https://doi.org/10.36375/prepare_u.iei.a173

MAKE EVERY WATER DROP COUNT

FOR THE SUCCESS OF $5 TRILLION ECONOMY AND TO SECURE WATER FUTURE OF INDIA

Water will be the most essential commodity for the success of the ambitious $5 Trillion Economy for India. Well planned Growth in Infrastructure, Industry, Agriculture, IT, Exports etc., a lot more productive sectors will be the key factor which need sufficient water. But water is not available in abundance at present. Large parts of India are already under water stress and will face water scarcity in a few years. Since a long, Water scientists across the globe were forewarning to take urgent actions to face it. But it is being neglected by the respective stakeholders Governments / Bodies / Public etc. Minimizing wastages and improving the efficiency of water management by changing the existing water management practices is the only solution. Specific and time bound actions on the implementation of measures are required at the earliest in a mission mode to improve efficiency of water use & also adopt new technologies. This paper compiles and focuses on some issues to awaken the stakeholders to start actions. Water will become a measure of the wealth of any Country in the next few decades.

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https://doi.org/10.36375/prepare_u.iei.a173

Contents

	Pages
1.00 Introduction	3 to 5
2.00 Global water reserves and future water crisis	5 & 6
3.00 Snapshot of irrigation in India	6 to 8
4.00 Challenges facing water sector	6 & 7
5.00 Action plan	9
5.01 Objectives of action plan	9&10
6.00 How to achieve Efficient Water Management	10
6.01 Roles and responsibilities of Governments	10&11
6.02 Roles and Responsibilities of stake holder water users	11&12
7.00 How to sustain the changes and new methodologies	12
8.00 Conclusions	12

https://doi.org/10.36375/prepare_u.iei.a173

1.0 INTRODUCTION

The $5 Trillion Economy India by 2024-25 is an ambitious task and its achievement will make every Indian proud of being part of it and have India among the top few biggest economies of the World. Fresh Water will be the most essential commodity for the success of the $5 Trillion Economy India. Well planned Growth in Infrastructure, Industry, Power, Agriculture, Aquaculture, IT, Exports etc., a lot more productive sectors will be the key factor and all of which need sufficient water. But water is not available in abundance at present. Large parts of India are already under water stress and will face water scarcity after a few years. Minimizing wastages and improving the efficiency of water management by changing the existing water management practices is the only solution.

Let us have a glance of water status in India in general and specific to resolve issues and how some of the great visionaries of India visualized and valued water.

"The earth, the land and the water are not an inheritance from our forefathers but on loan from our children. So, we have to handover to them at least as it was handed over to us." – ***Mahatma Gandhi****, Father of Nation India*

"Future wars will be over water" - ***Dr. A P J Kalam****, Former President of India.*
Dr. Kalam also expressed that "I remember there were SAVE WATER warnings on outside posters, radio and TV, but nobody paid attention. We thought that water was to last forever but it is not so and unless the country's citizen learns about water's judicious use, we will be in for more problems in future".

Water needs of India from both surface and ground water sources are estimated to be increasing from 634 BCM by the year 2000 to 1093 BCM by the year 2025 and it will further increase to about 1450 BCM by the year 2050. In the next 35 years the water requirement of the Country will be doubled when compared to the present requirement of about 710 BCM. The environmental changes and global warming is impacting the rainfall patterns both in time and spatial distribution across the globe causing heavy flooding and draught occur in different parts of a territory at the same time which is affecting the water availability.

The per capita annual availability of water of India has reached 1508 cubic meter by year 2014 from what it was 5177 cubic meter in the year 1951, 1816 cum in year 2001, 1545 cum in year 2011 and expected to decline to

1,486 cubic meter by 2021, 1,465 cubic meter by 2025, 1,367 cubic meter by 2031 and further to 1140 cubic meter by year 2050.

