

Delhi's Persistent Water Woes: Understanding Role of the Delhi Jal Board

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ABSTRACT

Water is an essential natural resource which is not only necessary for human life but also for flora and fauna. It is a known fact that scarcity of water for agriculture and the poor quality of drinking water will result in shortage of food and it will also adversely impact the human health. To make available clean and affordable drinking water and proper sanitation especially in urban areas is a gigantic task that requires appropriate policy designing, planning, sustainable management and effective implementation. Water also forms the part of Sustainable Development Goals (SDGs) 6 that state "Ensure availability and sustainable management of water and sanitation for all". The clean water supply along with providing other amenities to citizens has always remained critical in the Indian context. In Delhi, Delhi Jal Board (DJB) shoulders the responsibility of providing drinking water and sanitation. But the DJB comes across a number of issues and challenges while providing safe drinking water and sanitation which need to be addressed and resolved on an urgent basis.

Keywords: *Drinking water', 'Delhi Jal Board (DJB)', Sanitation, Urban, Planning*

INTRODUCTION

The basic human needs of food, air, water, shelter, clothing along with rights like access to and availability of education, health services, sanitation, pollution-free environment, affordable means of transportation, electricity, etc., are always at the core of governance that is both welfarist and committed to securing basic human rights for its populace. It is the most important frame that enables governments

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particularly democratic ones to reach out to their citizens and in the Indian context such amenities and services are provided by the Union, states and the local governments under the Constitutional provision of the Union, State, and the Concurrent lists respectively. Despite undertaking structural reforms in the economy, the fact remains that governmental plans and policies are still welfarist in nature. As a matter of fact, such an orientation is in sync with the goals and targets set-up under the 17th Sustainable Development Goals (SDGs).

The present paper looks into the water scenario in Delhi and the role of the Delhi Jal Board (DJB) in particular. Water as one of the most vital utility for human is also a natural resource which is used in different economic activities and sectors. It is the lifeline for generating the hydro-electricity and an input for many other industrial and economic activities. There is a potential growth for development of water resources in India, however, the progress on this front has indeed been slow. It is pertinent to mention here that under the Constitution of India water falls in the Concurrent List -included in the Entry 17 of the State List and Entry 56 of the Union List. The Entry 17 under List II of Seventh Schedule provides that "Water, that is to say, water supplies, irrigation and canals, drainage and embankments, water storage and water power subject to the provisions of Entry 56 of List I" and the provision of the Entry 56 of List I of Seventh Schedule provides that "Regulation and development of inter-State rivers and river valleys to the extent to which such regulation and development under the control of the Union is declared by Parliament by law to be expedient in the public interest"¹.

It is a known fact that scarcity of water for agriculture and the poor quality of drinking water will result in shortage of food and it will also adversely impact the human health... Yet for many of the world's poor, one of the greatest environmental threats to health remains lack of access to safe (drinking) water and sanitation. Over one billion people globally lack access to safe drinking water supplies, while 2.6 billion lack adequate sanitation; diseases related to unsafe water, sanitation and hygiene result in an estimated 1.7 million deaths every year²... contaminated water and poor sanitation are linked to transmission of diseases such as cholera, diarrhoea, dysentery, hepatitis A, typhoid, and polio. Absent, inadequate, or inappropriately managed water and sanitation services expose individuals to preventable health risks.³

The water scenario of urban areas is in contrast to the water situation in rural areas. Potable water is one of the major issues in rural areas while urban areas have their own issues like that of supply and demand. The focus of this paper is on water scenario in urban areas. Water as one of the basic need along with housing, electricity etc. for the mounting

population in urban areas puts tremendous pressure on the existing urban resources. Most of the cities' local bodies have found it difficult to manage and provide these amenities or to a great extent failed to meet the demands, resulting in large gaps in provisioning of basic amenities like safe drinking water, sanitation, electricity and healthy living environment. The access to basic sanitation, drinking water and health services by the people living in slums is significantly worse off than the rest of the urban population although they squatter in the vicinity of the planned localities and form the part of the urban population.

