

Challenges in Achieving SDG-6 In Urban India: A Critical Review of Water and Sanitation Services.

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Abstract:

Sustainable Development Goal 6 (SDG-6) aims to ensure the availability and sustainable management of clean water and sanitation for all by 2030. In the context of urban India, rapid urbanization, population growth, lack of proper development of infrastructure and governance level challenges are the significant barriers to achieving this goal. This paper presents a critical review of the current status, policies and institutional mechanisms related to water supply and sanitation in urban regions of India. We focus on secondary data, government reports and recent scholarly literature, the study identifies key challenges such as unequal access, intermittent water supply, poor wastewater management and inadequate sanitation infrastructure in slums and peri-urban areas. It further analyses the role of policy initiatives like AMRUT, SBM (Urban) and Jal Jeevan Mission (Urban), highlighting gaps in implementation, financing and citizen engagement. The paper concludes by offering policy recommendations focused on decentralized water governance, integrated urban planning and inclusive service delivery, essential for realizing SDG-6 in India's urban future.

Keywords: Water Supply, Sanitation Services, Urban Governance, Urban Slums, Wastewater Management, Urban Water Crisis

1. Introduction:

Water and sanitation are basic need to human health, dignity, and sustainable development. Addressing their critical importance, the United Nations adopted Sustainable Development Goal 6 (SDG-6), which seeks to “ensure availability and sustainable management of water and sanitation for all” by the year 2030. While progress can be seen in insuring availability of drinking water and sanitation facilities in under-developed and somehow in developing world but more has to be done especially in the countries of Africa and South East Asian countries.

Over 35% of India's total population is now living in urban area, which is an unprecedented demographic shift for an economy which is recognized as rural based and agrarian economy (Statista, 2025). This rapid growth of the urban population has been created an immense pressure on previously available infrastructure for the basic facilities like clean drinking water, sanitation facilities, drainage and waste management system. Responsible authorities and central and local government have taken remarkable stapes to tackle the arising issues with flagship schemes such as the Atal Mission for Rejuvenation and Urban Transformation (AMRUT), Swachh Bharat Mission (Urban) and Jal Jeevan Mission (Urban), despite all the efforts urban areas continue to face critical challenges including unequal access to safe drinking water, intermittent supply, poor wastewater treatment, and lack of sanitation facilities, especially in informal settlements and slums areas. The institutional fragmentation, inefficiency, financial constraints, corruption, and weak governance further complicate the effective delivery of water and sanitation services to the people.

This paper critically evaluates the challenges facing in the implementation of target decided under SDG-6 in urban India. By examining policy frameworks, infrastructural gaps, and implementation barriers, the study seeks to provide a comprehensive understanding of the roadblocks to achieving universal and equitable access to water and sanitation in the Indian cities. It also explores potential pathways and policy recommendations to accelerate progress toward this crucial development goal.

2. Objectives:

- i. To examine the current status of water supply and sanitation services in urban India in the context of SDG-6 target.
- ii. To review existing government policies, programs, and schemes like AMRUT, Swachh Bharat, Jal Jeevan Mission in the relation to their effectiveness in achieving SDG-6.

3. Methodology:

Since availability of clean drinking water and sanitation are two most important aspect for the good health of the civilizations from past to present time. Present day population growth and unorganized way of urbanization created challenges to maintain these two facilities for government and even itself for the people especially in developing and under developed countries. As we analyze these two aspects focusing on SDG-6 in the context of India one of the developing countries. For this analysis we adopt qualitative and descriptive type of research design by evaluating existing literature, policies, and available data on urban water and sanitation facilities in India. The source of data is secondary in nature including government reports, reports published by international organizations, and academic sources such as Ministry of Housing and Urban Affairs, NSSO, NFHS, WHO, UNICEF, and related research articles.

4. Data Analysis

The data obtained from different government agencies related to water supply and sanitation are analyzed using Microsoft Excel through tables and graphs, descriptive analysis is also present with data available of different major cities in India.