In the past few decades, many reputed agencies across the World have been predicting that we have to face turbulent water future unless we take suitable immediate measures to mitigate the emerging situation including changing the present water management practices to improve efficiency and clearly forewarned “the countries will face a severe water crisis within the next two decades and they cannot cope up with the water needs of their increasing population and thriving economy”.

It is estimated the world population will increase from the present 7.7 Billion to 10 Billion by 2050 and about 52% population will affected by the water scarcity. 14 of 20 most populous cities of the World are already under water stress and Delhi and Mumbai cities of India are in the list.

Recognizing the distress of farmers, the Government of India (GOI) has done lot exercise on this subject and set targets in the Five year plans to get over the situation...

a) XIth Five year plan (2007-12) focused not just on farm production but also on farm incomes, stressing service delivery and on a wide demand for a ‘second green revolution’ with more irrigation and better crop-specific technologies and more relevantly on the related research work.
b) XIIth Five Year Plan (2012-17) contemplated to establish National Water Framework Law (NWFL) to address Centre-State issues, massive wastage in various uses, Pollution, contamination. If it includes specific action plan for improvement of efficiency of water management and minimizing wastage, it can resolve the problem over a decade or so.
c) National Water Policy (2012) has recognized many parts of India have already become water stressed and inefficient water management. It also flagged to assess the water availability scientifically and reviewed at periodic intervals due to various factors including climate change. A system to evolve benchmarks for water uses for different purposes and water auditing should be developed to promote and incentivize efficient use of water. Recycle and reuse of water, including return flows, should be the general norm. It further opined that the State Water Policies may need to be drafted/revised in accordance with this policy keeping in mind the basic concerns and principles as also a unified national perspective.
d) The GOI have also flagged the importance of efficient water management in their 12th Five year plan (2012-17) and emphasized

the need for attention to tackle increasingly difficult challenges faced in the management of water resources. A very important target for XII Plan is to improve the efficiency of the irrigation project by at least 20%. The present level of efficiency of major and medium irrigation project has been assessed to be about 30% and it is planned to improve the existing level of efficiency of major and medium irrigation projects by 20% (from present level of about 30% to targeted 36%). It was also opined that a real solution has to come from greater efficiency in water use especially in Agricultural sector which accounts for more than 80% of total water use.

e) Jal Jeevan Mission on the drinking water and sanitation has fixed benchmark forurban water supply as 135 litres per capita day (lpcd) and for the rural areas a minimum service delivery of 55 lpcd.
f) National Water Development Agency (NWDA), Central water Commission, National Water mission under MoWR are working on conservation of water, minimizing wastage and ensuring its equitable distribution across and within states through integrated water resources development and management.
g) NITI Aayog released the Composite Water Management Index (CWMI) to identify, target and improve key water resources-related indicators. The index has a set of 28 Key Performance Indicators covering irrigation status, drinking water and other water-related sectors. Critical areas such as source augmentation, major and medium irrigation, watershed development, participatory irrigation practices, sustainable on farm water use practices, rural drinking water, urban water supply and sanitation, and policy and governance have been accorded high priority.

Despite the concern of oncoming water stress/crisis expressed by great Visionaries, hundreds of Organizations across the World, thousands of Water Scientists and Media during the past two decades and GOI itself set excellent targets in several Five Year Plans and water scenarios documented by the water related Organizations of the GOI and NGOs, actions are not happening to evolve process, parameters and implementation. Lot of things need to be done to study has to be instituted. The process of adaptation to changed water management practices will take substantially long time for the users.

This paper is not just for presenting some facts figures but to motivate some actions to start happening towards securing country’s water future. It compiles various issues and concerns raised and outlines the urgent actions need to be taken by the concerned functionaries.

