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SA STUDY OF SUSTAINABLE WATER MANAGEMENT IN INDIA

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Abstract- Air, water and land are traditionally considered as the principal free goods gifted by nature. A free good is one which is available at zero prices, and hence nobody can claim, the whole or part of it, as his/her own private property. In this sense, land and water cease to be free goods - land is bought and sold, despite VinobhaBhave's assertion that "all land belongs to God"; a part of water - ground water - has also already become appropriable. The root cause for such transformation is the occurrence of a gap between the growing needs and the given availability of the gifts of nature - land and water. It is expected that management transfer will have three beneficial results. First, crop production will increase, because the farmers collectively can make more effective water sharing decisions. Second, because they are directly affected, farmers are likely to take better care of their systems than the government officials, thus improving sustainability of the systems. Third, management transfer will result both in reduction of staff and other government costs for irrigation system management, thus easing pressures on government exchequers. With that objective, the Tamil Nadu Government has passed the Tamil Nadu Farmers' Management Irrigation Act 2000. In a walk-through survey of the researcher, it is found that the WUAs can effectively function as a gross-root institution for politico-cum-socio economic expansion. It could help in the expansion of local leadership and organizational abilities. It assures close contact with the Government as well as people. The WUAs can effectively act as guardians of common property and natural resources.

Keywords- Management, water, sharing, decision

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Introduction

Before independence, the state and central governments in India have made large investments in construction of government to perated irrigation systems. Numerous studies have shown that these systems have performed poorly in terms of irrigating the planned commands, system preservation, water sharing, fairness and efficiency in water usage and recovery of water charges. Also, increased pressure on government finances has resulted in irrigation system deterioration further as less and less resources are devoted to system preservation. In an effort to solve these problems, several states in India with support from the centre, are considering or implementing programs to transfer some irrigation system management errands from the government irrigation agencies to Water User Associations (WUAs). Numerous other countries are also trying this approach as well. It is expected that management transfer will have three beneficial results. First, crop production will increase, because the farmers collectively can make more effective water sharing decisions. Second, because they are directly affected, farmers are likely to take better care of their systems than the government officials, thus improving sustainability of the systems. Third, management transfer will result both in reduction of staff and other government costs for irrigation system management, thus easing pressures on government exchequers. With that objective, the Tamil Nadu Government has passed the Tamil Nadu Farmers' Management Irrigation Act 2000. In a walk-through survey of the researcher, it is found that the WUAs can effectively function as a gross-root institution for politico-cum-socio economic expansion. It could help in the expansion of local leadership and organizational abilities. It assures close contact with the Government as well as people. The WUAs can successfully act as guardians of common property and natural resources.

Air, water and land are usually considered as the principal free goods gifted by nature. A free good is one which is available at zero prices, and hence nobody can claim, the whole or part of it, as his/her own private property. In this sense, land and water cease to be free goods - land is bought and sold, despite Vinobha Bhave's assertion that "all land belongs to God"; a part of water - ground water - has also already become appropriable. The root cause for such transformation is the occurrence of a gap between the growing needs and the given availability of the gifts of nature - land and water.

M.S. Menon, Former Chief Engineer, Central Water Commission points out in his article on "The gathering clouds of water wars" (The Hindu, May 28, 2002), that "26 countries around the globe are now considered to be water scarce. Further, the projection that by the year 2025, two-thirds of the world population is likely to live in countries with moderate or severe shortage of water has to be viewed with greater concern". However, a distinguishing feature of water is that, it is also one of the most manageable of the natural resources, as it is capable of diversion, transport, storage and recycling. This makes augmentation and conservation of water feasible. Technology offers a number of options towards augmentation/ conservation - storing rain waters in reservoirs (and tanks) and releasing the same in the lean season, even taking it to distant places through canals; making further use of ground water through pump sets and bore wells, (that at times invite recharge of ground water sources by water spreading, sub-surface dams, injection wells, and induced recharge) water harvesting; resorting to sprinkler, drip and drop strategies of watering; adoption of apt cropping cycles and cropping pattern; conjunctive use of ground water with surface water; recycling of polluted/saline water etc.

Choice of particular technologies depends not on their own potential efficiency but on their economic efficiency - costs and benefits. It is no secret that the colonial rulers were very much interested in excavating big dams and canals, for such efforts and assured very high returns to investments.

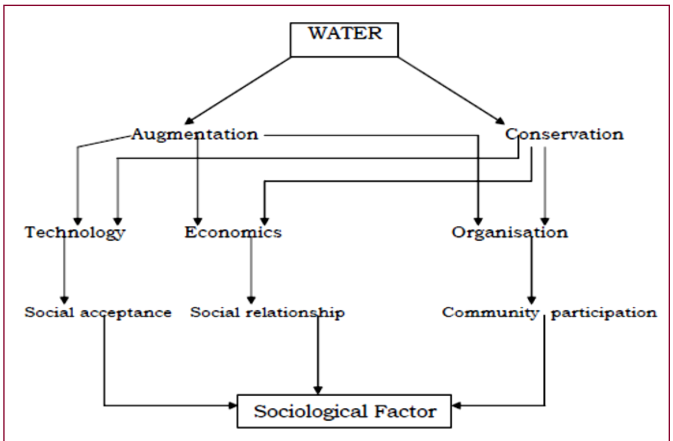

Fig. 1- Sustainable Water Management in India

When water becomes scarce, managing the demand for water in agriculture, which is the largest user of diverted water, holds the key to water management to meet the demands from competing users. As per some estimates, irrigation in India consumes nearly 500 BCM of water annually. Raising crop water output provides a means both to ease water shortage and to make available water for other human uses and nature. But the key to accepting the ways to enhance water output is in accepting what it means. Definition of water output is scale dependent. Water output can be analyzed at the plant, field, farm, system and basin levels, and its value would change with the changing scale of analysis. The past work on water output attempted to analyze water output of crops at the field level in biomass output per unit of water, the factors that drive change in water output of crops and impact of selected factors.