5. Results and Discussion

a. Overview of SDG-6 Targets in the Context of Urban India

There is total 17 Goals adopted by the United Nation in the year 2015 in which Sustainable Development Goal 6 (SDG-6) aims to "ensure availability and sustainable management of water and sanitation for all" till 2030 (UNEP, 2025). It encompasses a broad framework that includes multiple interrelated targets. In the context of urban India, the following targets are particularly mentioned below:

Target 6.1 Universal and Equitable Access to Safe and Affordable Drinking Water by 2030. This target ensures that all individuals, including those people who reside in urban slums and informal settlements, have access to safe and reliable drinking water. However, most of the cities in India face intermittent water supply, non-revenue water losses, and poor quality of water due to pollution, especially in unplanned and rapidly growing metropolitan areas. Target 6.2 Access to Adequate and Equitable Sanitation and Hygiene. This focus on vulnerable group and emphasizes the need for access to safely managed sanitation facilities and basic hygiene, with special focus to the needs of women, children, and marginalized communities of the urban society. In urban areas, sanitation coverage is not equal, as many slum dwellers have not individual toilets facilities, they depend on shared or open defecation practices which create filthy environment leads to many diseases which degrade the quality of life. Target 6.3 Improve Water Quality and Wastewater Treatment. Under this target it is decided to increase the amount treated wastewater as the present available capacity. Urban India a significant amount of untreated water goes directly to river and other water bodies and pollutes them due to insufficient available infrastructure and weak regulatory enforcement. This target includes increasing recycling and reusing at the global level. Target 6.4 Increase Water-Use Efficiency and Ensure Sustainable Withdrawals. Over-extraction is the basic problem of present-day urban areas due to heavy burden of population and lack of planning to recharge ground water. These targets promote to use sustainable withdrawals of ground water and supply of freshwater for drinking and cooking especially in water stress region, investment in water-saving technologies and reuse/recycling systems. Target 6.5 Implement Integrated Water Resources Management (IWRM). Urban water management in India is often fragmented across various agencies, leading to duplication, inefficiency, and accountability issues. So, SDG 6.5 encourages the cities to adopt a holistic and integrated approach for the water resource planning and management. Protect and Restore Water-related Ecosystems. This target includes the conservation, restoration and sustainable management of the natural ecosystem which plays a significant role to maintain water cycle. To maintain water quality, groundwater recharge, flood control, and to sustain biodiversity we have to ensure a healthy ecosystem. Target 6.a and 6.b International Cooperation and Community Participation. These targets emphasize international support and local community participation, in the Indian urban context, the focus should be given on water harvesting, desalination, wastewater treatment, recycling and reuse technologies by international developed countries in developing and under developed countries. By strengthening local governance, enhancing stakeholder engagement and capacity building at the municipal level gives a positive result in improving water and sanitation condition.

This overview lays the groundwork for a critical analysis of the deficiencies and institutional obstacles that impede the realization of SDG-6 in urban India. Each aim is related to urban problems in infrastructure, policy, planning, and socio-economic inequality. The article goes into more detail about these issues.

b. Current Status of Urban Water Supply and Sanitation in India:

India’s urban landscape is undergoing a process of demographic transformation which results with over 35% of the population now living in urban areas, expected to rise to nearly 600 million by 2036 (World Bank, 2024). This rapid rate of urbanization has placed an immense stress on the basic urban services, particularly water supply and sanitation facilities in the town and cities, which are core components of Sustainable Development Goal 6 (SDG-6). Despite numerous national programs and policy reforms took place year after year, the urban water and sanitation scenario continues to face significant challenges in the terms of access, quality, reliability, and sustainability which are a challenge for urban people.

According to data from the Ministry of Housing and Urban Affairs (MoHUA), approximately 70% of urban households have access to piped water supply (PIB, 2023). There are only 42% of urban households have facilities to access sewage (BW BUSINESSWORD, 2023).

Many urban local bodies (ULBs) struggle with intermittent supply, pipeline leakages, aging pipelines, and high levels of non-revenue water (NRW)—estimated to be between 30–50% in some cities is far exceeding the global benchmark of 15-20% which is a big number in itself (ORF, 2025). Groundwater over-extraction remains rampant due to unreliable municipal supply which leads to aquifer depletion and water quality degradation from contaminants such as fluoride, arsenic, and nitrates over time is concerning. Pollution of surface water sources due to untreated sewage discharge further exacerbates the issue of safe drinking water availability.