The water saved by efficient management practices can add new areas under cultivation, Infrastructure, Industry, Power etc., for diversified beneficial uses to support and bring in reality the $5 Trillion Economy India

2.00 GLOBAL WATER RESERVES & FUTURE WATER CRISIS

The status of water reserves in the Globe and the forecast of water crisis in the near future. About 97% of the water on the Earth is salt water and only 3% is fresh water. About 67% of the fresh water is frozen in the glaciers and polar ice caps. The remaining unfrozen freshwater is slightly less than 1% which available in the form of surface water, groundwater and in air.

As per international criterion water stress will be experienced when annual per capita availability of fresh water falls below 1,700 cubic meters. If it falls below 1,000 cubic meters per capita annually, water scarcity / crisis begins and then India would be declared as water-stressed country. Water crisis is a crisis of managing water badly and any system that is improperly managed can be wasteful. The per capita annual availability of water of India has reached 1508 cubic meter by year 2014 from what it was 5177 cubic meter in the year 1951, 1816 cum by year 2001, 1545 cubic meter by year 2011 and expected to decline to 1,486 cubic meter by 2021, and it is expected to decline to 1,465 cubic meter by 2025, 1,367 cubic meter by 2031 and 1140 cubic meter by year 2050. Water stress has already begun in most parts of India and comes close to the state of water scarcity/crisis by turn of 2050.

Water availability per person is dependent on population of the country and for the country of India per capita water availability in the country has declined due to increase in population as well as lower efficiency of water management. The benchmark for urban water supply has been suggested as 135 lpcd and for the rural areas a minimum service delivery of 55 lpcd has been fixed under Jal Jeevan Mission.
The status of India’s per capita annual availability of water from the year 1951 to 2014 and projections for future from 2021 to 2050 are shown in Chart-1

https://doi.org/10.36375/prepare_u.iei.a173

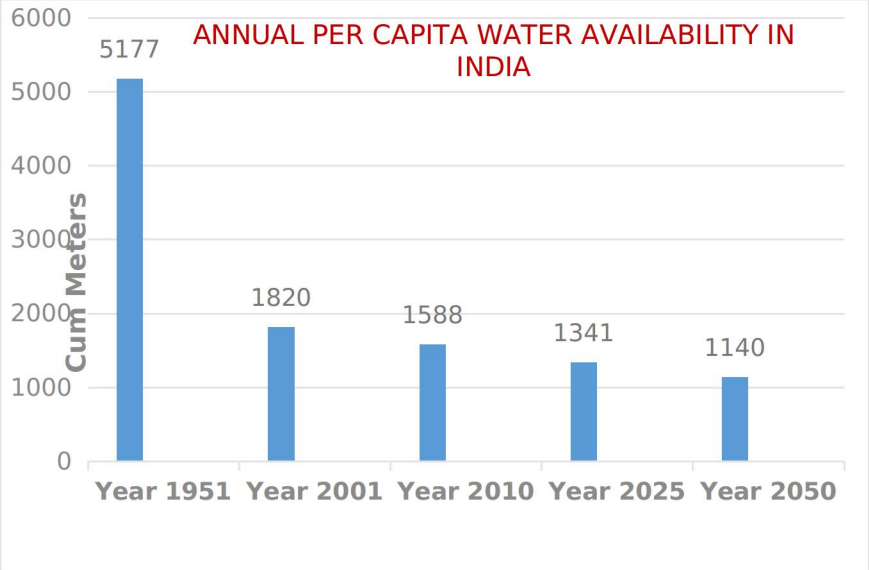

Chart-1: India's Per Capita Annual Availability of Water (Year 1951-2050)

The above status of India's per capita annual availability of water is clearly forewarning for quick initiation of all the measures required to make the country safe against the water stress and predicted future water scarcity.

3.0 SNAPSHOT OF IRRIGATION IN INDIA

Government of India attached high importance to the development of irrigation potential giving specific targets in each Five year plan since Independence. The Irrigation Potential of India under Major & Medium Irrigation projects and Minor irrigation sources covered by both Surface water and Ground Water has increased from 22.60 MHa at pre-plan (1951) to 102.77 MHa by end of 10th Plan (2007). During the above period there was equal growth of 40 MHa of Irrigation Potential under each source of Surface Water and Groundwater. Each 5 year / annual plan-wise I P targets up to Xth Plan period are shown in Figure-1.

