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Introductory Chapter: Resources of Water and the Need for Conservation

Prathna Thanjavur Chandrasekaran

1. Introduction

Unlike other natural resources such as wind and solar, water resources are limited and can include surface water, ground water, rain water and saltwater. Of all the water resources present on earth, only 2.5% exists as freshwater. Fresh water can exist in the form of ground water, surface water and water present in glaciers and ice. A major fraction of fresh water is present in glaciers with only a tiny fraction available as surface water.

Increasing population and urbanization has increased our water demands and place undue stress on the existing water resources. Studies indicate that by 2030 there will be a 40% deficit between the world water demand and the available water resources [1]. People in the developing world are most vulnerable to climate changes; changes in rainfall pattern as a consequence of climate change have largely affected the world in recent years. Extreme changes in the rainfall patterns have increased the frequency of floods and droughts. Exploitation of the available water resources affects all aspects of human existence in addition to disrupting the fine balance in the ecosystem. Erratic and unseasonal rainfall largely affects agricultural activity which mainly sustains the economy of most of the developing countries. Sustainable water management practices are therefore critical to ensure conservation of the existing water resources. Development of policies on smart water practices and its implementation need to go hand in hand to promote conservation of water resources. Many countries around the world have adopted different strategies to reduce the pressure on their available water resources and interesting case studies on their success stories exist.

2. Strategies for sustainable water management

Some of the strategies that can be adopted for sustainable water management are: (i) re-use of treated water for various end uses such as agriculture, horticulture, ground water recharge, aqua culture etc., (ii) revival of water bodies; (iii) reduction in non-revenue water losses. These strategies need to be executed in parallel to conserve and sustain the water resources.

3. Re-use of treated water

Treated water from the Sewage Treatment Plants (STPs) can be used to cater to horticultural needs, irrigation and partly for the daily water requirements. The city

of Delhi for example has three sources of water: (1) Surface water supplied by river basins; (2) groundwater; (3) Treated water- the status of which will depend on the quality of treatment. The daily water requirement for Delhi is around 1120 MGD, of which 840 MGD is extracted from River Yamuna and 80 MGD is extracted from groundwater. Currently most of the treated water from STPs are discharged into the major drains and reach River Yamuna. As of 2019, out of 720 MGD generated as raw sewage, only 90 MGD is currently being utilized by various agencies for non-potable purposes like horticulture and in STPs. Some of the advantages of utilizing treated wastewater are:

1. It will reduce the ever-increasing gap of Potable Water Supply and Demand in Urban Cities.
2. It can bring down billing charges of fresh water which are a result of long-distance transportation, gradient and higher energy costs.
3. It can mitigate conflicts of water resource allocation between the Domestic and Agriculture/ Industry.
4. It can reduce groundwater extraction and also aid in conservation of water resources.
5. It can make water and sanitation sector sustainable.

4. Revival of existing water bodies

Water bodies are an excellent source to conserve rain water which otherwise can lead to flooding due to complete concretization of cities. Revival of existing water bodies and creation of new water bodies can have many advantages; few of which are mentioned below:

1. Additional Reserves of water can be created within the city which can be utilized in case of scarcity
2. Ground water recharge
3. Treated water coming from STPs can be utilized which currently discharge into drains
4. Rain water can be captured and stored at massive level
5. Excess water can be utilized to meet needs of the people
6. Social and Cultural connected – Community owned space – Protection of water bodies

5. Reduction in non-revenue water losses

Non-revenue water loss refers to the produced water that is lost during distribution without generating revenue and comprises of components such as real

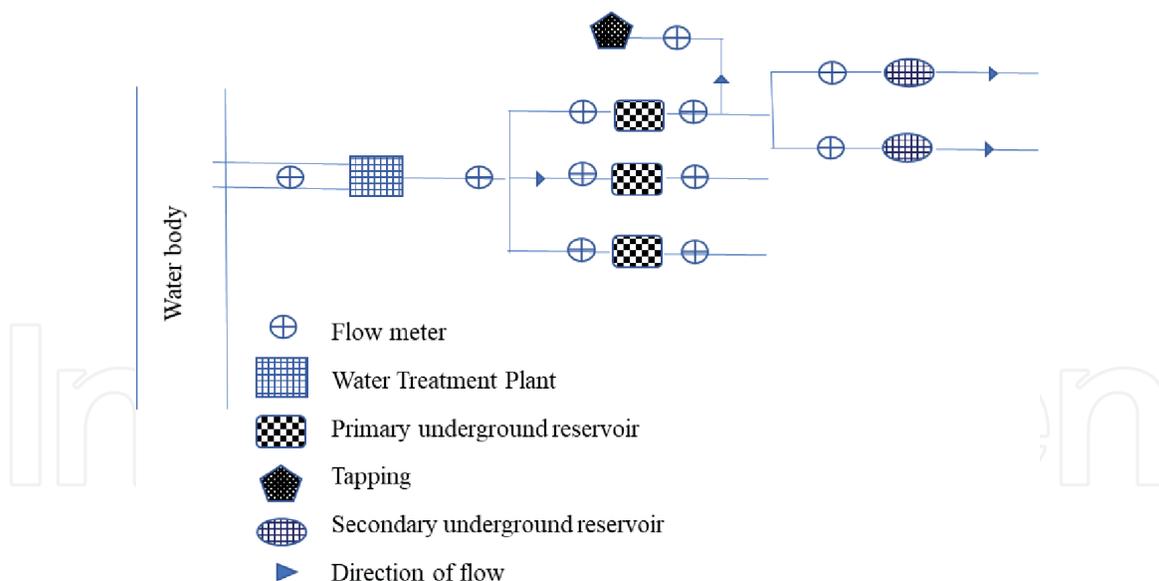


Figure 1.
Installation of flow meters in a water distribution network.

losses, apparent losses and unbilled water consumption [2]. Real losses and apparent losses in a distribution network can be reduced considerably by efficient water auditing. Water flow meters play a critical role in water auditing and give an idea on water losses and usage during each stage. Electromagnetic flow meters can be fitted at different stages of the water supply and a typical scheme of attached flow meters is shown in **Figure 1**. Water from the source water body reaches a Water Treatment Plant (WTPs) and following treatment is diverted to various primary underground reservoirs. Water from the primary underground reservoir can be tapped to various locations and can also be stored in a number of secondary underground reservoirs. Water flow meters installed at different stages can help identify water losses, water consumption patterns and enable better water accounting. The capital city of Delhi for example has Ten WTPs and until 2015 had a total of 350 water flow meters. Sustainable water management practices in the recent years have led to better water accounting and until 2019, a total of 2000 water flow meters have been installed. This has enabled efficient distribution of available water resources and decreased water losses during distribution and water theft.

6. Conclusion

Sustainable management of water resources to provide safe drinking water to all and to protect the natural reserves is one of the major goals of the SDGs put forth by the United Nations. In the current scenario of climate change and water scarcity, it is of utmost importance to strategize urban water management focusing of water use and reuse, conservation of available water resources and sustainable plans to reduce water losses. Sustaining a low water footprint can effectively reduce water scarcity. The developing world is already taking considerable measures to achieve sustainable use of available water resources while many nations in the developing world have started taking initiatives to adopt sustainable water management. Sustainable water management practices can go a long way in protecting the available water resources and preserving the fragile ecosystem for the future generations.

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