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Water budgeting and its importance

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ABSTRACT

Water is the physical basis of life. Without sufficient water on the planet earth, the existence of biodiversity is highly impossible. "A water budget is a basic tool that can be used to evaluate the occurrence and movement of water through the natural environment". India entered the water deficit nation's league in 2011. We have an annual financial budget with the estimations of income and expenditure. In the same way, the state water budget is to enable and empower the states to ensure that annual water withdrawals are within the limits of utilizable availability. State Water Budgeting empowers the State Government in achieving Water Security, Safety and Sustainability. The primary stakeholder in the water budgeting exercise is the "Farmer". This exercise helps the farmer become aware of the water availability at the watershed/village level and make an appropriate agricultural plan. The Crop Water Budgeting (CWB) tool has been developed to assist communities in how to utilize surface and groundwater efficiently without causing further depletion of present resources. The most important advance in modern agriculture is the invention of the drip-irrigation system. Drip method of irrigation (DMI) was introduced in India during the mid-1980s primarily to save water. Now Israel is the world's leader in farming and irrigation practices. India should learn lessons from Israel by adopting its success story. India is facing a severe water crisis and drought with an increasing population at an alarming rate. So there is an urgent need to establish water recycling units, desalination plants to irrigate agricultural lands and to maintain moisture in barren lands by irrigating them with recycled water and followed by massive introduction of micro-irrigation techniques.

Keywords— Water budgeting, Importance, Supply-demand, Stakeholders, Watershed management, Israel, Drip irrigation

1. INTRODUCTION

Water is a physical basis for life. Without sufficient water on the planet earth, the existence of biodiversity is highly impossible. Sustainability in water supply can be achieved by understanding the hydrologic cycle. Recent studies on water budget simply state that "A water budget is a basic tool that can be used to evaluate the occurrence and movement of water through the natural environment"¹. Watershed Support Services and Activities Network (WASSAN) is implementing watershed management, groundwater management, and rainfed agriculture projects in 72 villages of Rangareddy, Mahaboobnagar districts (Telangana state) and Anantpur district in Andhrapradesh. Partners of WASSAN are NGOs that are associated with management of natural resource watershed and rain-fed agriculture; State Level Nodal Agencies of Andhra Pradesh; Telangana, Tripura, Manipur, Jammu & Kashmir and NABARD. Mitra et.al. (2015) measured the balance of water demand *versus* water resource availability in an interfluvium of West Bengal, India to support water resource planning, particularly of inter-basin transfers.

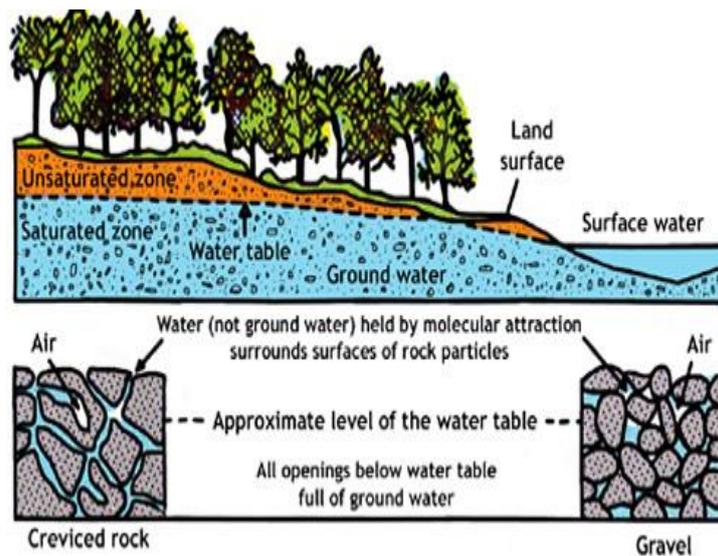
Importance of Water Budget:

It protects sources of drinking water, plans for a number of land and water use developments, monitors recharge rates in local watersheds, as a decision-making tool in restoration and rehabilitation projects, to design environmental monitoring programs; and to assist in setting targets for water conservation. If per capita availability of waterfalls below 1700 cubic meters per person, then the Nation is treated in water deficit nation. India entered water deficit nation's league in 2011. As per the Central Water Commission, we are utilizing 85.3% of the total water for agriculture in the year 2000. This may decrease to 83.3% by 2025. As India is an agriculture-based country, we should take immediate steps to ensure water availability to farmer rather than shifting to animal rearing sector. If agriculture is neglected due to water scarcity, we may not produce food for human beings and fodder to animals. If this sector is strengthened by water budget tools, recycling waste water and establishing desalination units we can grow to water surplus countries like Israel.

Indian government should put maximum effort by spending more money in achieving to achieve water sustainability. If water budget studies are perfect and accurate we could achieve something by understanding the hydrologic cycle we can achieve our goals.