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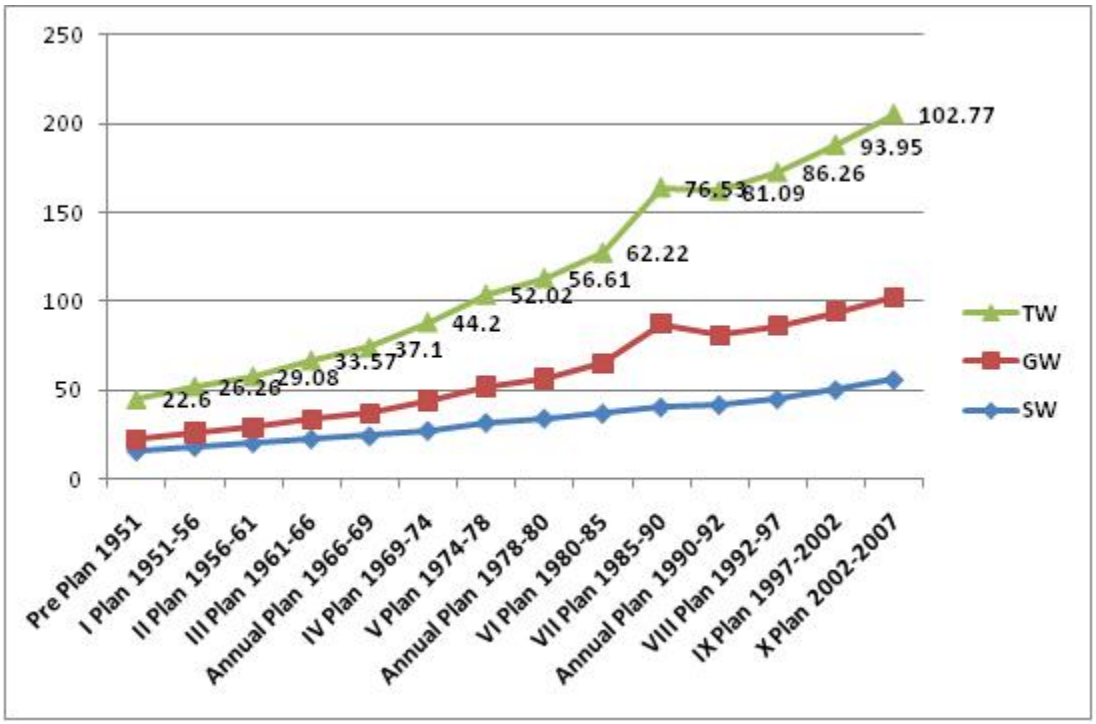

Figure 1: Irrigation Potential – Plan Targets in MHa
(TW-Total Water, GW-Ground Water, SW-Surface Water)

The Central Water Commission estimated the total annual surface water resources potential of major river basins in India is 1869.35 BCM and the utilizable flow is estimated to be 690.32 BCM. The annual net groundwater availability is 433 BCM and draft is 243.31BCM (221.42 BCM for irrigation and 21.89 BCM for domestic and industrial uses). The estimated total utilizable water resources in the country are 1123 BCM which comprises of 690BCM surface water and 433BCM ground water. The storages created of the utilizable water (including projects under construction) from various surface water sources are about 304 BCM.