In India, the present developmental strategies are entailed under a three-year action plan, which is also part of a seven-year strategy paper and a 15-year vision document. The vision document cannot disregard the development strategies that were identified and adopted in the erstwhile Twelfth Five-Year Plan (2012-17). The Twelfth Plan document has dedicated a chapter on water and it is mentioned that the Indian economy and society face daunting challenges in the water sector. The demands of a rapidly industrialising economy and urbanising society come at a time when the potential for augmenting supply is limited, water tables are falling and water quality issues have increasingly come to the fore. As we drill deeper for water, our groundwater gets contaminated with fluoride and arsenic. Both our rivers and our groundwater are polluted by untreated effluents and sewage is continued to be dumped into them. Climate change poses fresh challenges with its impacts on the hydrologic cycle. More extreme rates of precipitation and evapo-transpiration will exacerbate impacts of floods and droughts. It is no wonder then that conflicts across competing uses and users of water are growing by the day. Meanwhile, water use efficiency in agriculture, which consumes around 80 per cent of our water resources is only around 38 per cent, which compares poorly with 45 per cent in Malaysia and Morocco and 50-60 per cent in Israel, Japan, China and Taiwan. Sanitation and clean drinking water are critical determinants of health and are complementary to each other. Without proper sanitation, the incidence of diarrhoeal diseases due to contaminated drinking water will not come down, and without adequate water supply, improved sanitation is generally not possible. It is, therefore, necessary to adopt a habitation approach to sanitation and to institutionalize the integration of water supply with sanitation in each habitation. The problem of sanitation in urban areas is also very serious since almost all our cities, including even the State capitals and major metros, have a large percentage of the population (45 per cent in Delhi) not connected to the sewer system. Urban development must give top priority to planning for water, toilets and sewerage as an integrated whole taking into account the likely expansion of the urban population.⁴

Demographic and Water Scenario of Delhi

Delhi is a mega-city which attracts migratory population from rural and urban areas as well as the demographic characteristics of Delhi also have the feature of the floating population. As per the Census 2011 in the nine districts of Delhi there are 3,435,999 number of households in which reside 16,787,941 number of persons with the average of five persons per household (Table 1).

The population residing in the nine districts of Delhi have access to water from different sources like tap-water from treated source, tap-water from un-treated source, covered well, un-covered well, hand-pump, tube-well/borehole, spring, river/canal, and tank/pond/lake. The highest percentage of tap-water from treated sources are in Central district (93.1) and around three per cent of households of North and North West districts each gets water from tank/pond/lake. No household in the nine districts of Delhi gets water from spring and river/canal. In all the nine districts, except for North and North West districts, more than 75 per cent of the households have water source within the premises. In Central district 7.7 per cent, in North district 18.6 per cent, in South district 16.8 per cent, in East district eight per cent, in North East district 17.3 per cent, in South West district 13.3 per cent, in New Delhi district 13.8 per cent, in North West district 19.3 per cent and in West district 14.7 per cent households have water sources near premises. And in all the nine districts some percentage of households have water sources away from the premises. Like, in Central district 0.6 per cent, in North district 6.8 per cent, in South district 7.0 per cent, in East district 1.2 per cent, in North East district 5.9 per cent, in South West district six per cent, in New Delhi district 7.2 per cent, in North West district 9.9 per cent and in West district 4.7% households have water sources away from the premises (Table 2.1 and 2.2).

The basic needs of domestic use of water are for drinking, cooking, bathing, washing utensils and clothes. These needs are separated from inevitable use of water for toilet flushing, sewer flushing, water for lawns and gardening, etc. The Union Ministry of Housing and Urban Affairs has fixed the standard for availability/use of water for various basic human needs as shown in Table 3.

Likewise, the National Commission on Urbanization has also suggested minimum norms for use of water. According to the Commission, even in the worst drought conditions and even in the poorest colonies, at least 70 liters of water must be delivered per day to sustain the human life at a minimum standard of hygiene (Table 4).