Table 1:

City/States	Major Contaminants	Incidence (2024-25)
Delhi	Nitrate, Uranium, Heavy Metals	Localized contamination in the peri-urban areas
Indore	Faecal coliform & BOD	Outbreaks in the last week of December 2025 and first week of January 2026, approx. 7-16 deaths, 1400+ ill
Gujarat	Fluoride, nitrate, salinity	Repeated diarrheal outbreaks is common
Rajasthan	Salinity, fluoride	High EC in Jodhpur, Barmer
Uttar Pradesh, Bihar & West Bengal	Arsenic	More than 40 districts in UP, 30 in Bihar and chronic exposure in several districts of WB

Source: CGWB, 2024; CSR Universe, 2026

Urban Sanitation Coverage and Waste Management through Swachh Bharat Mission (Urban) has significantly improved access to toilets in urban areas, with over 99% of the urban areas declared as Open Defecation Free (ODF) (The Indian Express, 2020). However, ODF status does not necessarily reflect safe sanitation condition. A large proportion of urban sanitation systems rely on on-site sanitation (OSS) which includes the septic tanks and pit latrines, and only around 40% of urban wastewater is treated before discharge into water bodies such as rivers and ponds (Dasgupta, S., Agarwal, N., & Mukherjee, A. (2021). Total waste water generation by the urban centers in India is estimated to 72368 million liter per day (MLD) whereas the total installed capacity for their treatment is far below the half of total generated

sewage is approx. 31841 million liter per day (MLD), which covers around 44% of the total sewage generated by the urban centers (India Water Portal, 2023).

Table 2: Sewage generation and their treatment in the major cities of India (2024)

City	Sewage Generation (MLD)	Installed STP Capacity (MLD)	%Treated
Delhi	3800	2330	61%
Mumbai	2700	2000	74%
Chennai	1200	700	58%
Bengaluru	1400	1000	71%
Indore	400	350	88%
Prayagraj	468	340	72%

