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Water Conservation and Reuse Policy

Introduction

Water is the prime source of existence of the mankind. Living beings need water for majority of their activities like agriculture, industries and domestic purposes such as bathing, washing, drinking etc. Unfortunately, the access to safe freshwater has become quite challenging these days. Throughout the world, the availability of water is threatened because of population growth, climatic variations and changes in the land and water use patterns. The water cycle is also affected by the human activities like the reduction of forest areas and grasslands, urbanization etc. causing reduced groundwater recharge, overexploitation of groundwater resources, seawater intrusion, pollution of surface water resources due to the discharge of the untreated industrial and municipal wastewater etc. It can be said that the water availability is getting scarce in many regions worldwide, especially in developing countries like India.

The water problems in India mainly comprise of spatio-temporal variation of water resources leading to lesser water availability even for the present population, exhausting surface and groundwater resources and highly polluted water bodies. It has been estimated that by the year 2030, the annual demand will be much higher as compared to the available water supply. Research indicates that there will be an expected gap of approximately 50% between the water demand and supply.

To address the existing and anticipated water shortages, water resource planners are in search of alternative sources to enhance the limited freshwater resources at a global level. One of the alternate management approaches is the use of recycled or reclaimed water, most commonly known as, reuse of treated wastewater.

While discussing about water reuse, it is very important to define three similar terms i.e. water recycling, water reclamation and water reuse. The terms "reused" and "recycled" are often used interchangeably. Recycled Water generally refers to treated domestic wastewater that is used more than once before it passes back into the water cycle.

Reclaimed water is not reused or recycled until it is put to some purpose. It can be reclaimed and be usable for a purpose, but not recycled until somebody uses it. Water reuse is defined as the use of water which is generated from wastewater and that achieves, after treatment as necessary, a quality that is appropriate (taking in account the health and environment risks) for its intended use such as irrigation, industrial or civil (municipal) in general.

Concept of Water Reuse

Wastewater is a growing resource which needs to be managed and used efficiently. Water reuse can serve as an alternative to existing water supplies and be used to enhance water security, sustainability, and resilience. Reuse of treated wastewater has emerged as an environmentally sustainable option that has helped many global communities

significantly in managing wastewater and augmenting their water supplies.

Water reuse offers following benefits.

Augmentation of existing sources
Environment friendly
Dependable and assured source of supply
Revenue generation options
Resource recovery and energy savings
Helps in increasing the quality of life, well-being and health by improvement of urban environment (e.g. urban parks and fountains).

Need for Water Reuse

The main driver to reuse water is shortage of freshwater availability or water scarcity but due to difference in baseline climatic conditions, existing water resources and level of economic and social development, local circumstances also contribute towards the need to reuse wastewater. In India, the major driving factors emphasizing water reuse are given below:

Rising population
Industrialization
Urbanization
Agro economy Climatic variations Technological developments Depleting water resources

Challenges for Water Reuse

India is still in the initial phases of wastewater reclamation and reuse. There are many barriers associated with the implementation of treated wastewater reuse projects, limiting the growth of wastewater reclamation and reuse in the country.

Generally, the set of challenges involves technical such as, physical and chemical treatment processes involved, distribution pipelines, waste disposal systems etc., financial such as funding for water reuse projects covering planning, design, construction, operation, and implementation, social and political/institutional.

A general lack of awareness, both of problems and of solutions, affects water reuse projects at all stages. Some of the challenges that have stigmatized water reuse and hindered its implementation in the country are discussed as follows.

Backlog in laying affordable and scalable wastewater collection and treatment networks

Lack of effective and low-cost treatment technologies and monitoring processes to ensure adequate water quality

Lack of coordination between various sectors responsible for water supply and wastewater management

No strict policies or guidelines regarding the reuse of treated wastewater

Little attention towards public engagement and outreach

Scope of Water Reuse in India

Due to its high population, India is on the verge of being one of the severely water scarce countries in the world. There is a lot of potential for reuse of treated wastewater in the country. Being an agro-economic developing nation, its water resources, especially groundwater, is under stress to supply water for both agricultural and industrial activities.

To ensure a sustainable supply of water for such purposes, reclaimed water plays a major role. Recycling and reuse of treated wastewater is quite favorable as it provides an opportunity for environmental restoration by keeping the wastewater discharge out of water bodies along with providing an assured supply of water to meet the increased water demands, thereby, reducing the pressure on freshwater resources.

Nowadays, the global wastewater reuse market is being shifted to Asia. Industrial reuse of treated wastewater has boomed in response to the degradation of water resources in China and India. India is now the fastest growing market in the region, with new environmental legislation as one of the drivers.

Technology Used for Water Reuse

For safe and effective reuse of treated wastewater, it is very important to treat the wastewater confirming to the desired water quality. With the development in technology, the efficacy of the treatment processes has also enhanced.