TABLE 1: POPULATION OF DELHI (CENSUS 2011)

State/district	Area (sq km)	Number of households	Population			Average no. of persons per household
			Persons	Males	Females	
North West	443	736,253	3,656,539	1,960,922	1,695,617	5.0
North	61	180,044	887,978	475,002	412,976	4.9
North East	62	406,125	2,241,624	1,188,425	1,053,199	5.5
East	63	358,937	1,709,346	907,500	801,846	4.8
New Delhi	35	33,208	142,004	77,942	64,062	4.3
Central	21	119,639	582,320	307,821	274,499	4.9
West	130	533,221	2,543,243	1,356,240	1,187,003	4.8
South West	421	494,439	2,292,958	1,246,046	1,046,912	4.6
South	247	574,133	2,731,929	1,467,428	1,264,501	4.8
NCT of Delhi	1,483	3,435,999	16,787,941	8,987,326	7,800,615	4.9

Source: Census of India, 2011. Available at: https://censusindia.gov.in/2011census/PCA/PCA_Highlights/pca_highlights_file/Delhi/DATA_SHEET_PCA_DISTRICTS_NCT_OF_DELHI.pdf

TABLE 2.1: MAIN SOURCE OF DRINKING WATER IN NINE DISTRICTS (IN PER CENT)

Main Source of Drinking Water	Districts								
	Central	North	South	East	North East	South West	New Delhi	North West	West
Tap-water from treated source	93.1	77.3	60.1	91.8	76.6	68.1	91.1	73.1	82.3
Tap-water from un-treated source	3	4.5	10.9	2.4	5.1	7.6	4.2	6.1	4.6
Covered well	0.1	0.1	0.1	0	0	0.1	0.1	0.1	0
Un-covered well	0	0.1	0	0	0	0	0	0	0
Hand-pump	1.2	6.8	6.7	1.5	11.6	2.1	2.2	6.2	4.1
Tube-well/Borehole	2.5	1.3	19	3.5	5.7	15.4	1.3	4.2	6.2
Spring	0	0	0	0	0	0	0	0	0
River/Canal	0	0	0	0	0	0	0	0	0
Tank/Pond/Lake	0	2.9	0.8	0.3	0.4	1.4	0.9	2.7	0.5
Other sources	0.2	6.9	2.3	0.5	0.6	5.3	0.2	7.6	2.3

Source: Census of India 2011. Available at: https://censusindia.gov.in/2011census/HILO/HL_PCA/Houselisting-housing-Delhi.html

TABLE 2.2: LOCATION OF SOURCE OF DRINKING WATER

Location of drinking water	Districts								
	Central	North	South	East	North East	South West	New Delhi	North West	West
Within premises	91.7	74.7	76.1	90.8	76.8	80.7	79	70.8	80.7
Near premises	7.7	18.6	16.8	8	17.3	13.3	13.8	19.3	14.7
Away	0.6	6.8	7	1.2	5.9	6	7.2	9.9	4.7

Source: Census of India 2011. Available at: https://censusindia.gov.in/2011census/HILO/HL_PCA/Houselisting-housing-Delhi.html

TABLE 3: NORMS FOR USE OF WATER FOR DOMESTIC PURPOSE

<i>Purpose</i>	<i>Rural Areas (litres/ capita / day or lpcd)</i>	<i>Urban Areas (lpcd)</i>
Drinking water	5	5
Cooking	3	5
Ablution	6	-
Bathing	15	55
Washing of utensils, clothes & household	11	45
Flushing of toilets/ sewer	-	30
Total Basic Water Requirement (BWR)	40	140

Source: http://117.252.14.242/rbis/india_information/drinking.htm

TABLE 4: RECOMMENDED NORMS FOR WATER SUPPLY

<i>Population</i>	<i>Recommended water supply norm (lpcd)</i>
Less than 20,000	
a. Population served by stand posts	40
b. Population provided with pipe connections	70
20,000 to Less than 100,000	100
100,000 to Less than 1,000,000	100 (with no sewerage system) 135 (with sewerage system)
1,000,000 and above	150
Rural and hills (per elevation difference of 100 m)	40 or one hand-pump for 250 persons within a walking distance of 1.6 km
Rural - additional water for cattle in Desert Development Programme (DDP) areas.	30

Source: http://117.252.14.242/rbis/india_information/drinking.htm

Delhi Jal Board (DJB)

The clean water supply along with providing other amenities to citizens has always remained critical in the Indian context. The increased urbanisation which is a sign of development always poses problems for water management since urban population needs to be serviced with piped water systems available on a 24 × 7 basis and these systems should be accompanied by sewerage systems, which ensure that only cleaned water is returned to rivers or other disposal sites. At present, not a single city in India is in a position to boast of a complete sewerage system. In

