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WATER RESOURCE MANAGEMENT IN GUJARAT: CHALLENGES AND THE WAY FORWARD

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ABSTRACT

With increasing population and economic growth, water demand is likely to increase significantly in the future. Aggregate consumption in total demand, resulting in relatively low availability for domestic and industrial uses. Given the state's increasing urbanization and industrialization trends, this is a major challenge for Gujarat's water sector planning.

Gujarat has made serious efforts through reduction in dependence on scarce ground water resources in all important areas of water sector such as source enhancement, source management and distribution management. This has been achieved through water grid and master planning and implementation of several schemes under the Sardar Sarovar Project, Sujalam Suphalam Yojana and SAUNI Yojana and Kalpsar as well small projects like Boribandh and Khet Talavadi.

As these issues will become of major importance in the coming years and with increasing pressure on performance and investment in the sector, some areas will require more attention. Preparations for tariff rationalization, water distribution deficit reduction, sector reforms and private sector participation in these areas of improvement.

KEYWORDS: *Water management, Challenge, Government efforts.*

1. INTRODUCTION

Gujarat is one of the most water deficient areas in India, more importantly; there is a high demand for water in areas with poor water problem. Most of this demand comes from agriculture, which is due to the availability of high per capita arable land on water for their livelihood and the high dependence of rural population. Water use is currently unstable in three of the four regions of North Gujarat, Saurashtra, and Kutch. The state is known for the problems of groundwater mining in north Gujarat and seawater intrusion in coastal areas of Saurashtra and Kutch. About two-thirds of the state's geographical area is dry.

As we know that it is obvious, "population expansion and requirement of industries create more strain, making situation more serious". The condition has been such that the next governments of Gujarat had to manage water from far away which is environmentally, socially and economically not sustainable for the long time.

2. GLOBAL SCENARIO

Water use has been increasing worldwide by about 1% per year since the 1980s (AQUASTAT, n.d.). This steady rise has principally been led by surging demand in developing countries and emerging economies. Agriculture (including irrigation, livestock and aquaculture) is by far the largest water consumer, accounting for 69% of annual water withdrawals globally, Industry (including power generation) accounts for 19% and households for 12% (AQUASTAT, n.d.)

Over 2 billion people live in countries experiencing high water stress. Although the global average water stress is only 11%, 31 countries experience water stress between 25% (which is defined as the minimum threshold of water stress) and 70%, and 22 countries are above 70% and are therefore under serious water stress (UN, 2018a). Growing water stress indicates substantial.

3. INDIA SCENARIO

Approximately 96% of urban areas and 90% of rural population have better access to water resources. Demand for water by industrial area will be quadrupled to 196 BCM by 2050.

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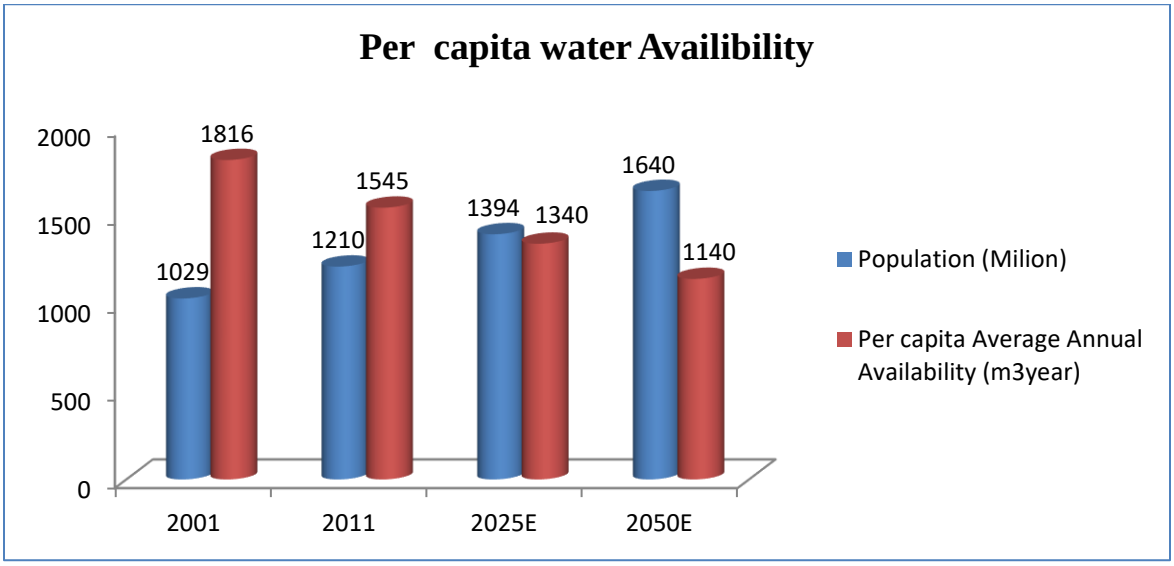
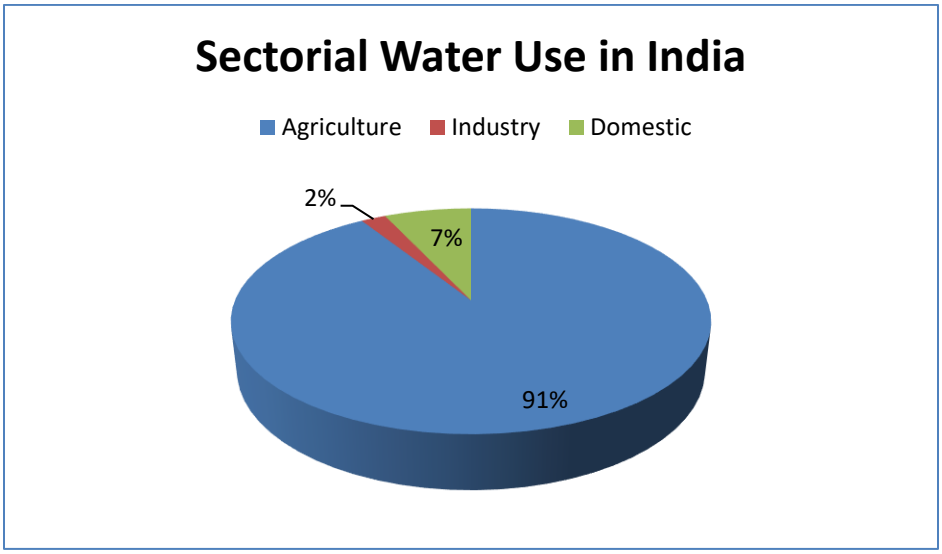


