

Water Resource Management

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Abstract

In our country, Water is a limited resource in both rural and urban areas and hence needs planned utilization and judicious management for meeting the social, economic and environmental demands and targets. The ever increasing pace of development coupled with the growing population and the associated urbanization and industrialization poses challenges on water resources. The present environment needs to address this serious concern on the ever increasing pressure on water management issues, before it is too late and poses serious threats and negative impacts.

Issues related to water resources management and its planning are becoming increasingly complex and water resource planners/managers/officials often lack the right information which limits their capacity to suggest judicious water use options and appropriate water management decisions in both Urban and Rural areas. There is a need for a scientific and orderly disposition of water resource management for Agricultural purposes. A properly prepared water use plan based on sound scientific and technical procedures, Flood and Drought management and Groundwater resource management can facilitate water utilization for future demands. This supported by a strong planning process, where communities and various stakeholders are involved, can strengthen the decision making process on allocation and utilisation of water resources.

This paper high lights a holistic and strategic approach for pragmatic water resources management in India holistically.

Keywords: Water as an Essence of Life, Water for Agricultural requirements, Floods and Drought management, Groundwater Resource management, Water resource management in Urban environment.

Introduction

“Thousands have lived without Love, not one without Water.”

WH Auden

It is prudent to mention here that Water, Land and Air are the three essential components of any form of life on this planet and hence, Water naturally remains one of the most essential natural resources for sustaining life. Cohesive water management is vital for poverty reduction, environmental sustenance, and sustainable economic development. Owing to the rapid surge in population, urbanization, and industrialization, the demand for water for meeting various requirements is unceasingly increasing. Apropos, we are facing frequent challenges in the water sector, which include reducing per capita water availability, the decline in groundwater table in many areas, and saltwater intrusion in coastal areas. The increasing pollution from various sources is also deteriorating the quality of surface water and groundwater. Another factor is also the climatic changes that may also unfavorably affect the availability and distribution of water resources. This article presents an overview of relevant issues pertaining to develop the subsequent paragraphs, issues related to the Water utilization, including classification and problem areas would be covered in a holistic manner.

Water as an Essence of Life: An Overview

The growth and development of India essentially depends on its Water and Land resources management. This is not surprising since India supports 17% of the global population but has only 4% of the world's water resources. Improved and more effectual use of water is a challenge for Indian agriculture and industry alike. Both, cities and the villages need to be geared up for the same. As per the Prime Ministers' initiative of 'Atma Nirbhar Bharat', a lot needs to be done to conserve, preserve and utilize the water resources for various industrial and agricultural projects judiciously. Presently, 70% of water in India is used by agriculture and only

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20-25% by the industry. In the coming years, this ratio may change and the total demand for water will also rise. The water resource management planning has regard to all the competing demands for water and seeks to allocate water on an equitable basis to satisfy all uses and demands. One of the biggest concerns for our water-based resources in the future is the sustainability of the current and future water resource allocation². As water becomes more scarce, the importance of how it is managed grows vastly. Finding a balance between what is needed by humans and what is needed in the environment is an important step in the sustainability of water resources. India is urbanizing at a rate not seen in its history. An effort is being made to build or upgrade numerous modern cities as part of the Smart Cities initiative. Reuse of water, solid waste management and better sanitation infrastructure and practices are benchmarks to assess Smart Cities. In urban India, 40 billion liters of wastewater is produced every day. Much effort in water resource management is directed at optimizing the use of water and in minimizing the environmental impact of water use on the natural environment. The observation of water as an integral part of the ecosystem is based on integrated water resource management, where the quantity and quality of the ecosystem help to determine nature of the natural resources.

Importance of Water for Agricultural Requirement

Agriculture consumes 70 percent of the world's freshwater resources³. As the world population rises, it consumes more food (currently exceeding 6%, it is expected to reach 9% by 2050), the industries and urban developments expand, and the emerging biofuel crops trade also demands a share of freshwater resources, water scarcity is becoming an important issue. In order to meet the challenges of overall water scarcity scenario in the country, various measures can be taken, such as the construction of water harvesting structures, mass awareness among citizen for water conservation, construction of new water storage structures, interlinking of rivers, renovation, and repair of existing water bodies etc. Water budgeting and planning the cropping patterns for the oncoming agricultural seasons, the strategy for avoiding water-intensive crops to the extent in consultation with the relevant expert departments are also crucial for checking such situation. Micro-irrigation should be adopted to achieve more crops per drop. Water conservation and cutting down on wastage holds the key to bringing irrigation facilities to every farm in the country.

Flood and Drought Management in the Country

Regional variations exist in India with water management. The groundwater sources are being severely exploited and exhausted in some of the Northern and Western states whereas, there is the challenge of overflowing rivers and regular flooding. For a prolonged period, this damages human habitation and leads to tragedies in countless families. Only a multi-stakeholder and multi-pronged approach can address such calamities. This includes achieving

interlinking of rivers where feasible. It also necessitates a basin-wide management of river systems to both keep rivers clean as well as serve the purpose of different types of users⁴.

Drought is another regular feature occurring in our country posing havoc and devastation besides mismanagement of water. Drought should be considered relative to some long-term average condition of balance between precipitation and evapotranspiration in a particular area, a condition often perceived as "normal". It is also related to the timing and the effectiveness of the rains.

