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SUSTAINABLE ENVIRONMENTAL SANITATION AND WATER SERVICES

Sustainable Utilization of Kerala's Water Resources

Subha Rani Kurian, Leven K. V., & Sathian, K. K., India

Situation

The state of Kerala lies in the pre-humid and humid climatic belts, except the southern most pockets of the state and the eastern part of the Palghat region which come under moist sub-humid climatic type. The rainfall distribution is bimodal and receives heavy rains during both the monsoons with an annual average of 2963 mm. Though the annual rainfall figures indicate fairly heavy rainfall in the state, its concentration during the monsoon period with remaining part of the year remaining dry requires careful management practices to meet the requirements of water for agriculture, drinking water, industrial use and other purposes. Even potable drinking water is scarce during summer. On the other hand, inadequate control of monsoon results in serious environmental problems. The predominantly shallow soil offers little scope for soil moisture storage in the crop root zone. Added to this is very low groundwater potential since the lithosphere comprises essentially hard rock and lateral beds. The topographical situation of the state do not provide the scope for surface water storage through tanks as in case in the plateau regions of peninsular India. There are 44 rivers flowing through the state. The special characteristics of these river systems are their shortness in length and they flow through distinct topographical belts, namely, highland, midland and lowland. All these critical features necessitate the adoption of special measures to conserve and utilize available water resources efficiently, with the ultimate aim of achieving sustainability and environmental safety.

Most of the industries in the state are located in the coastal region. There is also seawater ingression into the substantial reaches of the rivers in the coastal region. The effluents from industries and pollutants resulting from human excreta as well as the residues of agricultural chemicals, governs the quality of water, especially in the coastal belt. At many places, the aquatic life mainly fish are exposed to deteriorating water quality.

Emerging New Concepts

The concept of water management is undergoing a major turn by changing from site or component specific quantification and utilization of water resources to holistic approach. Finally it has paved the way to a new school of thought of integrated water management, even cutting across the boundaries of the countries. Now-a-days, hydrological data has been exchanged between the countries to facilitate this by accurate spatial and temporal quantification of components to tackle the inherent stochasticity. The latest advances in information technology can be best utilized in the management of volumous data in water resources. But, in India the importance of the hydrological data transfer and the integrated water management is yet to be recognized at a macro level. At least, we should start it from the command area level of major reservoirs, as the holistic approach is capable of increasing the overall efficiency of water resources utilization.

Water resources management of Kerala requires detailed understanding of each river system and appropriate management practices to attain systainability in agricultural production and water supply coupled with proper management of the ecosystem. An effective water management system require the storage of feasible quantities of monsoon runoff through small, medium and large dams and their release for hydro-power generation and maintenacne of stream flow in the river systems during dry periods. Mere quantifications of the quantum of discharge into the Arabian sea and proposals to divert the flows to the other basins in the neighbouring states could lead to serious environmental consequences. A typical case is that of the Vembanad lake and the Kuttanad region which is known as rice-bowl of Kerala. Restriction of flow into the lake system by interbasin transfer is likely to lead to serious environmental deterioration resulting in adverse effects in the riparian flora and fauna. This is more important when aquatic life and the health of people of coastal region are concerned.

Step Towards Sustainability

The quantification and the characterization of components of a major river system at block level for better water resources management can be achieved through studying the hydrology of a selected system, including the availability of gravity flow and the possibility of conjunctive use of canal water with other sources of water like seepage flow, groundwater, drainage water, pumping from streams within the command.

Agriculture is the major water consumer. Water in a

major irrigation system is delivered over a considerable area with variation in crops, soil, climate, topography and socio-economic situations. Because of these complexities, it is not easy to estimate and deliver the exact required quantities of water to different users at the field level as and when required. The excess water released is not only wasted but also causes waterlogging in the low-lying regions of the canal commands. There are ample opportunities to utilize the excess flow, as stated above, by developing suitable storage facilities along the distribution system or permitting the neighboring interested farmers, those who are not included in the canal command, to irrigate their fields by pumping from canals. It may lead to an increase in the yield of profitable horticultural crops, which are not irrigated at present, but shows a considerable yield response to irrigation. Moreover, the emerging interest in crop diversification schemes in most of the rice-based farming systems in humid-tropical Asia necessitates the reorientation of the operation and maintenance program of irrigation projects. Thus, there is ample scope to increase the irrigation potential to improve the efficiency in water resource utilization of a canal system by resorting to suitable schedules for flow-cum-lift irrigation without adversely affecting the riparian rights of downstream beneficiaries who are originally being benefited by gravity system. This school of thought is gradually gaining popularity among planners as observed in Trichur District Planning Committee (1999), Kerala. There is also scope for augmentation of canal water supplies with other sources of water supply such as conjunctive use of canal water with ground water, recycling of seepage flows and drainage water. These options are highly site specific. Hence, the water management of a large canal system should be done after studying the hydrology of different reaches separately in conformity with the heterogeneity of a large command.

Wetlands in any state need special attention due to environmental as well as demographic importance. Flood at monsoon, salinity and seawater intrusion, silting of waterbodies, environmental degradation, deficiency of potable water even during rainy season and decrease in aquacultural population are the main problems exist in coastal wetlands of Kerala. Low availability of water causes immense stress on the health and nutrition on women as the drudgery of locating the drinking water source and transportation of the drinking water falls on them especially in economically weaker sections of the society. Paddy growing wetlands of Kerala with acid sulphate soils have the problem of the availability of good quality irrigation water as those regions lie below mean sea level. The farmers of the area developed an indigenous technique of the utilization of rainwater by harvesting it in the paddy field and later temporarily storing this rainwater in the irrigation canals and recycling it. Developing an indigenous rainwater harvesting technique is the best techno-economic solution as the quality of rainwater is likely to be superior to water from discontinuously-pressured public water supply system, shallow well water and even deep well water in almost all developing countries. There are success stories from Chellanum and Monkombu in Kerala where the quality of water in upper profiles as well as in the deeper ones are brackish leaving little scope for ground water development for drinking. Regional Agricultural Research Station, Kumarakom has initiated a research project to study the feasibility of roof rainwater harvesting to solve the deficiency of potable water in wetland with the financial assistance from Ministry of Science and Technology, Government of India. Construction of check-dams at the high land for flood control, restricting the closure fo regulators for seawater intrusion to bear minimum and automation or real time operation of control structures may further improve the situation in wetlands. 'Eco-city' programmes initiated at government level is a significant step towards sustainable development.

Specific Observations

Quantification of components of water resources within a water divide will pinpoint the water resources potential both spatially and temporarily in an area as a whole for the rational utilization of water resources for irrigation, water supply and other uses. The quantum of water which could be directed for system storage through gravity flow and direct lifting from a water course at its reaches could be delineated without affecting the water allowance already available for existing users. Direct benefits would be substantial increase in agricultural production and water availability for domestic and industrial use. Indirect benefits would be the adoption of crop diversification as well as the reduction or the elimination of problems of water logging or inundation. This information will also lead to realistic estimation of the capacity requirement of the drainage system.

SUBHA RANI KURIAN*, LEVEN K. V., SATHIAN, K. K., Asst. Professors (Engrg.) Kerala Agricultural University, K.A.U.P.O., Pin 680656. (* Author for Correspondence).