Source: CPCB, 2024; CEEW, 2023; PIB, 2025

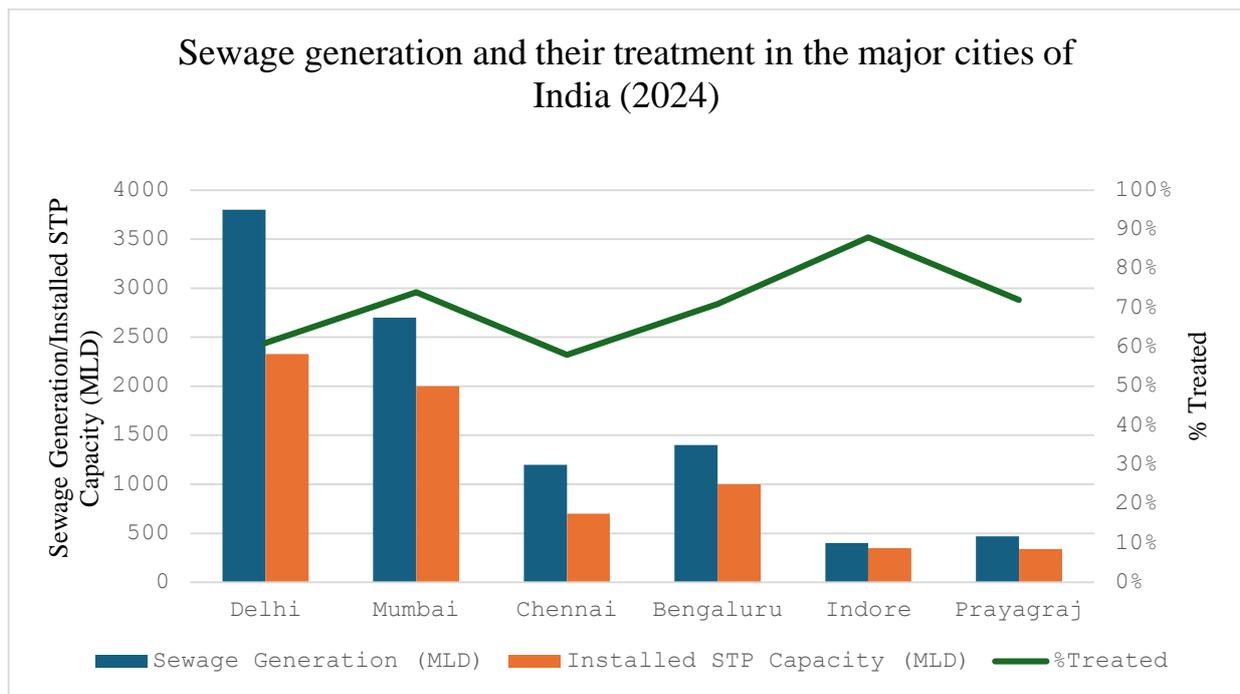


Figure: 1

At national level, class I and class II cities covers only around 30-35% of total sewage generation for treatment and rest is discharged directly into the rivers and other water bodies without any treatment which plays a significant role in health hazards and polluting water (IWP, 2023). Informal settlements and urban slums still don't have adequate sanitation facilities, proper drainage facilities, and safe ways to solid and liquid waste disposal system. The lack of comprehensive fecal sludge and septage management (FSSM) systems in smaller towns and tier-2 cities is seen as the considerable risk to public health and environmental sustainability.

Due to institutional and financial constraints regulation and management of water and sanitation in urban India is highly fragmented, with overlapping responsibilities among different authorities such as municipal bodies, state water boards, and parastatal agencies. Urban Local Bodies (ULBs) often do not have the technical capacity, financial autonomy, and human resources to plan, implement, and monitor service delivery system effectively. Funding is a main challenge for proper operations and maintenance of related infrastructure in the urban areas.

The government and responsible authorities have taken so many steps to tackle the problem related to water supply and sanitation facilities in urban areas. Flagship initiatives such as AMRUT (Atal Mission for Rejuvenation and Urban Transformation), Jal Jeevan Mission (Urban), and SBMU (Swachh Bharat Mission Urban) have contribution to expanding infrastructure facilities, capacity building, and digital monitoring system. However, the focus has largely remained on infrastructural development rather than service quality, inclusivity, and long-term sustainability. Community participation and behavior change in the people is critical for sanitation success. A significant work has been done in expanding access to water and sanitation services in urban India, but persistent disparities, service quality issues, and governance challenges hinder the achievement of SDG-6. A shift toward inclusive, efficient, and decentralized water and sanitation governance is essential to ensure sustainable outcomes for urban populations.

c. Challenges in Achieving SDG-6 in Urban India:

Inadequate Urban Water Infrastructure which includes aging pipelines is one of the main problems, leads to the significant water loss which enhance the water scarcity problems in urban areas, poor maintenance, and lack of expansion to meet growing urban demand. Uneven distribution and intermittent water supply in many cities of India such as Chennai, Bangalore, and Hyderabad. Leaking pipes and old infrastructure are causing Hyderabad to lose a lot of water, which reaches to 750 lakh liters of water per day in the city (TOI, 2025).

Table 3: None Revenue Water & Per Capita Supply in Selected Cities (2024)

City	NRW (%)	Per Capita Supply (lpcd)	Cost Recovery (%)
Mumbai	18.0	135.0	100.0
Delhi	26.4	105.7	83.9
Bengaluru	45.0	135.0	100.0
Chennai	11.0	114.0	85.0
Lucknow	26.3	162.7	96.6
Vijayawada	9.65	150.0	77.1