The estimated water need by year 2050 is 1450 BCM and the estimated deficit is 327 BCM. The interlinking of rivers is expected to give about 200 BCM of water and still there will be some deficit. Irrigation is the major water user with a share of about 83% at present and its water requirement from surface and groundwater sources at its high demand will be as shown in Chart-2…

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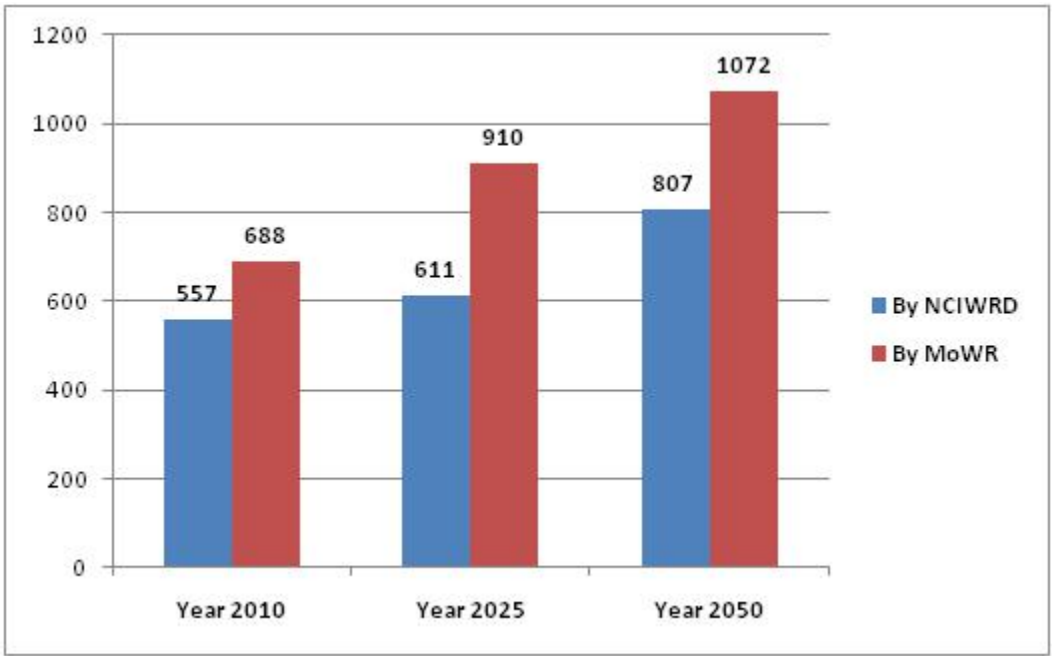

Chart-2: Water demand for Irrigation in BCM[3]

It is expected that 10% improvement in the efficiency of water management in irrigation will save water which can bring about 14% of additional area under irrigation at the expense of a moderate investment on O&M works including automation and user / provider education. Western and Southern regions of India experience severe deficit in water availability. Since the Brahmaputra–Barak (Meghna)-Ganga river system in Northern India accounts for 60% of total surface water resources of the country, river linking would be helpful to stabilize the surface water sources and irrigation across the country.

4.00 CHALLENGES FACING WATER SECTOR

According to the report of the National Commission on Integrated Water Resources Development, the projected demand for water by 2050 is likely to reach 1,180 BCM, against the availability of 1,137 BCM.

Due to the environmental changes and global warming erratic rainfall patterns both in the time and special distribution are being experienced across the globe resulting in floods and draught at the same time. The above position and quick changes taking place in the dependable waters scenario are warranting the need to compute the hydrology periodically and establish the actual availability of dependable waters in all the river basins. Updating of water balance of River basins is to be done regularly adapting the latest

rainfall and river gauge data. Presently, irrigation water use accounts for 80% of the available water, i.e. 700 BCM. However, within the limited availability of 1,137 BCM we need to cater to the growing demand of the population, including domestic water requirement, industrial requirement, ecology sustenance, and power generation requirement, among others. It is estimated that irrigation requirement has to be lowered to the level of 68% of the total demand by 2050 to cope up with the overall increasing needs. Organizations like World Bank, ADB conducted studies and examined challenges facing the water sector and suggested some critical measures to be addressed at earliest. Apart from changing the water management practices other important suggestions are - the Government has to define water entitlements at all levels, improve the quality and quantity of data and make these data available to the public, stimulate the formation of user groups at all levels and entrust such tasks the Government need not perform to cooperatives and private sector and concentrate on those tasks the State only should do.

