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Review on Implementing Smart Water Grid for Smart Cities in India

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Abstract: *This paper face an acute shortage of resources in today's world such as Fuel, Clean Water, Shelter and Hygienic Food. And only 0.1% of the total Water on Earth is available to living beings as clean and fresh water. The human population on Earth is also increasing day by day and most sources of clean water are depleting. The level of groundwater is rapidly declining and the pollution of groundwater by chemicals [water and soil pollution] has alarming effects on human beings ' sustainable growth. Worldwide, water scarcity is rising at the most alarming rate and millions of people around the world have no access to water. India suffers from one of their worst shortages of water. The crops get ruined, and water shortages in its underground reservoirs lead to drought and emptiness. The households waste most of the clean water and this usually happens in modern societies and recent establishments. This review paper discusses the need for water management, water scarcity control measures and the idea of a smart water grid for water conservation, as well as the challenges of implementing it in India.*

Keywords: *Smart Tap; Smart city; Smart Grid; water management*.

I. INTRODUCTION

The Smart Cities Mission, sometimes referred to as the Smart City Mission, is an urban renewal and retrofitting program carried out by the Government of India with the mission of developing 100 smart cities across the country, making them citizen friendly and sustainable. The Union Ministry of Urban Development is responsible for carrying out the mission in collaboration with the state governments of the respective cities. Smart Cities Mission envisages developing an area within 100 cities in the country as model areas based on an area development plan, which is expected to have a rub-off effect on other parts of the city, and nearby cities and towns. Cities will be chosen based on the challenge of Smart Cities, where cities will compete in a countrywide competition to get the benefits of this mission. As of January 2018, 99 cities were chosen to be upgraded as part of the Smart Cities Mission after beating other cities in the contest. A competition-based approach was used by the Ministry of Urban Development (MoUD) program as a way of selecting funding cities based on an area-based development strategy. Cities competed with other cities within the State at the state level. The state-level winner then competed on the Smart City Challenge at the national level [1] [2].

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Fig.1 Smart City Mission

No one can deny anywhere on earth the lack of water. The new and available quantity of water is only 0.014 trillion. Today, global Scale availability of fresh water is adequate. Worldwide, water scarcity is rising at the most alarming rate and millions of people around the world have no access to water. India suffers from one of their worst shortages of water. The crops get ruined, and water shortages in its underground reservoirs lead to drought and emptiness. India is an agricultural land that uses and uses 70% of its water for agricultural purposes, and demand for agricultural supply will increase by 50-60% in the coming years. Water shortage also hinders the country's growth and development, and causes health problems. This scarcity can be controlled and regulated in the country with the aid of the technical advancement [3] [4].

II. REASONS FOR WATER SCARCITY

II.I. Inefficient agricultural use of water: India is an agricultural land and one of the top producers of agricultural products, with the highest use of water in that industry. The typical use of used water causes water loss due to improper use of water by evaporation, runoff, and inappropriate use of groups and liquids. This adds to the water scarcity due to water use on Agricultural land, livestock and human daily activity. The use of water in India has been represented in the fig. 2 [4].

