



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

# IJRSET

International Journal of Innovative Research in  
**SCIENCE | ENGINEERING | TECHNOLOGY**



# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 13, Issue 4, April 2024

**ISSN** INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA

Impact Factor: 8.423

9940 572 462

6381 907 438

[ijirset@gmail.com](mailto:ijirset@gmail.com)

[www.ijirset.com](http://www.ijirset.com)

# Wastewater Management in Rural India

Jainish Solanki Haresh, Asst Ms. P.A. Hase

Department of Civil Engineering, Rajarshi Shahu Collage of Engineering Polytechnic, Tathawade, Maharashtra, India

**ABSTRACT:** Wastewater management in rural India presents a multifaceted challenge stemming from inadequate infrastructure, limited resources, and socio-economic factors. This paper examines the current state of wastewater management in rural areas, exploring the various challenges and opportunities. Key strategies and technologies for effective wastewater treatment and disposal are discussed, including decentralized systems such as constructed wetlands, biogas plants, and community toilets. The role of community engagement, government initiatives, and education in promoting sustainable wastewater management practices is also emphasized. By addressing these challenges holistically, rural India can achieve significant improvements in sanitation, public health, and environmental sustainability.

**KEYWORDS:** Collection, Infrastructure, Waste Management.

## I. INTRODUCTION

The purpose of wastewater management is to collect, treat, and dispose of wastewater in a safe and environmentally responsible manner to protect human health, prevent water pollution, and promote sustainable water use. The scope of wastewater management includes:

1. Collecting wastewater from various sources, such as homes, businesses, and industries, through a network of sewer systems or other means of conveyance.
2. Treatment: Treating wastewater to remove contaminants, such as solids, nutrients, pathogens, and chemicals, using physical, chemical, and biological processes. This helps in ensuring that the wastewater is safe to be discharged into the environment or reused for beneficial purposes.
3. Disposal or Reuse: Disposing of treated wastewater in an environmentally responsible manner, such as through appropriate discharge methods into rivers, lakes, oceans, or by land application. Alternatively, treated wastewater can also be reused for non-potable purposes, such as agricultural irrigation, industrial processes, or groundwater recharge, depending on local regulations and treatment capabilities.
4. Monitoring and Regulation: Implementing monitoring and regulatory measures to ensure compliance with wastewater management regulations, standards, and guidelines, and to prevent water pollution and protect public health.
5. Planning and Infrastructure: Developing and maintaining wastewater management infrastructure, such as sewer systems, treatment plants, and pumping stations, and planning for future needs based on population growth, urbanization, and industrial activities.
6. Public Education and Engagement: Promoting awareness and educating the public, stakeholders, and communities about the importance of proper wastewater management, water conservation, and pollution prevention practices.
7. The scope of wastewater management may vary depending on local regulations, available resources, and environmental conditions, but its overall purpose is to protect water resources and public health through effective and sustainable management of wastewater.

## II. MATERIALS AND METHODS

### Plastic Pipe:

Plastic pipe system is used widely for the transportation of wastewater from the building to the wastewater treatment plant. This can be done by gravity sewer, pressure or vacuum sewer or by using domestic wastewater treatment tanks.

Pipeline rehabilitation is also a common application. These pipes are used for collection of water, Filtration of water, Infiltration of water, retention of water, transportation of water and reuse of rain water. Their flexibility allows them to adjust to inevitable ground moment such as void collapses or even earthquakes.

#### **Pump Stations:**

A Pump stations are used in waste water management for moving water through the different stages of treatment. According to the US EPA, Pump station capacities range from 76 lpm (20 gpm) to more than 378,500 lpm (100,000 gpm). Prefabricated pump stations generally have a capacity of up to 38,00 lpm (100,000 gpm). Usually pump stations include at least two constant speed pumps ranging in size from 38 and 78,000 lpm (10 to 20,000 gpm) each have a basic well level control system to sequence the pump during normal operation.

#### **Plastic:**

Plastic has a good insulation and low thermal conductivity. Plastic has a good transparency and wear resistance. Plastic accumulates in the natural environment due to the durability and low recycling volume. Wastewater treatment plants (WWTPs) have been identified as important sources for the release of plastic into aquatic and terrestrial environment that may lead to further contamination summary of current knowledge on plastic pollution from WWTPs.