The level of treatment required is directly linked to the cost and the intended use. Higher the quality of water required, higher is the treatment costs.

Initiative for Various Policies in India

Strong legal framework serves as the backbone of an effective water reuse scheme. The overall planning, implementation, and success of reuse projects depends highly on the policies, institutional framework and regulations. Water sector in India is governed with policies of central and state Governments as well as local bodies governing rural and urban regions. Over the period of time, many initiatives have been taken by

the authorities, at both central and state levels to promote the reuse of treated wastewater as shown below.

2008: National Urban Sanitation Policy; National Action Plan on Climate Change
2011: National Water Mission
2012: National Water Policy
2013: Guidance Manual on recycling and reuse of sewage
2014: Namami Gange programme; Swachh Bharat Mission
2016: Ministry of Power Gazette notification; National Water Framework Law
2018: Individual State Water reuse policies e.g. Gujarat, J&K, etc.

Initiative by Shivaji University

Our university is working on the clean water and sanitation indicators and progressively following the different parameters. We are developing a system where we can calculate the total inflow and usage of the water in the university and also water consumption per person. We are measuring the supply of total water from various resources. In our university we are using average One MLD water from various resources like University's own wells and earthen storage reservoirs. The total peak residential population including students and staff at campus is 7,000 to 10,000 persons including floating population on the campus. The total peak water requirement is 10,00,000 Liters (142.85 Liters/person). This is at par to the water requirement as specified by NBC (135 Lts/person).

The volume of potable water required for daily usage which is taken from all its own sources e.g. University's wells, earthen storage reservoir etc. is lifted to the University's own treatment plant of one M.L.D. (Ten lacs liters) capacity. After treatment, the treated water is lifted to University's own elevated storage reservoir of capacity three lacs liters, which is having provision of measurement of volume of water stored. This tank is filled two times a day and thus six lacs liters of treated water is distributed on the entire campus. Thus there is a provision of measurement of water distributed per day. On non working days of University generally three lacs or lesser quantity is distributed which can be measured with the volume measuring scale fitted on the elevated storage reservoir.

Further drinking water on the campus is provided from centrally installed R.O. plant of five thousand liter per hour capacity through the jars of volume twenty liters to various hostels, departments, quarters and administrative building. Thus there is also facility to measure the treated water given on the campus. Generally eight hundred jars of twenty liters capacity i.e. sixteen thousands liters on and average treated water is distributed on campus.

The water required for laboratories and toilet blocks in various departmental building is meet from the source which is lifted in two stages from Rajram Talav to central circle and south circle having tanks of one lacs liters capacity each. These tanks are filled twice in a day as per consumption. The marking of liters on the tank is mentioned which helps us to know the water

consumed on that day.

Wastewater recycling is the best option of water saving. Underlining this fact, Shivaji University has established four recycling plants / grey water treatments units at various locations in the campus.

1. Recycling plant near women's hostel (60 thousand liter water is recycled per day).
2. At Panch Bunglow (50 thousand liter water is recycled per day).
3. Hostel of Department of Technology. (50 thousand liter water is recycled per day).
4. Newly constructed at Boys Hostel Campus (50 thousand liter water is recycled per day).

This recycled water is used for the garden and campus beautification through drip lines all over the gardens. The gardens of old and new library, Garden around Karmaveer Annabhau Patil statue, Garden of Humanities building and north circle garden is irrigated with the recycled water from plant near Ladies Hostel. The gardens in the area of Department of Technology are irrigated with the recycled water from their hostel.

The bio-digester of 9000-liter capacity designed by DRDO has been installed behind Main Administrative Building. This recycled water used for Coconut Garden behind Rajmata Jijausaheb Multipurpose Hall. As per routine practice all buildings are provided with septic tank and soak-pits.

The cleaning and inspection of filters and membranes is done once in every month, and the quality of water is verified for drinking purpose once in month from Shivaji University's own Environmental Science Department. To minimize the water use we have constructed our buildings in a way to harvest the rain water and paneled with the facility for rain water supply to the building for specific purposes. We also have very successful model for the landscape plantations. We have plantation of drought tolerant plants as well to minimize the usage of water and also support the water conservation. The images of the drought tolerant plants with landscape plantations at the various places of the university are provided.

Methods Adopted by Shivaji University for Water Reuse and Water Conservation

Treatment of used water through Sewage Treatment Plant
Rainwater harvesting, treatment and reuse
Designing of buildings for water conservation
Awareness generation for water conservation

Conclusion

Shivaji University is focusing on the water conservation throughout the whole campus. We have a planned system for the water conservation and reuse through STP, rainwater harvesting, landscape designing and plantations, awareness generation etc. We are working under the norms of the state and central government and participating in the issue of national importance of water conservation.