Other climatic factors such as high temperature, high wind, and low relative humidity are often associated with it in many regions of the world and can significantly aggravate its severity. Water conservation and water management measures are need of the day to achieve a strong and stable economic base, especially in the arid and drought-prone areas of the country. There are no general solutions possible. They will have to be area specific, because of the hydrological peculiarities.

The Flood management activities are classified as attempts to modify the flood, attempts to modify the susceptibility to flooding damage, attempts to modify the loss burden and bearing the loss. All these measures for flood management can be classified as Structural measures or Non-structural measures. Broadly, all measures taken up under the activity of "Modifying the flood" which are in the nature of physical measures are "Structural measures", while the others which are taken up as management tools without major construction activity are grouped as "Non-structural measures".

This approach had been extensively constructed in the Godavari, Krishna and Cauvery deltas in South India and also in some areas of Indo-Gangetic plain.

Groundwater Resources Management

Groundwater in India provides for about 60% of the country's irrigation needs, 85% of rural drinking water

The Groundwater in India provides for about 60% of the country's irrigation needs, 85% of rural drinking water requirements and 50% of urban water needs. The challenges to ground water management are owing to the over-exploitation and contamination to include increasing demand of groundwater for agriculture, industrial and drinking purposes; change in cropping pattern and growing of paddy and cash crops that consume large quantities of water; scanty rainfall in arid and semi-arid regions; flat rate/ free subsidized electricity for extracting groundwater in certain states, etc.

Development of groundwater resources in different areas of the country has not been uniform. Highly intensive development of groundwater in certain areas in the country has resulted in over-exploitation leading to declining groundwater levels. Mass awareness movement is required for restrained exploitation of groundwater. One of the key management initiatives to arrest the depletion of groundwater resources is to augment the resources through artificial recharge to groundwater and

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rainwater harvesting. Central Government has taken several steps for promoting rainwater harvesting measures in various parts of the country. Focus on development activities needs to be balanced by management mechanisms to achieve sustainable utilization of groundwater resources. There is a need for scientific planning in the development of groundwater under different hydrogeological situations and to evolve effective management practices. Groundwater management is the foremost challenge being faced by the organizations dealing with groundwater in the country. The activities of the organizations and policies affecting groundwater need to reflect the priority issues with the overall objective to provide water security through groundwater management in major parts of the country. Management of groundwater resources in the Indian context requires a combination of area-specific and problem-specific strategies.

Water Resource Management in Urban Environment

Due to technological advancement and economic opportunities, urbanization in modern times is increasing at a fast pace. This rapid urbanization is prevalent worldwide but occurs mainly in new rising economies and developing countries. Cities in Africa and Asia, including India are growing fastest with 28 out of 39 megacities (a city or urban area with more than 10 million inhabitants) worldwide in these developing nations⁵. The number of megacities will continue to rise reaching approximately 50 in 2025.

With developing economies water scarcity is a very common and very prevalent issue. This is caused by polluted fresh water resources, over exploited ground water resources, insufficient harvesting capacities in the surrounding rural areas, poorly constructed and maintained water supply systems, high amount of informal water use and insufficient technical and water management capacities⁶.

As cities offer the best opportunities for selling produce, farmers often have no alternative to using polluted water to irrigate their crops. Depending on how developed a city's wastewater treatment is, there can be significant health hazards related to the use of this water. Wastewater from cities can contain a mixture of pollutants. There is usually wastewater from kitchens and toilets along with rainwater runoff. Developing world countries tend to have the lowest levels of wastewater treatment. Often, the water that farmers use for irrigating crops is contaminated with pathogens from sewage. The pathogens of most concern are bacteria, viruses and parasitic worms, which directly affect farmers' health and indirectly affect consumers if they eat the contaminated crops. Scientists have been working to find ways to reduce contamination of food using a method called the 'multiple-barrier' approach. This involves analysing the food production process from growing crops to selling them in markets and eating them, then considering

where it might be possible to create a barrier against contamination.

Aim of the Study

Water has been a scarce resource in the prevalent global environment and is likely to pose pressure on the World order. In the light of this essential issue, this paper aims at enumerating holistically the essence of Water preservation and suggesting remedial measures and methodology of Water Resource Management and Conservation in a judicious manner to facilitate overall social, economic and industrial progress.

Conclusion

The efforts of our government, individuals, industrialists and organizations should be integrated to harmonize the effectual water resources management in a judicious manner. A comprehensive and integrated water utilisation planning system is a known solution to cope with the dynamics of development and to ensure optimal utilization of water resources. The viable approach is to focus on identifying and planning Agriculture based water requirements, harmonizing measures for Flood and Drought management. As the Urban areas provide large opportunities to local populace for economic development, the water resource management in Urban areas and Groundwater resource management also plays a major role in water conservation and utilization in a comprehensive manner. Due to advancement in technological threshold, the technological assistance should also be taken into consideration in terms of the GIS, GPS and IT aspects. Such a holistic approach would support sustainable water use for an emerging country like India to achieve sustainable growth and development in all spheres of activities.

"The, Earth, the Air, the Land and the Water are not an inheritance from our fore fathers but on loan from our children. So we have to handover to them at least as it been handed over to us."

- Mahatma Gandhi

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