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URBAN WATER SUPPLY IN INDIA

Policy Paradigms and Institutional Priorities

WATER SEEKERS' FELLOWSHIP | 2020

Jitendra Bisht
Neymat Chadha

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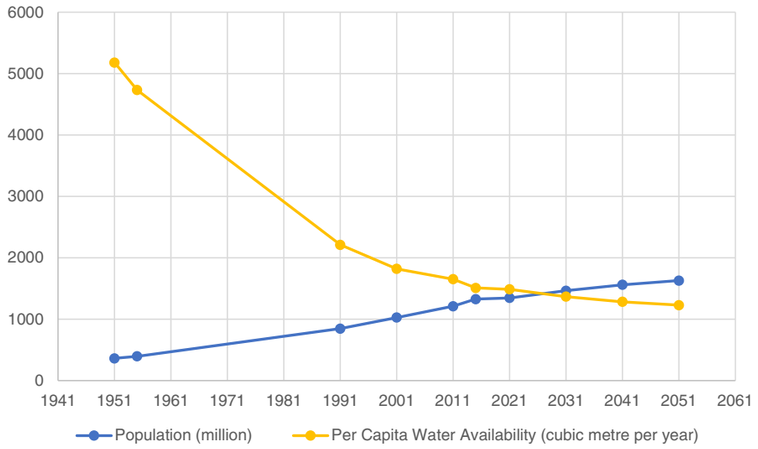
Context

Over the last two censuses, India's urban population grew to over 31% of the total population registering an annual growth rate of 2.7%. Estimates suggest that while a third of the country's population currently live in urban areas, by 2050 this number could go up to 814 million, or 50% of the projected total population of 1.6 billion (Bhagat 2014: 4). Over time, India has become a water stressed[1] country, with the per capita water availability steadily decreasing since 1951 (Figure 1). The government's premier policy think tank, NITI Aayog, has also noted that over 600 million people, i.e. almost half the country's population, face high to extreme water stress (NITI Aayog 2018: 15). With the urban population increasing, the share of urban water demand is expected to grow drastically.

Fig. 1: Per capita water availability in India vs Population



Source: Central Water Commission [CWC] 2019a: 3

[1] Less than 1700 cubic metres of per capita water availability is categorised as a water-stressed condition under the Falkenmark Water Stress Indicator. Less than 1000 cubic metres indicates water scarcity.

Location: Chennai

Photo by *Palani Kumar and Steevez Rodriguez* / PEP Collective

Much of the recent literature on urban water management in India refers to the premise illustrated in Figure 1 where a rapidly increasing urban population is going to put immense pressure on its water resources (Aartsen et al., 2018; Bassi and Kumar 2012; Gupta et al., 2012; Punjabi and Johnson 2018; Shah 2016; Shah et al., 2016; Shah and Kulkarni 2015; Wankhade et al. 2014). Studies on urban water management that employ a Malthusian lens place population as the key element behind increasing demand and competition for available water resources across urban areas.

Thus, a general shift towards demand management can be increasingly noticed in policy frameworks. The Urban Water Policy framework, launched in 2019 by the Ministry of Housing and Urban Affairs [MoHUA] and National Institute of Urban Affairs [NIUA], on the one hand emphasises the need to address multiple supply-side issues such as "adequacy and frequency of water supply, affordability and pricing, water quality and institutional sustainability of water utilities" (MoHUA-NIUA 2019). On the other hand, it also calls for a paradigm shift towards "demand management and reducing the wastewater footprint of cities".

Apart from reducing the wastewater footprint of cities, the stated vision of the document is to manage water demand. This vision indicates the primacy accorded to water demand in urban water management measures.

It further iterates that there are "limits to the extent of supply side solutions to meet the growing demand for water supply to urban India" (ibid). This policy brief seeks to understand the severity and main source of demand-side issues in water management, as well as some extant issues on the supply side. It further explores the state of monitoring urban water supply as well as the financial woes of urban local bodies (ULBs).

People anxiously fetching water from a water tanker.