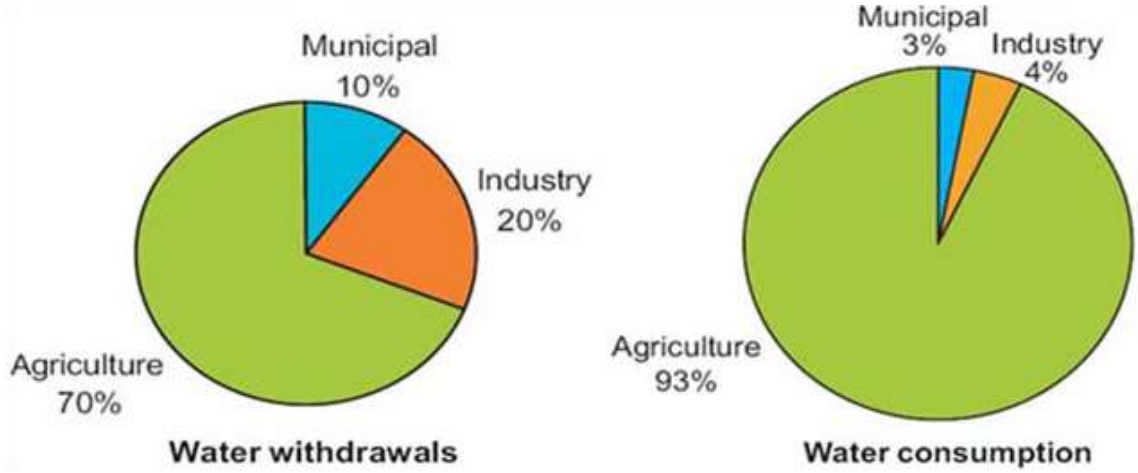

Fig.2 use of water in agricultural

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II.II. Industrialization and construction: As a result of rapid construction and industrialization, land and maximum land are used due to which water recharge mechanisms are affected and ground water recharge mechanisms are halted due to increased concretization due to urban development and which have choked ground water and resource level, as well as sewage and waste water drainage into traditional water.

Water supplies products (e.g. drinking water, irrigation water) and services (e.g. hydroelectric generation, recreation, and amenities) used by farmers, industry, and households. Many of these goods and services are interrelated, determined by the quantity and quality of the water available. Water management and distribution requires consideration of its unique features as a tool. Different water recharge way has been shown in fig.3 [5].

II.III. Inefficient water management: Inefficient water management is there in distribution of water to consumer, agriculture and industry. The inefficiency to use water resource wisely leads to water shortage and wastage due to leakage and overuse of water and also lack of enhanced storage capacity which can store water during monsoon that can be used later is not available.

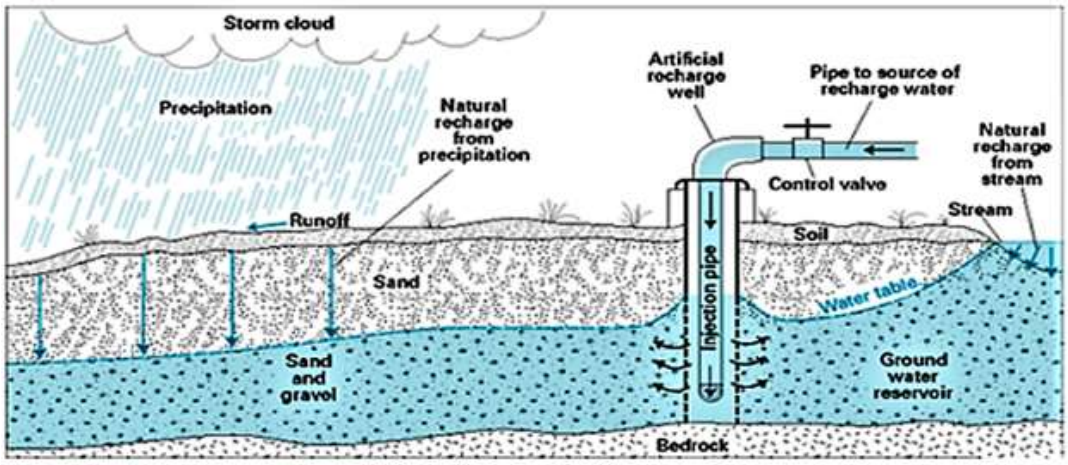

Fig.3 Water Recharge

4. *Water leakage*: One of the major problems that lead to the water shortage is water leakage. This occurs because of the pipeline issues that are impaired due to corrosion and any unnecessary human activity. The type of water wastage occurs in non-revenue water that is produced from the source station but due to mismanagement and leakage cannot enter the user or for use [6].