Source: Bandari & Sadhukhan, (2023); MoHUA, 2021

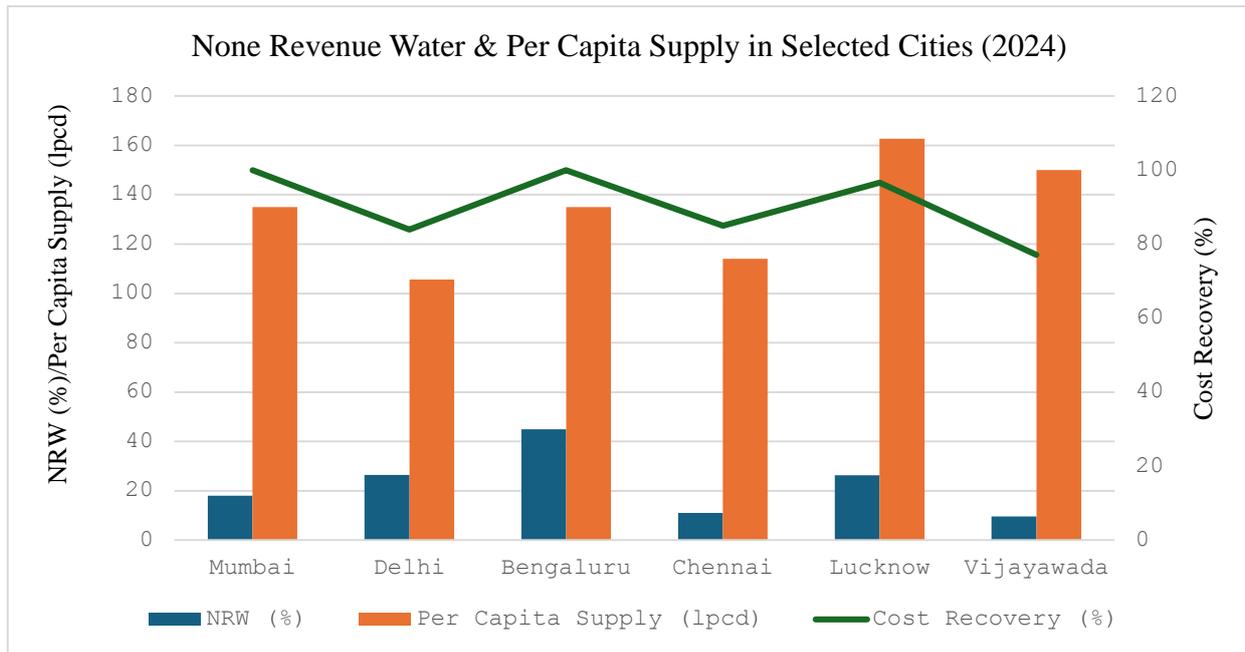


Figure: 2

Limited Access in Slums and Informal Settlements shows marginalized communities, low-income group and poor often excluded from formal water and sanitation services. Most of the slums lacks of individual household toilet facility due to lack of space and they generally depend on shared or public toilets which even do not meet the basic standard of hygiene and proper cleanliness which increases risk of diseases. In 2023, one community toilet seat was used by 86 men and 81 women, which is more than the Swachh Bharat Mission's standards, the availability of sanitation infrastructure on the basis of gender, we find that only one public toilet seat is available for women out of four toilet seats in the well-developed city like Mumbai, further data shows that in total of 6800 community toilets there are 60% which have no electricity facility and 69 % has no water supply connection (TOI, 2025).

Poor Wastewater Management and Treatment results over 60% of urban sewage is discharged untreated into the water bodies due to lack of proper sewage treatment plants (STPs) and inadequate coverage of sewer networks in the urban areas (Dasgupta, S., Agarwal, N., & Mukherjee, A. (2021). Groundwater Depletion and Over-Extraction due to over-dependence on the groundwater in the Indian cities where surface water sources are insufficient or polluted and can't be used even for daily use work such as washing, bathing and gardening purposes. Falling water tables and worsening water quality due to contamination. Water Pollution is the major problem under which rivers, ponds, and other water bodies polluted from untreated industrial effluents, domestic sewage, and solid waste in the lack of proper development of infrastructural facilities and required rules and regulations. Health risks due to waterborne diseases and lack of potable water access are the major problem.

Fragmented Institutional Framework under which there are multiple overlapping agencies at central, state, and municipal levels which have problem of proper coordination. There is lack of accountability, clearly defined roles and responsibility for urban water governance. Climate Change and Urban Water Security increased frequency of floods and droughts affects both water availability and infrastructure. Urban areas face growing water stress and unpredictability in supply. Implementation Gaps in Government Schemes, there are various schemes launched by government to provide basic amenities to the people but delays in

execution, mismanagement of funds, and lack of monitoring in schemes like AMRUT, SBM (Urban), and Jal Jeevan Mission (Urban) can't successfully mitigate the problem. Prioritize infrastructure development over enduring sustainability and behavioral transformation. These interconnected difficulties highlight the complexities of meeting SDG-6 in urban India. Addressing them requires a multifaceted approach that includes infrastructure development, institutional reform, community engagement, and sustainable urban planning.

6. Policy and Programmatic Analysis:

India has launched several policy initiatives and flagship programs over the past decade aimed at improving water supply and sanitation infrastructure in urban areas. These efforts aligned with the broader objectives of Sustainable Development Goal 6 (SDG-6). However, despite so many significant investments and institutional reforms, gaps in planning, implementation, and inclusivity remain critical hurdles. This section provides an analysis of the major policies and programs relevant to SDG-6 in urban India.

i. Swachh Bharat Mission (Urban)