Source: www.statista.com



Source: Food and Agriculture Organization of United Nations, 2012

The agriculture sector was the highest water consuming sector over the coming years the water requirement across all the sectors will likely increase due to the growing population there was a significant in balance between the water demand and water resource availability, thereby causing water scarcity.

4. GUJARAT SCENARIO

There is significant agricultural production in the state, though it is only 2.28% of India's water resources.

One of the most industrialized states of India, Gujarat has about 56 BCM of usable water. Net annual underground availability is approximately 17.5 BCM Surface water accounts for 68.5% of the total water resources of Gujarat. These resources have been distributed unevenly in the state, 80% of them are concentrated in central and southern areas, which is only one quarter of the total area. In an effort to resolve long problems of supply of water used in most parts of Gujarat, an "Inter Basin Transfer Scheme", i.e. has been considered for adding rivers where surplus water transfers in areas suffering from water scarcity will be done.

5. GUJARAT GOVERNMENT INITIATIVES & INTERVENTION

Gujarat Government taking initiatives & interventions for water management given below

5.1. Sardar Sarovar Canal Based Narmada Master Plan for Drinking Water supply:

The Gujarat Government has prepared, approved and implemented a master plan of master plan to cover 9633 villages and 131 urban centers of Sardar Sarovar Canal based drinking

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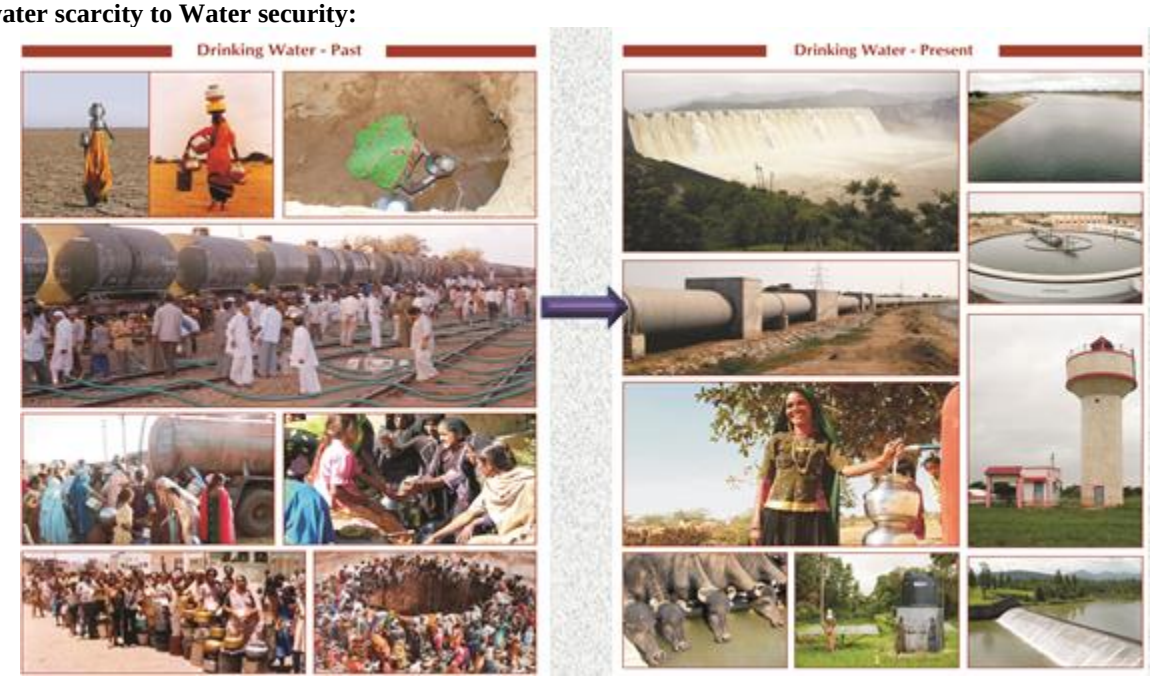
water supply project. The purpose of GRID is to transfer inter-basin water from the rare and quality affected areas of water with sustainable surface water resources to supply drinking water through surface / sub-surface sources of about 75 percent of the state's population.