#### **Chemical Wastewater Treatment:**

In this stage of wastewater treatment chemical process are used for wastewater treatment. To this end, Chemical compound are used to achieve legally prescribed water standard value. Chemical treatment in wastewater treatment includes neutralization, disinfection, phosphate precipitation, nitrogen elimination and manganese removal.

### **III. LITERATURE REVIEW**

A review of the existing research articles was carried out by the authors and their study was analyzed for its innovativeness and perception. The views expressed by the various authors are included in the present study. Pervez Alam et.al. [2014] proposed a solution in Jammu and Kashmir state for the growth of population at fast rate, lack of education poverty especially in rural areas as polluted environment to a great extent area. Here the paper gives the detail about the population of the area, the drainage detail water supply details and the ground water property recorded in the paper.

Dr. Amita Bhide [2011]- In this review paper author said as Maharashtra has historically been one of the highly metro states of India. The urban history of Maharashtra span over to blooms. Urbanization in the state has been effect by the in the north on one hand however the most significant, most effect, shaping the current form of urbanization in the state is the dependent impact which focus around the private port city.

Zisan Aslam, Yawar Mushtaq Raina, Irfan Mohiuddin [2015]-In this review papr author said as Water overstress physically, chemically as well as biologically is known as Wastewater. Pitch away process of solid waste and its management has been leading environment problem for most of the cities in India especially in Rural India to make people aware about the level of poison in wastewater and to be suggest the way of management of wastewater which will result in throw away of domestic sewage without any danger to human health, a study on characteristics of wastewater in Rajouri Town, Jammu and Kashmir was connected.

Rohit Ashok Mohite, Lalitkumar Kishor Joya[2021]-In this review paper author said as Mumbai has the fourth largest pollution in the world (12.4 million resident, 2011 of India) this results is a lot of regular traveller flow from nearby towns, such as NaviMumbai and thane, resulting in wide range of services Mumbai has invested in expanding basic services to make pollution is need such as water supply soil waste disposal and wastewater collection and management in order to make it's growing needs.

### **IV. BENEFITS OF WASTEWATER MANAGEMENT**

Wastewater management is an essential aspect of industry operations, especially in aiming to protect the health of various ecosystems. Properly treated wastewater can be a reliable water source for many purposes. Good wastewater management maximizes the reusing of water for sustainability and nature preservation.

- **Water Clarification:**

Clarification is a vital step in a wastewater treatment process. It involves removing suspended solids via gravity settling, which provides a clear liquid effluent. The secondary function of water clarification is to remove scum or floating matter that accumulated on the water surface.

- **Waste Reduction:**

Through the management of waste water, the amount of waste that is usually released into the environment is reduced thus improving environment health. By doing the so the government in turn reduces the health risks associated with environmental pollution and reduces the water loss include through water pollution.

- **Energy Production:**

The sludge collected during the treatment process is itself treated because its content large amount of biodegradable material. It is treated with anaerobic bacteria in special fully in closed digester heated to 35 degrees Celsius an area where these anaerobic microorganisms thrive without any oxygen.

- **Protect Environment:**

Wastewater contains a lot of waste material including chemical component. The water released from industrial sector, it contains a harmful chemical, which can be fatal to leave it wide open out there. In such condition, the industrial water treatment plant will remove the harmful ingredients and chemical components from the water. This way, two things will happen. First, you can reuse the water for personal or industrial use. Second, you can help in minimizing environmental pollution too.

## V. METHODOLOGY

- Discussion with Guide
- Selection of Topic
- Collection of Research Paper
- Synopsis Writing
- Literature Review
- Collection of Material
- Testing of Material
- Comparison of Result
- Report Preparation
- Submission

## VI. OBJECTIVE OF WASTEWATER MANAGEMENT

Wastewater management is very necessary for the above-mentioned reason. It is more needed for the reduction of biodegradable organic substances in the environment: organic substances such as carbon, nitrogen, phosphorus, Sulphur in organic matter need be broken down by oxidation into gases which is either released or remains in solution. Recycling and Reuse of water: Water is a scarce and finite resource which is often taken for granted. In the last half of the 20th century, population has increased resulting in pressure on the already scarce water resources. Urbanization has also changed the a griannature of many areas.