Apart from implementing Participatory Irrigation Management through Farmers Organizations, the constitution of Water Regulatory Authority is to be done by many States. The Water Regulatory Authority has to be endowed with powers – to allocate water entitlements, regulate water drawls, water audit, set water charges for different uses and more to balance the interests of various users. The Regulator should act in a mission mode and play vital role in the change of Water Management with time bound specific action plan.

5.00 ACTION PLAN

The action plan should clearly focus on the following two fronts..

A. To Build Further Water Storages:

The cumulative storage created under various surface water sources is about 304 BCM. Further storages have to be built up for the remaining potential of utilizable surface water potential of 150 BCM in all the left over river basins including interlinking of the rivers wherever necessary and feasible based on the updated hydrology.

B. To Improve Efficiency of Water Management:

The present water management is an increasing concern to the Governments and the Governments have a special responsibility and clearly an urgent need to start actions to change the water management practices of both surface and ground waters. The abstract issue of “changes in water

management practices" has to be transformed into specific action plan to implement and systematize in a time bound manner.

5.01 OBJECTIVES OF ACTION PLAN

The objectives of action plan are proposed keeping in view of the existing practices and suggestions made by various organizations for the change of water management practices from River Basin level to Field level...

❖ Update water balance of river basins annually due to quick climate and environmental changes.

It is essential for declaring the availability of resource every year and make necessary changes

in providing water rights appropriately.

❖ Comprehensive Master Plan of all Water resources (from major river basins to micro Sub-basins) and allocations to various projects and uses should approved and it should be a guide for any new sanctions including watersheds etc. It will avoid duplication of schemes on the same resource.

❖ Construction of storages for balance utilizable surface water potential should be completed.

❖ Provide water rights to all users to know their water share and to manage their needs within

the same and also control over draws. Saving of water within one's right has to be incentivized.

❖ Close monitoring of water extractions up to field outlets (with water meters) to regulate and

manage command areas within allocated Waters.

❖ Formulate and implement measures for improving efficiency of Water Management and

eliminate wastages in water usage.

❖ Sustenance of the changed water management practices should be given due importance.

❖ Recycling water and use of water saving devices should be

❖ Implementation of citizen charters to water sector for developing awareness and demanding service as per rules and law.

❖ Modernization, automation and decision support systems should be provided to all projects and canal networks.

Efficient water management obviously involves optimum use of water which should well supported by reliable and dependable water supply. The Think Tanks and Research Groups already working for the Government on water

have to be reoriented and engaged in this process to suggest and implement the measures for bringing in efficient water management as soon as possible. Fortunately India is having about 4% of world's renewable fresh water resources and 2.4% of World's land area which is a good sign for India and it can be turned into water treasure.

6.0: How to achieve Efficient Water Management

Efficient water management is the key factor for protecting our water future by eliminating wastage of water and changed practices which is possible by playing effective roles and responsibilities by the Governments and stake holder water users….

6.01: Roles and responsibilities of Governments

Since Government is the custodian of water, it should take lead role to take steps and evolve specific time bound action points to improve efficiency of water management by ….

a) Make necessary policy changes, identify specific action points, empowerment and framework of rules for changing the present water management practices.
b) Reorganize the Think Tanks to research and standardize parameters and provide action points for conduct of efficient water management.
c) Introduce online crop and marketing advice to farmers every crop season to guide them to cultivate crops within demand zone and market their harvest profitably without any hassle.
d) Modernize the systems for canal automation with telemetry, SCADA, GIS based DSS etc., to cope up with implementation of efficient water management targets.
e) Benchmark the productivity of various crops per each unit of water used for the users to be accountable.
f) Distribute water rights (entitlement of water over a crop period) to all water users for accountability of the water consumed and provide incentive for the saving of water within the right provided.
g) Facilitate and strengthen hands of operators to implement actions with support of advanced communication & DSS systems etc.,
h) Publicity and conduct of motivation and training of users on the policy changes, new set of guidelines, practices and goals, advanced methods of water saving farm-culture.
i) Monitor the implementation and results through expert bodies periodically.