III. EFFECT OF WATER SCARCITY

Lack of access to drinking water is the biggest problem as people are unable to get fresh clean drinking water due to water shortage. The human body consists mainly of water and the people need fresh drinkable water and lack of fresh water can lead to various health problems [7].

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Fig. 4 Water Scarcity Management

A lack of food resources due to water shortages, crops cannot grow without sufficient amounts of water, resulting in a shortage of food and hunger for humans and animals that will have a serious impact on the area's flora and fauna.

Water shortage causes diseases due to the unavailability of clean water as unhealthy use of water for drinking and bathing purposes would cause waterborne diseases, as well as there will be no way to clean food, dishes and citizens will not be able to access water for proper sanitation and therefore diseases follow.

Development is affected by water scarcity, water availability allows a place to flourish with business and industrial work needing reliable water and due to water scarcity reliable water supply cannot be given and therefore businesses refuse to invest in that region and it affect the development and employability of the area [8].

IV. MEASURES TO CONROL WATER SCARCITY

As we have already discussed that the major problems of water scarcity occur due to the rapid increase in development, water wastage in agriculture due to the old practices being followed, water pollution due to factories and inadequate management of water resources, so this paperneed concrete approaches and control measures to address these issues. Indian government and local authorities have already implemented some of the control measures but water scarcity is still a big problem [9]. Some of the controls include the

- Drawing guidelines for factories and the corporate sector for their wastewater management and rel easing their waste to local water bodies after treatment.

- Opening of Krishi Vigyan centers to educate rural people on new irrigation and farming methods t hat consume less water, such as drip irrigation.

Fig.5 Typical Layout of the National Grid

- Proper freshwater management and laying of polymer pipes in newly developed cities and more s mart cities to avoid rusting and therefore leakage.
- Technological advances in water conservation such as the SMART TAPS, as well as the establish ment of standalone grids and monitoring of the water delivered to the common households through SCADA sys tems (in future smart cities).

The main goal is to integrate the independent system to decentralize the entire network and put it in the hands of the regional water dispatch centers at a lower level. This paperneed a number of regional water dispatch centers to be interconnected and controlled by the state water dispatch centers and in effect these state water dispatch centers are regulated by the government. This will allow us to track the entire collection and distribution of water even in remote locations, hence the issue of water leakage, it is possible to check water pollution and therefore reliable water supply can be minted in the future.

Our research focuses on creating a national grid in order to connect India, which is rich in a network of rivers, to share the water load and the areas near a particular water body receive the water from that particular water body. Fig.1 illustrated the standard configuration of the National Grid linking the planned Smart Cities (Phase-I).

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V. IMPLEMENTED PROCESS IN SMART WATER GRID

The method followed in implementing the smart water grid involves splitting the Micro grids into additional Meso grids to improvise the working, tracking, and resource management. It also isolates the various grids from each other, so that any faults on any other grids do not affect the operation of other grids [10].

Australia launched its smart water grid called southeast queensland after the 2007-2008 water crisis in the area where it focuses on water conversation and management through various approaches such as real time situation monitoring. This paperalso implemented bi-directional water movement through which water can be moved from overabundance to alert, or vice-versa through which excess water that did not come into use can flow back into the reservoir and be used afterwards when needed. They are constructing 12 dams, 10 treatment plants, 28 reservoirs for development. As a result, the reliance on rain decreases from 95 to 75%. Figure 6 below can grasp the idea:-