Launched on 2nd October, 2014 by the Ministry of Housing and Urban Affairs, the Swachh Bharat Mission (Urban) aimed to make cities free from open defecation, improve solid waste management, and ensure access to sanitation facilities in all urban areas. Generally divided into two phases, first phase focuses on to provide toilet facilities and behavioral change to make city Open Defecation Free (ODF). As government report Indian cities have been declared 100% open defecation free (ODF) on 2nd October 2019 and the target has been achieved successfully in many regions, whereas 13.40% of Indian people has no toilet facilities and practice open defecation (Jain, A., et al., 2025). Second phase of SBM-U focuses beyond ODF to ODF+, ODF++, and making Indian cities garbage free. Achievements: Over 4,300 cities have been declared Open Defecation Free (ODF); construction of millions of household and community toilets (Indian Express, 2020). Challenges: Focus on toilet construction rather than usage; lack of sustainable O&M systems; poor sanitation in urban slums; inadequate faecal sludge management in small towns.

ii. Atal Mission for Rejuvenation and Urban Transformation (AMRUT)

Initiated on 25 June 2015, AMRUT aims to provide basic urban infrastructure in selected cities, especially water supply, drainage, green spaces, capacity building and sewerage service in 500 cities across the country, which covers around 60% of the urban population (PIB, 2025). AMRUT 2.0 was launched on 1st October 2021 for the next five years, which main objective are universal coverage of tap water supply for each household in about 4800-4900 statutory towns, including sewage coverage in 500 AMRUT cities of the country covered in the first phase of the scheme (PIB, 2022). City Water Balance Plan (CWBP) has been developed and it aims to promote the circular economy of water by recycling and reuse of treated sewage, rejuvenation of the water bodies and water conservation.

Table 4: Treated Wastewater Reuse in Major Cities (2024)

City	% Treated Wastewater Reused	Main Uses
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Delhi	19%	Groundwater recharge, Park
Chennai	49%	Industry, horticulture
Indore	30%	Industry, agriculture, parks
Hyderabad	6%	Industry, construction

Source: CEEW, 2024; CSE, 2024

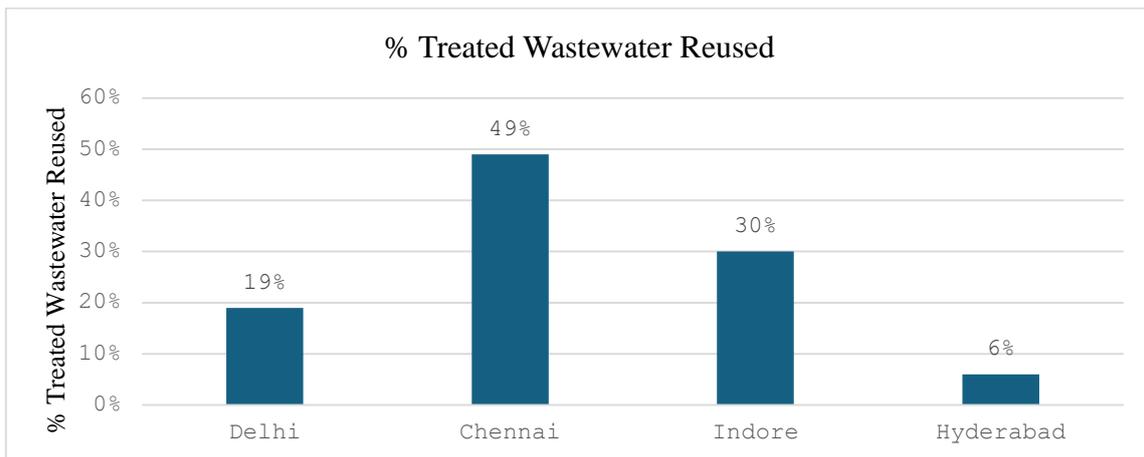


Figure: 3

Impact: AMRUT has positively impacted in the lives of women especially. Initially they spend most of their time in fetching water, but now they can save their time due to decrease in effort to fetch water and their time utilizes in more positive and productive way. The risk of water borne diseases has been decreased due to availability of safe drinking water.