Photo by *Palani Kumar and Steevez Rodriguez* / PEP Collective

THE LOGIC OF DEMAND MANAGEMENT

Urban Water Supply: Some Facts

A general trend in water supply across Indian cities is that affluent areas have an adequate and frequent piped water supply. In contrast, impoverished neighbourhoods have dysfunctional or no distribution networks. According to the World Bank (n.d.), 35.2% of the country's urban population lived in slums in 2018. With 1/3rd of urbanites living in slums, urban water supply is inequitably distributed across the city. For instance, 92% of Delhi's water supply caters to 20% of the population, while the remaining 80% depend on 8% of the city's water (Ahmed and Araral 2019: 2). Similarly, estimates suggest that 54% of Mumbai's population lives in slums and receives approximately 5% of the total water supply (Wankhade et al., 2014: 6).

As per the NITI Aayog's (2019) Composite Water Management Index [CWMI] report, the median and mean scores for the theme "urban water supply and sanitation" have remained close to the scores for the base year 2015-16, indicating no significant progress under the theme over the last three years. The index also reports that the indicator for access to drinking water among the urban population has a median score of 83%, demonstrating that much of the urban population has access to potable water in most states. However, some states such as Rajasthan and Bihar have appalling figures on the indicator, where less than 50% of the urban population has access to drinking water supply (NITI Aayog 2019). Among Himalayan states, Nagaland and Assam report only 22% and 19% of their urban population having such access.

Although, Household-level data from the National Sample Survey Office's [NSSO] 76th round survey conducted in 2018 reveals a clearer picture. According to the survey, the

primary source of drinking water for around 40.9% of urban households is a piped water supply to their dwelling, indicating that close to 60% of urban households rely on sources like bottled water, community taps, handpumps, tube wells, etc., as their primary source of drinking water (National Statistical Office 2019).

Additionally, the average per capita supply across cities is around 70 litres per capita per day [lpcd] (Ministry of Urban Development [MoUD] 2012: 12) as against a service level benchmark [SLB] average of 135 lpcd according to the Central Public Health and Environmental Engineering Organisation [CPHEEO] (see Table 1 below). Supply leakages are also high across cities. Estimates suggest that public supply networks in Indian cities lose between 25-50% water during distribution itself (IIHS 2014: 9; MoUD 2012: 12; Shah 2016: 37).

Table 1: CPHEEO recommendations for urban water allocation

S.No.	Classification of towns/cities	Recommended maximum water supply (lpcd)
1	Towns with piped water supply but without sewerage system existing/ planned	70 + 15% for leakage
2	Cities with piped water supply where sewerage system exists/planned	135 + 15% for leakage
3	Metropolitan and megacities with piped water supply where sewerage systems exist	150 + 15% for leakage

Source: CPHEEO 1999

As per the CWMI, the median score for urban wastewater treatment capacity stood at 52% (NITI Aayog 2019). However, at least nine states out of 27 have less than 20% of urban wastewater treatment capacity. Wastewater management is intimately linked to urban water supply, given the amount of untreated wastewater[2] that flows into freshwater sources in India. Untreated wastewater not only reduces the overall utility of freshwater but also contributes to almost 2 lakh deaths annually (ibid). While wastewater treatment capacity across states is inadequate, it is utilised even less. CWMI data reveals that only 33% of states that claimed to have the capacity to treat 50% or more of their wastewater actually used the installed treatment capacity. In 12 out of 27 states, the proportion of wastewater treated was less than 50%, with Bihar, Odisha, Kerala, Chhattisgarh, Tripura and Uttarakhand being the worst performers (ibid).

[2] As per estimates by the Central Pollution Control Board, almost 60% of wastewater flows untreated into freshwater sources in India.

A Metro water tanker is filled with water in a Metro water pumping station: They are the only lifeline for the citizens of Chennai. They make multiple trips through the day filling at metro stations and distributing them across various places.

Photo by *Palani Kumar and Steevez Rodriguez* / PEP Collective

A major consequence of poor water supply systems in urban areas is the increasing dependence on groundwater, especially through individual borewells. Groundwater is essentially the property of the owner of a particular piece of land under the Easements Act 1882. It has become the go-to option for households facing water distress, due to the absence of sufficient municipal water supply.