India, governments have been able to get treated only 30 per cent of the human waste. Just two cities, Delhi and Mumbai, which generate around 17 per cent of the country's urban sewage, have nearly 40 per cent of the country's installed capacity⁵. As in the case of the metropolis Delhi, the total water requirement is 800 million gallons per day (MGD). Delhi, which is situated on the banks of the Yamuna, gets scarcely 25 per cent of its needs from the river. The balance needs of water are met by releases from Bhakra Dam and Ramganga Dam. This is in addition to a number of tube-wells, which contribute less than 10 per cent of Delhi's water supply. In 2004, only the water supply of 640 MGD was being treated at the water treatment plants of the DJB. A new plant has been constructed at Sonia Vihar with a capacity of 140 MGD and raw water for this plant is to come from the Tehri dam in Uttarakhand via the Upper Ganga Canal (till Muradnagar in UP and then through a 30-km 3,250 mm diameter conduit). Noteworthy feature of this scheme is that the contract for building and operating this plant for 10 years has been given to a private company on the model of Public Private Partnership (PPP).⁶

The development activities and the civic amenities in Delhi are provided by multiple civic agencies and authorities like Delhi Development Authority (DDA), New Delhi Municipal Council (NDMC), Municipal Corporation of Delhi (MCD) and the Cantonment Board along with the DJB which is engaged in the collection, treatment and distribution of water and sanitation of the National Capital Territory of Delhi (NCTD).

Delhi Jal Board was established by the Delhi Water Board Act, 1998 to cater to the need of water in Delhi with the mission of production and distribution of drinking water along with collection, treatment and disposal of domestic sewage in the capital. The Board is supplying filtered water to more than 1.6 lakhs persons of Delhi while ensuring average availability of 50 gallons per capita per day of the same through an efficient network of water treatment plants, booster pumping stations and about 9000 kilometer of water mains and distribution system. The sources of water that the DJB collects are from Yamuna, Bhakhra storage, upper Ganga Canal and the ground water. DJB being engaged in water supply and sanitation, provides bulk water to NDMC and Cantonment Board and collects waste water for treatment and disposal from these areas.

The broad services provided by the DJB are:

1. Supply of potable drinking water;
2. Supply of portable water through tankers whenever needed;

Supply of packaged water, "JAL", in jars through Jal Suvidha Kendras.* "JAL" certified by the Bureau of Indian standards is put through stringent purification techniques to ensure that the consumers are provided with a hygienic and quality product.⁸

3. Treatment and disposal of sewage;
4. Supply of Biogas/ Sludge Manure/ treated waste water;
5. Testing of water samples; and
6. Technical support for installation of Rain Water Harvesting System through Rain Centres and divisional office.⁷

These services of the Board are in accordance with the Act of 1998 which defines some of the main functions of the Board as—to treat, supply and distribute water for household consumption or other purposes through pipes or by any other means; plan, regulate and manage the exploitation of ground water in consultation with different agencies and promote measures for conservation, recycling and reuse of water; if desired by the government or the Central government, take over and carry out any function related to management and regulation of sewerage or drains of any area of Delhi for better sanitation environment.⁹

The DJB is also active in the field of water conservation. It has constructed three upstream storages on the River Yamuna and its tributaries in time-bound manner are of utmost importance to meet drinking water requirements of Delhi and to reduce dependence on ground water to a great extent. These three projects are namely, Renukaji, Kishau and Lakhwar and Vyasi Dams which have been declared as the National Projects. The ground water extraction in Delhi has been regulated in 2010 by Department of Environment & Forest and Wildlife, Government of National Capital territory of Delhi (GNCTD) under the Environment Protection Act (EPA) 1986 as amended from time-to-time. As per the regulations, prior permission is required to be taken for extraction of ground water from the bore wells and the same is given subject to provision for rain water harvesting, and recycling of waste water for use in horticulture and flushing purposes, etc., in terms of the aforesaid notification. The rain water harvesting has also been promoted by the DJB as 318 installations have this system. There is a dedicated Rain Water Harvesting (RWH) cell in DJB which is

*DJB launched the project of processed packaged drinking water with the brand name "JAL" to make available purified drinking water in 20 Liters jars and cartons of disposable glasses containing (24 x 250 ml) glasses to serve the residents of Delhi.