Challenges: the data shows that about 200,000 people die annually in India due to lack of safe drinking water, sanitation, and hygiene, despite expending thousands of cores in implementing the scheme (EAF, 2024). If we compare from our neighboring county like China, burden of disease in India due to unsafe drinking water and sanitation is 40 times higher per person showing more have to do for improvement (The Indian Express, 2017). About 40% of the population of India has no drinking water till 2030 (PIB,2022), near about 31% of urban households no access of piped water (IWP, 2021) while 67.3% households are not connected to piped sewerage system (Jain, A., et al. 2024).

iii. Jal Jeevan Mission (Urban)

The Jal Jeevan Mission has been proposed in 2021 for a period of five years under the Housing and Urban Affairs Ministry for the universal coverage water supply to all the households in accordance with the Sustainable Development Goal-6. The key objectives of the mission are securing tap and sewer connections, rejuvenation of water bodies, and creating circular water economy. JJM-U seeks to ensure universal coverage of potable water supply in urban households through tap connections. Focus Areas of the mission is reuse of treated water, reduction in non-revenue water, and technological innovation in water supply systems. Implementation Bottlenecks: Financing constraints in ULBs, challenges in integrating water source sustainability, and poor monitoring mechanisms.

iv. National Urban Sanitation Policy (2008)

National Urban Sanitation Policy was launched in 2008 by the Ministry of Urban Development. This policy framework provided a vision for inclusive and safe sanitation in cities and towns. It introduced the concept of city sanitation plans (CSPs) and advocated the decentralized sanitation systems in urban areas. It also includes providing universal access to sanitation, promoting behavioral change, and achieving city-wide sustainable sanitation through strategies like household and community toilets and through proper waste management system. Limitations: Lack of enforceability; insufficient institutional capability at the local level to successfully execute CSPs.

v. State-Level and Local Innovations

Some states and cities, like Kerala, Hyderabad, and Indore, have tried new things like decentralized wastewater treatment, public-private partnerships, and community-led sanitation planning. India's urban water and sanitation policy landscape has drastically changed to comply with SDG-6 ambitions. However, fragmented administration, top-down implementation, underfunded ULBs, and the exclusion of informal settlements remains major concerns. There is an urgent need to transition from infrastructure-centric approaches to holistic, inclusive, and participatory forms of urban water and sanitation management.

7. Recommendations for Future Planning

To address the existing problems in achieving SDG-6 in urban India, the following strategic interventions are recommended are mentioned. To Strengthen Urban Water Governance: Establish integrated and accountable institutions to coordinate across water supply, sanitation, and wastewater sectors in the urban areas. Encourage a system of decentralization by empowering Urban Local Bodies (ULBs) with financial autonomy and technological development.

Invest in Infrastructure and Technology: Upgrade and expand old urban water supply system and sewage networks, especially in underserved slums, underdeveloped and peri-urban areas. Promote the use of smart technologies for water monitoring, leakage detection, and wastewater recycling.

Promote Inclusive and Equitable Access: Ensure targeted service delivery for vulnerable and most affected populations, including informal settlements and economically weaker sections of the society. Design gender-sensitive water and sanitation programs with special emphasis on the menstrual hygiene and their management.

Enhance Wastewater Management: Prioritize the construction and maintenance of sewage treatment plants (STPs) and decentralized wastewater systems to minimize the release of untreated sewage water into the river and other water bodies. Encourage reuse of treated wastewater in non-potable applications such as gardening, construction, and industrial cooling.

Behavioral Change and Community Participation: Launch awareness campaigns to promote water conservation, hygiene practices, and the importance of sanitation for a healthy life. Involve local communities in the planning, monitoring, and maintaining water and sanitation infrastructure through participatory models. To Ensure Sustainable Financing: Leverage public-private partnerships (PPPs), municipal bonds, and climate funds for financing urban water and sanitation projects. Implement progressive water pricing models that recover costs while ensuring affordability for the poor.

8. Conclusion:

Achieving SDG-6 in urban India is both a critical necessity and a formidable challenge. There are rapid expansions of the urban population, including infrastructural deficiencies, fragmented governance system, and existence of the socio-economic inequalities which has creates the situation of uneven availability of safe water and sanitation services in the urban areas. While various flagship schemes have been started in the last few decades such as AMRUT, Swachh Bharat Mission (Urban), and Jal Jeevan Mission (Urban) which have laid a strong foundation, their implementation has often been hindered and face challenges by institutional, financial, and technical constraints. Now there is an urgent need of shifting toward the integrated, inclusive, and sustainable urban water management system. This shifting requires not only infrastructural investment but also political will, local community engagement, and innovative governance models. With a comprehensive and equity-driven approach, India can accelerate and maintain its progress toward SDG-6 which ensures urban development on true sense with healthy and happy human.

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