5.2. From water scarcity to Water security:



Source:https://www.slideserve.com/aira/by-mahesh-singh-ifs-member-secretary-gwssb-water-supply-department-government-of-gujarat

Before the government has not taken any steps the people had to suffer and had to travel long for water. After the pipe line extension and building of various Dams now they are very comfortable regarding water.

5.3. Gulf of Khambhat Development (Kalpasar) Project: World's largest man made freshwater reservoir:

- To meet the demands for irrigation, domestic purpose and industries
- Creation of reservoir by construction of Gulf closure dam at the Gulf of Khambhat with storage of 10,000 million cubic meter water inflows of major rivers
- Project expected to cater to 10.54 lakh hectares in 39 Talukas of 6 districts, essentially Saurashtra and Central Gujarat water scarce regions
- Value based utilization, generation of wind and solar energy at premises for lifting freshwater from reservoir to canal.

5.4. Deferent scheme by government

In order to meet the needs of drought-hit areas, the State Government has implemented Sujalam Safalam Yojana, Sauni Yojana and Watershed Development Program.

Suajlam Safalam Yojana is given that water to dry foreground and underground areas. It was started in 2004 to complete the dry prone areas of North and Central Gujarat, Saurashtra and Kutch. The canal extends to 27 rivers of the state covering a total length of 332 km covering 7 districts of the state (Panchmahal, Kheda, Sabarkantha, Gandhinagar, Mehsana, Patan, Banasantha). Currently 8 schemes covering about 600 villages and 7 towns have been completed and these 2 plans are closed to completion.

Saurashtra-Narmada Avtaran Irrigation Scheme (Sauni Yojana) has been started to give more than 10 lakh acre feet of water flowing through Narmada flood water allocated for Saurashtra region. Overflowing of Narmada flood water will be distributed to 115 reservoirs in eleven districts of Saurashtra, with a total of 1126 kilometers of four link pipelines, 10,22,589 acres will be benefited.

Watershed is a geo-hydrological unit of an area draining to a common outlet point. It is recognized as an ideal unit for planning & development of land water and vegetation resources. According to 1999-2000 statistics a net sown area of 141.23 million hectare is under cultivation, out of which 84.58 million hectare is rainfed area

6. WASTEWATER MANAGEMENT

A general assessment of wastewater systems in Gujarat indicates an immense load on existing infrastructure due to unprecedented growth in cities such as Ahmedabad and

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Vadodara. The wastewater volumes currently generated in the cities have far exceeded the capacity of the present infrastructure The three issues that represent the major barriers to successful wastewater management in Gujarat cities:

6.1 Infrastructure Capacity

A number of issues affect infrastructure capacity including quantity of wastewater generated, land use and demography of the region, and types of wastewater treatments used. The conventional approach is to centralize the wastewater treatment system in each zone, channeling all types of effluents into a single system. Each system accommodates peak loads based on the total water supply to a particular area. Storm water run-offs and groundwater discharge increase overall volumes. Storm water causes silting in pipes and reduces the carrying capacity of the system, resulting in overflow onto streets. The disposal of industrial effluents into the domestic wastewater network affects efficient functioning of the system. Ahmedabad and Surat have the potential to segregate runoffs and use that resource to recharge groundwater. In Rajkot, lack of a perennial water source and permeable soils requires an alternative approach. (http://www.iaacblog.com/programs/a-landscape-for-gujarat-cities/)

6.2. Quality of Treated Water:

The type and number of industries generating different effluents determine the quality of treated water. In Ahmedabad, industrial effluents are channeled into the domestic system, complicating the process and exerting pressure on the existing infrastructure. The presence of industries within residential areas has a negative effect on wastewater quality.