j) Enforce mission mode approach for evolving and implementing new policies and actions and make the program of high priority.
k) Establish model farms involving experts to demonstrate the advanced methods and technology in agriculture, horticulture etc., for benefit of farmers to grow crops of high demand and returns and also for optimal use of water.

It may be suggestible for the emphasis and success of the program, an exclusive brief session of Water Budgeting is conducted annually in the month of June in Parliament and Assemblies to discuss and declare to the public about the availability of water in the current season, planning of usage for various purposes, announce the demand for various crops for domestic consumption & export and presenting & reviewing the achievement of set targets in the previous season.

6.02: Roles and Responsibilities of stake holder water users

Stake holder water users have more responsible role to implement the guidelines of the Governments and committed to avoid over use and wastage of water.

a) Learn the new methods and guide lines for application of water, crop management to save water.
b) Adopt to the changes of water management practices evolved by the Governments for improving efficiency of water use.
c) Take online crop and marketing advice from the Governments in each season to keep the harvest within demand zone and not face any issues of wastage and marketing. This can stabilize and enhance income of farmers.
d) Care should be taken to plan and manage crops within the water right provided and be accountable for every drop of water used.
e) Commit to get the benchmarked productivity per each unit of water used and try to earn incentive for saving water.
f) Resort to low water consumption agriculture, horticulture crops deploying automatic climate control water release systems etc.
g) Deploy micro irrigation systems wherever feasible and replace water wasting devices with water saving modern devices.
h) Use the crop practices demonstrated in the model farms developed by the Governments to upgrade and take up beneficial crops.
i) Take measures for treatment and recycling of water wherever feasible.

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7.0: How to sustain the changes and new methodologies…

It is not simple process to change the water using habit of the people. It takes fairly long time of a few years if the program is enforced and implemented in a mission mode with high priority. A few measures for sustenance are…

a) Research institutions and laboratories have to standardize certain parameters like crop water requirements specific to the crop & land, weather, dosage of water to be applied, realistic system losses, crop management, O&M of Systems etc., to avoid confusion and justify the whole exercise for its compliance.
b) Implement Citizen Charters for the water users to make Operators and users more responsible.
c) Introduce water use return Vis a Vis water right every Ten Daily/monthly in a crop period like tax returns.
d) Water user has to be served from one point forming a Central unit involving all input services instead of making farmers to approach different people for different services.

8.00 CONCLUSIONS

Always consider Water Resources / Irrigation services are the noblest of all services rendered by any Government to the public and every one participate with it should feel proud of serving basic need of water for drinking, agriculture, industry etc.

The concerns and advices of the water experts and the targets set in the Five Year plans by GOI should be implemented and monitored closely.

The water saved by efficient management can be used for diversified beneficial uses including export to needy countries in future during crisis phases. In the year 2008, Barcelona, Spain imported tankers of fresh water from France.

Lot of motivation is necessary for the Government and Stakeholder water users to start actions for efficient water management and Institutions individuals should create a movement through Social Media etc., platforms till it really takes off.

Water will become wealth of the Country in the next few decades. It is therefore, “MAKE EVERY DROP OF WATER COUNT” for the water future of India and successful achievement of the $5 Trillion Economy India.

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Acknowledgements: *This compilation used data available in the sites of ….*

1. *Central Water Commission*
2. *National Water Development Agency*
3. *Jal Jeevan Mission*
4. *Indian Planning Commission - 5 year plans*
5. *A few other National and International Organizations*