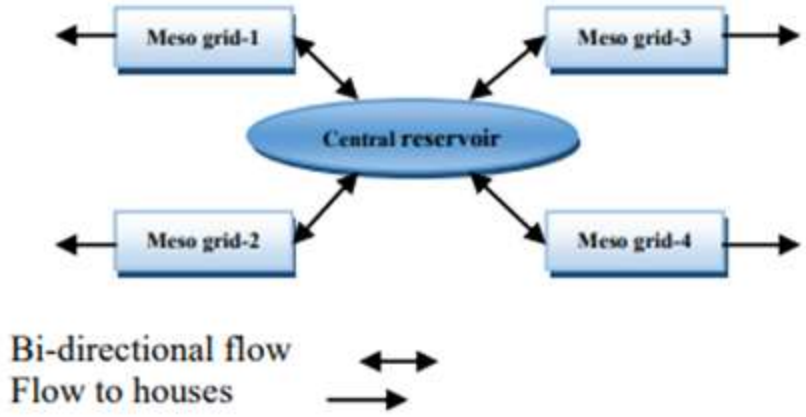

Fig.6 Central Grid System

VI. CHALLENGES FACED IN ESTABLISHMENT OF SMART GRID SYSTEM IN INDIA

Coordination between resources at different geographies and with India's water ecosystem is urgently needed.Water conservation is a serious issue and the need for increased investment, coordinated developments, is constantly growing. Information technology would play an important role in developing highly efficient methods for organizations in society, business and government to deal with the complexity of water conservation in the future.It requires the right amount of data, specific mining across different isolated grids for better real-time monitoring of single access for enhanced quality management operations, as well as adequate statistical algorithm approaches for enhanced scalability and interoperability as these are major constraints that hamper effective management across organizations. Future water management system spectrum is to be more versatile that will drive the next generation of water management system while offering more comprehensive real-time analytics, modeling, and decision support capabilities.

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VII. CONCLUSION

India's condition isn't that much different from the rest of the world. Smart grid can be well established in India by having data from all the different sections in the power sector, but there are certain challenges that need to be resolved as mentioned above. Smart water Grid also has some challenges about technological, social and economic barriers, similar to other advanced techniques in any region. Technical challenges are essentially bottlenecks in the integration of multiple devices with network grids. Economy will play a major role in the implementation and development of this technology; for the success of this technology, social acceptance by SG is necessary. Smart Water Grid has achieved considerable acceptance of technical advances but still there are issues that need to be addressed.

REFERENCES

[1] E. Al Nuaimi, H. Al Neyadi, N. Mohamed, and J. Al-Jaroodi, "Applications of big data to smart cities," J. Internet Serv. Appl., 2015.
[2] M. E. El-Hawary, "The smart grid - State-of-the-art and future trends," Electr. Power Components Syst., 2014.
[3] N. M. Pindoriya and N. Gurrapu, "Emerging trends in electricity market in India - A review," in 2011 Nirma University International Conference on Engineering: Current Trends in Technology, NUiCONE 2011 - Conference Proceedings, 2011.
[4] J. Sahoo and M. Rath, "Study and Analysis of Smart Applications in Smart City Context," in Proceedings - 2017 International Conference on Information Technology, ICIT 2017, 2018.
[5] L. Dobriansky, G. Ghatikar, and D. Ton, "Smart microgrids: Re-visioning smart grid and smart city development in India," in Lecture Notes in Electrical Engineering, 2018.
[6] G. Kibria, A. K. Y. Haroon, and D. Nugegoda, "Low-Carbon Development (LCD) Pathways in Australia, Bangladesh, China and India—A Review," J. Clim. Chang., 2018.
[7] M. Ramaiah and R. Avtar, "Urban Green Spaces and Their Need in Cities of Rapidly Urbanizing India: A Review," Urban Sci., 2019.
[8] M. Fatima, S. Jain, A. Chikara, and M. Luthra, "Review on Implementing Smart Water Grid for Smart Cities in India: Challenges and Solutions," in 2019 5th International Conference on Advanced Computing and Communication Systems, ICACCS 2019, 2019.
[9] G. Floater et al., "Cities and the New Climate Economy: the transformative role of global urban growth," London Sch. Econ. Polit. Sci., 2014.
[10] M. E. El-Hawary, "The Smart Grid—State-of-the-art and future trends," 2017.