The Mihir Shah Committee's report on water management notes that 56% of metropolitan, class-1 and class-2 cities in India are dependent on groundwater either fully or partially (Shah et al., 2016). According to the Central Groundwater Board [CGWB], groundwater contributes to at least 45% of urban water supply (CGWB 2019: 1). It is important to note that out of 1122 billion cubic metres (bcm) of usable water resources in India only 432 bcm is groundwater while 690 bcm is surface water (CWC 2019b: 3).

On account of having more paved surfaces and high deforestation, urban areas generally have high surface runoff. This leads to decreased groundwater recharge as well as flooding during rains. This predisposition, in tandem with the unregulated nature of groundwater use and inefficient water supply systems drive the increasingly higher rates of groundwater extraction in cities like Delhi and Bengaluru, among others.

Drilling a bore-well and trying to locate the water table: The ground water table is also dry in most parts of the city (Chennai).
Thus the probability of getting water in the bore-wells is low in many areas.

Photo by *Palani Kumar and Steevez Rodriguez* / PEP Collective

Rural Water Demand

Table 2 below shows water demand in India across major sectors. Notably, irrigation accounted for around 85% of the country's total water demand in 2010 as per the estimates of the standing subcommittee of the Ministry of Jal Shakti. The committee's projections for 2050 indicate that irrigation related demand will decrease marginally to 74% of the total water demand. The report of the National Commission on Integrated Water Resources Development [NCIWRD] also show similar demand projections.

Table 2: Projected water demand across sectors (in billion cubic metre or bcm)

Sector	Standing Sub-committee of MoJS			NCIWRD					
	2010	2025	2050	2010		2025		2050	
				Low	High	Low	High	Low	High
Irrigation	688	910	1072	543	557	561	611	628	807
Drinking Water	56	73	102	42	43	55	62	90	111
Industry	12	23	6	37	37	67	67	81	81
Energy	5	15	130	18	19	31	33	63	70
Other	52	72	8	54	54	70	70	111	111
Total	**813**	**1093**	**1447**	**694**	**710**	**784**	**843**	**973**	**1180**

Source: CWC 2019b: 121

In India, water demand estimations have conventionally been done for sectoral usage, as shown in the table above, not across the rural-urban typology. Even so, one can see that irrigation is a distinct need in rural regions and accounts for a majority of India's water demand. Though available only in 49% of cultivated area, irrigation agriculture is a major cause behind freshwater withdrawal in the country (Gulati et al., 2019). Around 2/3rds of water for irrigation comes from groundwater, while 23% comes from canals (ibid). The high dependency that irrigation has on groundwater is worsened by inefficient usage of water during agricultural activities. As shown in Table 3 below, the average amount of water required to grow major crops like rice, wheat, sugarcane, and cotton in India is significantly higher than in countries like China and the US. Out of these, water-guzzlers like rice and sugarcane consume over 60% of the water available for irrigation (Sharma et al., 2018).

Table 3: Efficiency of water use in agriculture across select countries

Crop	Average water needed in cubic metre/tonne			
	Brazil	India	China	US
Sugarcane	155	159	117	103
Wheat	1616	1654	690	849
Cotton	2777	8264	1419	2535
Rice	3082	2800	1321	1275

Source: Suhag (2016: 8)

Clearly, while rural India accounts for a majority of national water demand, it also accounts for much of its wastage. To combat this issue, measures like promotion of micro-irrigation techniques and crop diversification are being taken. However, a greater policy push is now also given towards demand management in urban areas despite unaddressed supply-side issues that have led to poor accessibility, sub-par quality and frequency of supply, distribution leakages as well as overdependence on groundwater pumps.

Much of the urban population does not have access to an adequate water supply. Water wastage is high at the distribution stage itself. Taking stock of water demand in rural regions, the inefficient usage of water, and the poor water supply indicators in cities, focusing on demand management as part of urban water policy seems premature to say the least. In this context, there is a need to highlight and rectify persisting issues in urban water governance that contribute to the mismatch between demand and allocation

in urban areas including supply-side wastage and pollution of available water resources - among other things. Inadequate monitoring and inefficient institutions for governance are two such issues that we underscore in the next section.

