, in strengthening of soil and water management and revival of traditional resource management practices.

An Experience of TBS

The most important input in increasing agriculture productivity is availability of secure water for irrigation. TBS in course of its evolution found that, agriculture productivity has reportedly increased substantially in the following cases: *Prevention of erosion:* In cases where the primary objective of the RWH was soil conservation, a significant impact in crop productivity and a reduction in expenses in maintaining and levelling fields affected by gully formation has been observed.

Increase in water for irrigation: Where RWH has increased Groundwater and previously un-irrigated or inadequately irrigated fields have been put under irrigation, the impact has been the most dramatic in hundreds of villages.

Increase in productivity and income: A study conducted in 2000-01 by an eminent economist; Bharat Jhunjunwala. He observed that in the project villages of TBS, the area irrigated by a well increased by 7.4 bigha in project villages in comparison to 0.3 bigha in control villages and therefore, the impact of RWH was dramatic as the average increase in irrigated area in a project village was 426 bigha against mere 2 bigha in the control villages. *In the case of wheat, the average productivity has increased from 720kg per acre to 1,500 kg per acre.* The same study also revealed high benefit-cost ratio of TBS interventions.

One major benefit of the RWH has been that cultivation has shifted from one Kharif crop of bajra or maize to second Rabi crop of wheat or mustard. Since the Rabi crop

is the main cash crop in this region, this has translated into significant economic gains.

In many villages, farmers have diversified into crops such as onion, vegetables and flowers due to assured water availability. This has led to an increase in agricultural income. In some villages, reports of wastelands being converted into agriculture lands are also reported.

Livestock

Livestock play role in all three aspects of food security viz. food production, stability of supply and access to food because livestock make a significant contribution in terms of;

- Food production through the provision of high value protein-rich animal products. It can measurably enhance nutritional quality in diets, especially vulnerable groups such as young children and pregnant and lactating women.
- Indirect support to crop production through draught power and manure.
- Significant source of income and store of wealth for smallholders, thereby providing access to food. Contribution to economic progress and social transformation as a strategic asset of the poor.

An Experience of TBS

Impact of forest protection: In villages where protection of Common Property Resources (CPR) and catchment has been done in addition to RWH structures, the improvement in quantity and quality of fodder has changed livestock composition.

Increasing drinking water availability for animals: The greatest impact of TBS' work has been on animal husbandry. The increased availability of drinking water for animals (both in grazing lands and in villages) in peak summers could be rated as star achievement. Drinking water security has resulted in significant changes in cattle population and composition.

Increase in fodder through strengthening of agriculture yields: In villages where a significant recharge in wells has taken place leading to better irrigation, a positive impact has been observed on fodder availability from agriculture lands in the form of agriculture residue from Bajra, maize and wheat as well as green fodder.

Increase in milk yields of cattle: Due to increase in Drinking water availability from RWH and increase in fodder availability by protection of CPRs and catchment, it is reported to be a marked improvement in cattle health. This improvement is reflected in increased milk yields of cow and buffaloes.

Incomes from animal husbandry: With increased water and fodder availability, there has been a consequent increase in incomes from the animal husbandry sector. In many villages, the real annual income from animal husbandry per family rose by an impressive three times.