providing technical assistance to facilitate the public in implementation of Rain Water Harvesting system. More than 240 installations of DJB and Delhi Government buildings has been identified by DJB for implementing RWH. DJB also provides 10 per cent rebate in water bills of its consumers on plots size of 100 square meters and above and penalty is levied in water bills of its consumers on plot size of 500 square meters or more, who do not implement RWH systems and water bills are increased by 1.5 times.¹⁰

The water supply by the DJB is well under the quality assurance measures right from the raw water stage till it reaches at the individual households and the water which is made available from tube-wells and wells, is also tested regularly. DJB maintains periodic data in this regard, by way of collecting and analysing of water from different water supply sources along with preparation of daily water production report so that safe water reaches to every individual. The Board has the responsibility of water supply and sanitation to the citizens of Delhi with legal safeguards provided under the Act of 1998 along with administrative set-up and budgetary provision for service delivery.

But the National Sample Survey Office (NSSO) in a nation-wide survey in 2018 on 'Drinking Water, Sanitation and Housing Condition', found that households in Delhi as in other States and UTs use different methods for treatment of drinking water like electric purifier, boiling, chemically treated with alum, chemically treated with bleach/chlorine tablets, non-electric purifier and filtered water with cloth as they may not be getting satisfactory quality of the drinking water supplied by the Board even though DJB, further confirmed water quality through third party agency namely, National Environmental Engineering Research Institute (NEERI), Ministry of Science & Technology, Government of India annually and take further action accordingly to maintain water quality at every stage as per norms.¹¹ Table 5.1 shows that out of the total households in Delhi, 36.5 per cent of the households treat water with electric purifiers and which is much higher than the value for All-India. Around 48 per cent of the households in Delhi use one or other method for treatment of drinking water. And when it comes to no treatment of drinking water, around 52 per cent of the households in Delhi do not treat water and 65.3 per cent is the value for All-India. Likewise, in Delhi, 22.2 per cent of the total households do not get sufficient drinking water throughout the year and they are dependent on alternate sources of drinking water like bottled water, piped water, public tap/stand pipe, tube well, tanker truck, spring, rain water collection etc. (Table 5.2).

TABLE 5.1: PERCENTAGE DISTRIBUTION OF HOUSEHOLDS BY METHOD OF TREATMENT OF DRINKING WATER IN DELHI

<i>Method of treatment of drinking water</i>	<i>Delhi</i>	<i>All-India</i>
Electric purifier	36.5	8.7
Boiling	3.8	7.7
Chemically treated with alum	0	0.4
Chemically treated with bleach/chlorine tablets	0.3	1
Non-electric purifier	7.4	3.5
Filtered with cloth	0.1	11.7
Others	0.1	1.7
Not treated	51.9	65.3
All	100	100

Source: Drinking Water, Sanitation, Hygiene and Housing Condition in India. NSS Report No. 584, page 83.

TABLE 5.2: PERCENTAGE OF HOUSEHOLDS NOT GETTING SUFFICIENT DRINKING WATER THROUGHOUT THE YEAR FROM PRINCIPAL SOURCE OF DRINKING WATER

<i>Source of Drinking Water</i>	<i>Delhi</i>	<i>All-India</i>
bottled water	15.2	1.4
pipd water into dwelling unit	20.5	11.5
pipd water to yard/plot	44.9	12.2
pipd water from neighbours	36.3	15.9
public tap/stand pipe	37.9	17.1
Tube-well	1.7	8
hand pump	21.8	9.3
well (protected)	0	19.3
well (unprotected)	0	22.3
tanker truck (public)	35.4	19.3
tanker truck (private)	27	9.5
spring (protected)	0	15.8
spring (unprotected)	0	33.1
rain water collection	0	63
surface water (tank/pond)	0	30.4
surface water (other surface water)	0	25.1
Others	66.7	22.8
All	22.2	11.3

Source: Drinking Water, Sanitation, Hygiene and Housing Condition in India. NSS Report No. 584, page 74.