Population increase means more food has to be cultivated for the growing population and agriculture as we know is by far the largest user of available water which means that economic growth is placing new demands on available water supplies. The temporal and spatial distribution of water is also a major challenge with ground water resources being over drawn (National Academy, 2005). It is for these reasons that recycling and reuse is crucial for sustainability.

## VII. FUTURE SCOPE

The future scope of wastewater management in rural India could involve implementing sustainable and cost-effective solutions such as decentralized treatment systems, community-based initiatives, and the integration of renewable energy sources for treatment processes. Additionally, there's potential for leveraging technology, such as IoT sensors and data

analytics, to monitor and optimize wastewater treatment processes. Education and awareness campaigns could also play a crucial role in promoting proper wastewater disposal practices and fostering community engagement.

### VIII. CONCLUSIONS

In the current management of wastewater by most countries, all the aspects that ought to be involved in the water treatment process are not considered, as it is evident from the above literature review. As a result, this results into the mixing of different wastewater in a bit to cut costs or utilize the few available wastewater treatment plants. This should however not be the case due to the varying impurity composition of for example sewage wastewater and agricultural wastewater. Some countries don't even bother with the management of storm wastewater hence posing pollution problems to their ecosystems. Governing bodies in different localities around the globe should therefore take the initiative of ensuring proper designing and operation of separate wastewater plants for different types of wastewater. All the relevant stakeholders should put more responsibility into the maintenance of water treatment plants. This will ensure a better supply of well-recycled water instead of the current state substandard recycled wastewater that is causing a global clean water crisis. It is also important to note that the management of wastewater ought to be done with the intent of helping in saving the cost of finding building new water infrastructures whenever there is water shortage. Wastewater management should also be viewed as an environmental.

### ACKNOWLEDGMENTS

We extend our heartfelt gratitude to our Principal, **Dr. S. S. Gaikwad**, and our Head of Department, **Mrs. L. K. More**, for their invaluable guidance and unwavering support throughout the completion of our project, '**Wastewater Management in Rural India**'. Specially, we express our sincere appreciation to our guide, **Ms.P.A.Hase**, whose expertise and mentorship have been instrumental in the success of this endeavor. We also acknowledge and appreciate all staff of the civil department who were indirectly involved in providing guidance and support.

### REFERENCES

1. Anonymous. 2004. NATP – MM project report on 'Use of Urban and Industrial Effluent in Agriculture' CSSRI, Karnal 132001, India.
2. Bhamoriya V. 2004. Wastewater Irrigation in Vadodara, Gujarat, India: Economic Catalyst for Marginalized Communities. In: Scott CA, Faruqui NI and Raschid-Sally L. (Eds). Wastewater Use in Irrigated Agriculture: Confronting Livelihood and Environmental Realities. CAB International in Association with IWMI: Colombo, Sri Lanka, and IDRC: Ottawa, Canada.
3. Bhardwaj RM. 2005. Status of Wastewater Generation and Treatment in India, IWG-Env Joint Work Session on Water Statistics, Vienna, 20-22 June 2005.
4. Billore, S.K., Singh, N., Sharma, J.K., Nelson, R.M., Dass, P. (1999). Horizontal subsurface flow gravel bed constructed wetland with Phragmites karka in Central India. Water Science and Technology. 40: 163-171.
5. CGWB. 2011. Ground Water Year Book - India 2010-11. Central Ground Water Board, Ministry of Water Resources. Government of India. <http://www.cgwb.gov.in/documents/Ground%20Water%20Year%20Book-2010-11.pdf>
6. CPCB (1999). Status of water supply and Wastewater Collection Treatment & Disposal in Class I Cities-1999, Control of Urban Pollution Series:CUPS/44/1999-2000.
7. CPCB. 2005a. Parivesh Sewage Pollution – News Letter. Central Pollution Control Board, Ministry of Environment and Forests, Govt. of India, Parivesh Bhawan, East Arjun Nagar, Delhi 110 032 <http://cpcbenvs.nic.in/newsletter/sewagepollution/contentsewagepoll0205.htm>



INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA



# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  [ijirset@gmail.com](mailto:ijirset@gmail.com)



[www.ijirset.com](http://www.ijirset.com)

Scan to save the contact details