In Surat, groundwater is a major source for industries. Although this is a high level of salinity, industrial processes use this water and leave waste materials in domestic waste water and natural streams. Existing treatment systems are unable to handle this complexity of salinity and chemicals in the flow. Therefore, the quality of treated water produced is vain and negatively impacts environmental disposal. To address the quality issues, detailed study of flow types is necessary to identify suitable solutions.

6.3. Economic Viability:

The financial responsibility for wastewater treatment systems generally lies with the public authorities. The success and failure of the economic models used in various projects needs to be evaluated to devise a robust plan to develop efficient wastewater management systems. Public-private partnerships (PPPs) are explored as a way of building and operating these systems.

7. SOLUTIONS LANDSCAPE

The Solutions Landscape outlines proposed improvement strategies to holistically address wastewater issues in the four cities.

7.1. Integrated Water Resource Management Plan

An Integrated Water Resource Management Plan will examine all the impact of waste water management in every major city of Gujarat. This plan will help in evaluating the city's capacity to increase the sources of drinking water and to effectively use the treated water to meet urban demand.

Each city has its own distinctive characteristics. In Ahmedabad, the amount of domestic wastewater is more than the amount of industrial wastewater whereas Surat produces high amount of industrial waste water. Effective wastewater treatment has been hampered in Rajkot, salinity, impermeability and prevailing climatic conditions.

7.2. Industrial Effluent Characterization and Usage Study

Industries vary from region to city, resulting in the quality of the fluctuations. A study is necessary to check industrial structures for each city as well as chemical composition and treatment of subsequent use.

7.3. Water Balance Model

Based on the Integrated Water Resource Management Plan and Flow Study Analysis, water balance model should be prepared for four cities. This model will estimate the exact amount of potable water, storm water and wastewater in the city. It will determine the capacity of the infrastructure required for the treatment of wastewater and to identify it within the city which has been treated for the surplus and deficit of water.

For example, in Ahmedabad and Vadodara, there is high amount of domestic wastewater compared to industrial effluents. Domestic wastewater treatment is relatively easy to treat and the treated water generated in these cities can be used for existing industrial and commercial areas. There is a high amount of demand for industrial water in Surat, which cannot be completed only through treated water. Rajkot's industrial processes require high quality water

The water balance model will examine the distribution of potable and treated water depending on each city’s priorities. The model will help address water deficits, distribute surpluses, and channel the use of treated water into the mainstream water cycle.

7.4. Treated Water Use Policies

There are currently various policies and incentives. Additional policies for the promotion of the use of water treated by the commercial sector along with these industries will reduce the use of treated water.

Both long and short term strategies will be set up to be phased out for policies. They will also encourage the use of water for treatment within industrial processes.

7.5. Decentralization Plan

The existing centralized wastewater system for major cities in Gujarat requires a redistributed decentralization scheme in smaller and more efficiently managed units. A city-level

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decentralization scheme should be developed based on integrated water resources management scheme and water balance model.

7.6. Green Community Sewage Treatment Plant Pilot Project

Additional environmental-friendly technologies can be used, in which solar panels are used to generate electricity, solar water heaters and lamps, walls of recycled material, and biological control for insecticides. The resources needed to serve the community will be reborn by fair recycling, thereby establishing the remaining balance of effective resources.

Waste water processing within the community will reduce the cost of infrastructure for the cities. This cost reduction can be transferred to the subsidies to develop tax concessions in the community or to develop new and green systems.

7.7. Public Awareness and Education Program

To raise awareness, a program will educate the residents of Gujarat about the limited availability of potable water resources and the benefits of waste water management. It is important for the success of the program that information about the use of water of treatment and related green technologies is broadcasted at the city, community and neighborhood level.

8. CONCLUSION

The inhabitants of Tianjin Echo-City will be able to drink directly from the tap. Rain water will be harvested and, together with recycled water, landscaping will be used for irrigation and general cleaning purposes. With integration of water-saving techniques in everyday life, residents also have an important role to play in conservation of water. There are technologies like integrated water and waste water management which are not easily available in India. We need to import these techniques from other developed countries around the world. During this process, the main challenge is to equally and efficiently deal with the cost of transferring transfer and time limit to the standard of living. Water conservation is very low in Gujarat because the long coastline (1600 kms), bay logging, hills and low recharge, excessive absorption of the groundwater and recurring dry, hence the above solutions proposed in this waste water management department of Gujarat Will help in achieving sustainability and water efficiency goals. The solution has been evaluated based on implementation and pragmatism as well as their overall impact.

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