The functioning of DJB has been also mentioned in the *Economic Survey of Delhi* for 2019-20 and which states that about 83.42 per cent households now have access to piped water supply. Water production

during summer season is being maintained at 921 MGD consistently. Water is supplied to about 18 million population of Delhi through existing water supply network comprising of 14,697 km long pipelines and more than 110 Underground Reservoirs (UGRs). Besides, a total of 407 new water tankers with stainless steel containers fitted with GPS have been engaged in improving the water tanker supply delivery system in the city. Apart from approximately 450 M.S hired tankers, 250 newly purchased SS tankers are being added to the existing fleet to supplement water supply in water deficit areas of Delhi.¹² Simultaneously, the *NSS Report on Drinking Water, Sanitation, Hygiene and Housing Condition in India, 2018* found that in Delhi, residents of around 5,193 number of households are fetching drinking water from outside premises and the average time taken in a single trip to fetch drinking water from principal source is 19.6 minutes (at the All-India level it takes 12.3 minutes) and the average waiting time required in a single trip at the principal source of drinking water is 10.8 minutes (at the All-India level it takes 5.1 minutes) (Table 6).

TABLE 6: PERCENTAGE OF TIME SPENT ON FETCHING DRINKING WATER FROM PRINCIPAL SOURCE LOCATED OUTSIDE PREMISES

<i>Percentage distribution of households by category of person fetching drinking water</i>	<i>Delhi</i>	<i>All- India</i>
Male- age below 18 years	4.6	2
Male- age 18 years and more	38.6	22.1
Female- age below 18 years	5.4	2.5
Female- age 18 years and more	32.7	69.2
Hired labour	0	1.5
Others	18.6	2.7
All	100	100
Average time taken in a single trip to fetch drinking water from principal source in minutes	19.6	12.3
Average waiting time required in a single trip at the principal source of drinking water in minutes	10.8	5.1
Number of households fetching drinking water from outside premises- Estd.(00)	5193	921579

Source: Drinking Water, Sanitation, Hygiene and Housing Condition in India. NSS Report No. 584. 2018. Table 13.

Issues and Challenges

There are number of issues and challenges with respect to providing safe drinking water and sanitation that are not only relevant for DJB

and Delhi and or any other city but for the urban and rural areas of the country. At the global level, UN have observed and identified that there is a serious lack of institutional and human capacity across the water sector which is constraining progress, particularly in developing countries. These issues and challenges has also been well identified even in the Twelfth Plan document. Like, the growth of cities and industries is inevitable and this growth has massive implications on the use of water and sewage system. In most of the industrialised countries, water use is primarily in the industrial as well as urban areas and the demand from these sectors is also bound to grow in India. This necessitates a 're-allocation' of water from agriculture to industrial/urban use. Unless this is managed in an equitable manner, it is likely to lead to conflict with traditional users in rural areas, especially by the farmers. Such tensions are already in evidence in certain parts of the country. Indian cities and industries will have to reinvent their water trajectory to both secure the water they need and do so in a way that minimises the scope for conflict. Indian cities and industries need to find ways to grow with minimal water and minimal waste.¹³

The urbanisation has led to attract poor people from villages and small towns who reside in slums and unauthorised colonies which are not connected to the city sewage system. Hence, in such a condition it is critical to invest in sewage systems, and equally more critical to invest in building affordable and scalable sewage networks, which require a fresh look at the current technology for sewage and its treatment along with providing accessible and affordable education and health facilities to these people.

In the context of clean water supply, data has been identified as a base for effective policy intervention. The present system of estimating demand and supply of water in cities is rudimentary and leads to poor accounting and poorer planning. Indian cities compute demand by simply multiplying the population (as known) by an estimate of water demand per capita (as understood). This leads to huge variations between cities in terms of how much water needs to be supplied. The guidelines provided by the Central Public Health and Environmental Engineering Organisation (CPHEEO) are used at times by city planners, but these often fail to provide clarity about how much water is needed. For instance, the guidelines differentiate between cities with and without sewerage (70 lpcd to without and 135 lpcd to cities with sewerage system). But these do not indicate how much area must be under a sewerage system before a city qualifies for higher water norms. The guidelines are also not precise – cities could provide additional water to hospitals, schools, airports and institutions which require water in