We have our annual financial budget with the estimations of income and expenditure. In the same way, the state water budget is to enable and empower the states to ensure that annual water withdrawals are within the limits of utilizable availability. State Water Budgeting empowers the State Government in achieving Water Security, Safety and Sustainability through a wide array of interventions in 5 strategic areas viz., i. Water Governance- Improvement ii. Supply Management iii. Demand-side Management iv. Water-saving technology for improved Water Use Efficiency v. Water Quality Management

India is the largest user of groundwater in the world with an estimated 251 cubic kilometres of groundwater per year - over a quarter of the global total. However Narasimhan (2008) identified that the utilizable water resources is just 712 BCM. As per the assessment of the National Commission for Integrated Water Resources Development (NCIWRD-1999 GOI), the annual requirement by the year 2025 and 2050 will be nearly 843 BCM and 1180 BCM respectively. The primary stakeholder in the water budgeting exercise is the "Farmer". This exercise helps the farmer become aware of the water availability at the watershed/village level and make an appropriate agricultural plan. This reduces the risk of crop failure due to water shortage and thus makes the farmer less vulnerable in the context of climate change. Rainwater is the main source of freshwater. It is stored in different forms such as groundwater, surface water, and soil moisture. This is our central water income (inflow). Evaporation, runoff and infiltration are important outflow Groundwater includes water in the saturated zone beneath the surface. Soil water occurs above the groundwater zone and below-surface water. Surface water includes lakes, ponds, rivers, streams, etc... Watershed development is an important artificial way to retain water. Watershed provides water for several purposes such as for food, fodder production, prevents soil erosion, degradation, and conservation of soil and water.



National Water Mission, Irrigation Association, Water Budget Organization Trust, Watershed support services and activities network (WASSAN) is associated with the assessment of water budget mainly to create awareness among farmers regarding the conservation and sustainable utilization of water resources. As 85% of water is utilized in agriculture, it is important to know about crop water budgeting tool. The Crop Water Budgeting (CWB) tool has been developed to assist communities how to utilize surface and groundwater efficiently without causing further depletion of present resources. This can be achieved by creating awareness about present water crisis among village communities by explaining supply-side management of water resources. If supply side is managed properly by constructing watersheds, farm ponds, percolation tanks, check-dams, etc., water availability can be increased. Management of water resources initially may be tough, but once the people are aware of its benefits, definitely they follow the supply side management of water resources. Demand-side management includes regulating the use of water by creating awareness among farming communities as water is more precious. The farming community should be guided to adopt water-saving technologies, change of cropping patterns, etc., they should be given training programs, make them aware of subsidies regarding the equipment used for this purpose.

Community resource persons play a key role in CWB for collection of data such as annual rainfall, census of bore wells, groundwater levels, changes across various seasons, and crops cultivated during Kharif and Rabi seasons. Water availability for the season is calculated basing on the recharge potential of the area. Rainfall levels and water storage in the surface structures are mainly considered to estimate recharge potential. Then it is matched against the water required for cultivation in particular season of particular crop based on the farmers' plans. The most important advance in modern agriculture is the invention of drip-irrigation system in Israel by Simcha Blass and his son Yeshayahu in 1959. It is the first watering innovation that increases crop yield, quality, and consistency while using less water per unit of land. Now Israel is the world's leader in farming and irrigation practices and has developed technologies and methods to deal with an array of challenges facing farmers around the globe. Drip method of irrigation (DMI) was introduced in India during the mid-1980s primarily to save water, consists of pipes that are designed to supply water directly to reach the root of plants for a sustained amount of time by saving water and increasing plant yield. In Israel the square serrated trays are placed around each tree. These are made of non -PET and limestone additive which is recyclable. During night time due to temperature change, dew forms on both the surfaces of Tal-Ya tray funnels the dew and condensation directly to the roots. During 2014, National Mission on Micro Irrigation (NMMI) revealed Drip Method of Irrigation (DMI) covering 13 States has benefited farmers significantly. Productivity increased by 42-53 percent in fruit and vegetable crops, reduced irrigation cost by 20-50 percent, electricity consumption by around 30 per cent and fertilizer consumption by about 28 per cent.

2. CONCLUSION

India should learn lessons from Israel by adopting its success story. Now Israel is in light of its world's highest crop yield per cubic meter of water consumed. It is using recycled, slightly brackish water for irrigation. Israel is recycling 80% of wastewater which is being used in agriculture. It is good for agriculture, but harmful to human consumption without further treatment. It is sifted from open water canals to pipes which saves three fourths of the water used for irrigation in long run. Both water and fertilizer consumption can be minimized by adopting drip irrigation. It also increases crop yield by 15% when compared to flood irrigated crops. Besides being implemented the above measures, Israel established many desalination plants to make surplus water country. India is facing severe water crises and drought with increasing population at alarming rate. So there is an urgent need to establish water recycling units, desalination plants to irrigate agricultural lands and to maintain moisture in barren lands by irrigating them with recycled water and followed by massive introduction of micro-irrigation techniques. Nearly 75% of domestic wastewater is discharged into local water bodies and rivers. If it is treated properly, we can irrigate lands; protect biodiversity and build a healthy nation with food security. Achieving water security through various above mentioned measures leads to 100% food security.

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