Analyzing the real opportunities for enhancing water output at the regional level would need taking current crop combinations, farming system and region as the unit of analysis, with several critical social and monetary realities factored in it, and the actual amount of water depleted in crop production. In India, the remarkable growth in well irrigation in the past few decades has brought profit, but in some cases has also resulted in negative consequences for the environment, for third parties, and for the long-term sustainability of the resource itself. Large parts of India, including the western and north-western parts and peninsular India are on the verge of being hit by lessening of underground water resources and water shortage. Inefficient pricing of electricity and lack of well-defined water rights leave no incentive among farmers to use underground water efficiently and sustainably.

Poor dependability and degree of control over field-level water application lead to poor technical efficiencies in public surface irrigation systems. Reliable and controlled water supply will maximize the beneficial use part of the water depleted. The overall effect will be that the Consumptive use would be less for the same ET. Moreover, with controlled water delivery, the efficiency of utilization of fertilizers will improve. Hence, with improved reliability and water delivery control, water output (₹/m3) will increase. Since there are no extra capital investments this will also lead to higher output in economic terms. If surface irrigation is made more reliable with greater control established over water delivery, it can result in improved water output in economic terms. Micro irrigation is being advocated as a means to improve water use efficiency in crop production and to save water in agriculture. But, the real water saving impacts of micro irrigation systems are often complex, and are not amenable to simple solutions. It depends on climate, soil type, crop spacing, geo-hydrology, and type of MI technology. Even when MI systems result in real water saving, it does not result in income gain for the farmers as they do not incur any cost of using water in most situations. There are other conservation technologies being promoted in water-scarce regions, such as System of Rice Intensification and zero tillage. But, there is limited knowledge about the real water saving from these technologies.

The Indian Context

India receives annual precipitation of about 4000 km3including snowfall. Out of this, monsoon rainfall is of the order of3000 km3. Rainfall in India is dependent on the south-west and north - east monsoons, on shallow cyclonic depressions and disturbances and on local storms. Most of it takes place under the influence of south-west monsoon between June and September except in Tamil Nadu, where it is under the influence of north-east monsoon during October and November. India is gifted with a river system comprising more than 20 major rivers with several tributaries. Many of these rivers are perennial and some of these are seasonal.

Ground Water Resources

The annual potential natural underground water recharge from rainfall in India is about 342.43 km3, which is 8.56% of total annual rainfall of the country. The annual potential underground water recharge augmentation from canal irrigation system is about 89.46km^3. Thus, total replenish able underground water resource of the country is assessed as 431.89%. After allotting 15% of this quantity for drinking, and 6 km3 for industrial purposes, the remaining can be utilized for irrigation purposes. Thus, the available underground water resource for irrigation is 361 km3, of which utilizable quantity (90%) is 325 km3. The estimates by the Central Underground water Board (CGWB) of total replenish able underground water resource, provision for domestic, industrial and irrigation uses and utilizable underground water resources for future use.

[Table-1] provides details of the population of India and percapita water availability as well as utilizable surface water for someof the years from 1951 to 2050 (Projected). The availability of water in India shows wide spatial and temporal variations. Also, there are very large inter-annual variations. Hence, the general situation of per capita availability is much more alarming than what is depicted by the average figures.

Table 1- Per capita per year availability and utilizable surface water in India (in m^3)

Year	Population (in million)	Per-capita surface water availability	Per-capita utilizable surface water
1951	361	5410	1911
1955	395	4944	1746
1991	846	2309	816
2001	1027	1902	672
2025	a.1286(low growth)	1519	495
(Projected)	b.1333 (high growth)	1465	
2050	a.1346(low growth)	1451	421
(Projected)	b. 1581 (high growth)	1235	

Source : Ministry of Water Resources, New Delhi.

Recapitulation

Water is one of the most essential natural resources for sustaining life and it is likely to become critically scarce in the coming decades, due to continuous increase in its demands, rapid increase in population and expanding economy of the country. Variations in climatic characteristics both in space and time are responsible for uneven sharing of precipitation in India. This uneven sharing of the precipitation results in highly uneven sharing of available water resources both in space and time, which leads to floods and drought affecting the vast areas of the country.

Conclusion

Distinguishing feature of water is that it is one of the most manageable of the natural resources, as it is capable of transporting, storing and recycling. Thus, augmentation/ conservation of water is feasible. In this augmentation/conservation, technology and economics play a decisive role in a conducive institutional set up, monitored by the society itself. In this context, a sociological study of water management is bound to be relevant and rewarding.

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