'considerable quantities'. Also, for example, there is no official accounts for the excreta we generate or the excreta we treat or do not treat. The fact is that we have no way of really estimating the load of sewage in our cities, because of the different ways in which people source water and the different ways in which people dispose sewage. Currently, sewage is measured in the most rudimentary ways: we assume that 80 per cent of the water officially supplied by municipalities is returned as sewage. The collection of data is divided between different departments and agencies. The agencies responsible for collection of the 'physical data' (to use precipitation and stream gauging as examples) are administered by differing Ministries, while the user data come under such diverse classifications as public health and sanitation, irrigation and urban planning. There is a consequential absence of a coherent and internally consistent conceptual framework and protocols for data collection and validation.¹⁴

In Delhi, although DJB maintains periodic quality assurance data by preparing daily water production report right from the raw water stage till it reaches safely at the individual household level, there is no maintenance of data for assessment of requirement of water. As per the *Handbook on Service Level Benchmarking* issued by the Ministry of Urban Development, the data relating to the per capita quantum of water supplied and household level coverage of direct water supply connections serve as performance indicators of water supply services in the city. Thus, for projecting realistic water requirement of a locality, DJB should have locality-wise data on population, availability of water and its per capita consumption. For supplying water in five zones under the Project - Water Tanker Supply Service (WTSS), DJB awarded five contracts (between August and September 2012) for 10 years. As per the agreements, contractors were to provide 130 tankers of 3,000 litre capacity and 255 tankers of 9,000 litre capacity. The requirement for water tankers was initially assessed at the time of awarding of contract. The DJB, however, did not have locality-wise data on actual quantum of water required and supplied to the consumers to project a realistic requirement and regulate allocation of water through tankers.¹⁵

Likewise, the public health implications of unclean water are enormous and unacceptable. It is unacceptable that diarrhoea and other water-borne diseases are one of the most common causes of death among children under age five. The State is focused on the need to invest in water and waste management in human settlements based on a strategy that is both affordable and sustainable.¹⁶

In 2016, the Comptroller and Audit General (CAG) in 2016 with the primary objective to evaluate the functioning of the DJB and to appraise

implementation of different projects in DJB and to assess whether conceptualization and the planning of projects were need based and according to priorities set in long term/master plan; awarding and execution of projects were in accordance with extant rules; whether financial management was efficient; whether the completed projects served the intended purpose; and whether the effective internal control and monitoring mechanism existed in the DJB, found that-

- The capacity utilisation of Sewage Treatment Plants (STPs) was only 66 per cent due to lack of adequate conveyance systems to bring sewage from command areas to the STPs.
- Water treatment plants and allied infrastructure for 150 million of Gallons per day (MGD) were developed at Dwarka, Bawana and Okhla without ensuring availability of the raw water.
- The penalty was withheld for delay in execution of 12 works by contractors was short by Rs 104.20 crore.
- A contractor for one of the work was allowed to change the technology from confined trench to micro-tunnelling method for laying sewer line that resulted in avoidable expenditure of Rs 15.33 crore.
- There were delays in execution of work in 44 out of 53 works ranging from five to 85 months.¹⁷

CONCLUSION

The DJB to provide the supply of water and proper sanitation conditions in Delhi and to meet the increasing demand of water with the concept of quality, should ensure that there is not any political interference at the decision-making, designing of the tariff structure and the financial matter. The *UN Synthesis Report on Water and Sanitation 2018* states that Improving water quality can increase water availability and worsening water pollution must be tackled at source and treated to protect public health and the environment and to increase water availability.¹⁸ At the management level there should not be delay in the implementation of the projects of the DJB, there should be intra and inter-agencies/department coordination with proper monitoring mechanism of the implemented projects.

DJB and other water supply agencies must ensure that for proportion of waste water treated safely, there is a need to enhance monitoring of key parameters of effluent standards that go beyond environmental parameters and address public health; address exposure risks associated

with reuse of waste-water. And to encourage participation of local communities in water and sanitation management, there is a need to define indicators to monitor the extent of participation of communities and to ensure that the participation is effective and all service users have a 'voice.'¹⁹

There should be focus on exploration for the participation of the private sector in improving the water supply and sewage collection not in Delhi but also in other cities as it will significantly help in cost reduction of the local bodies. As waste-water treatment is one of the most expensive component of the water supply, the participation of the private sector will not only lower the financial burden but also help in preventing water from entering in rivers. And last but not the least the different development and civic agencies in Delhi should develop a single integrated plan to meet the water demands of the thirsty Delhi.

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