THE INADEQUACY OF URBAN WATER GOVERNANCE IN INDIA

Benchmarking and Monitoring

One of the key components of any public utility is service level benchmarking [SLB]. As mentioned earlier, most urban centres in India fall way short of the SLBs recommended by the CPHEEO. Table 4 shows the average performance of cities compared to SLBs as per a survey of 1400 cities conducted by the erstwhile Ministry of Urban Development. The survey was conducted in 2010, reflecting the poor state of urban water supply systems, after which no more surveys were undertaken, indicating a glaring lack of monitoring efforts and evaluation in general. Without real-time or periodic monitoring of supply quality, urban water policy frameworks, city plans, or budgetary spending will remain data-blind.

Table 4: SLBs for water supply indicators

Indicator	Unit	Benchmark	Median	Average
Coverage of connections	%	100	53	50.2
Per capita supply	lpcd	135	69	69.2
Metering of connections	%	100	0	13.3
Non-revenue water	%	20	29	32.9
Continuity of supply	Hours	24	2	3.1
Quality and treatment	%	100	94	81.7

Source: MoUD (2012)

Location: New Delhi
Photo by *Poshali Goel* / WaterAid WASH Fellow

Data from the CWMI 2019 reveals concerning trends. Indicator 28 of the CWMI looks at the presence of separate centres on water data including the status of recording and updating data at such centres. Out of 27 states, only 15 have such centres and out of those, 13 states report regular updating of data (NITI Aayog 2019). Notably, Uttar Pradesh, Rajasthan, Bihar, Jharkhand, Kerala, and Odisha do not have such centres, indicating that water management and utilisation data for a large section of India's population is absent. Based on these findings, one can infer that major urban centres across these states also don't have such data.

Additionally, the CWMI index notes that "the robustness and frequency of this data is yet to be ascertained" (ibid). This means that even in states where such centres exist and data is regularly updated, the reliability of the data is questionable. These findings are in line with our earlier conclusion on the general lack of data on water supply and management across cities and the need for better monitoring. One prime example of lack of data-driven governance is the absence of clear estimations of how much groundwater cities consume. In most cities, usage almost always surpasses public water supply, largely on account of groundwater use. However, this kind of water usage remains unaccounted for in water policy frameworks and plans.

Urban Local Bodies

The lack of monitoring and integrated data centres can be linked to the state of India's water management and governance institutions. Water management falls within state's jurisdiction under the Indian constitution . While there have been periodic national water policies and schemes for which the central government disburses funds, the state departments, regulatory authorities, municipal and panchayat-level bodies decide where and how the funds are utilised. The Centre monitors and advises water management across states in a

periodic manner, having little to no role in implementation. As noted in a December 2019 report of the Standing Committee on Water Resources (SCWR) of the 17th Lok Sabha, there have been proposals to shift water from the state list to the concurrent list (entry 17). However, the Sakaria Commission and the Punchhi Commission on Centre-state relations both advised against it (Lok Sabha Secretariat 2019). The SCWR also noted that even the Ministry of Law found it unwise to shift water to the concurrent list while suggesting that water conservation, preservation, and management could have a separate entry as part of the concurrent list (ibid).

In urban areas, the responsibility for implementing central and state-level schemes, water distribution, infrastructure development, and maintenance lies with urban local bodies, state-owned enterprises, and district authorities. As noted by Shah (2016), the fragmentation of roles and responsibilities among different agencies has been a contributing factor in the current state of urban water supply. Shah has also observed that there is a lack of organisational strategy at both the ULB and state levels. Even after emphasis on organisational strategy by missions like JNNURM and AMRUT, there is not enough data available to judge growth, if any, in the technical and managerial capacity of ULBs.

Because of their inability to raise funds, when it comes to municipal finances, ULBs in India are worse off than similar institutions in other countries. This affects their service delivery alongside their ability to maintain and operate existing infrastructure. As noted by the High Powered Expert Committee report on urban infrastructure services requirement, water utilities in India are able to recover 30-35% of their operation and maintenance costs, compared to 100% in the Philippines and Cambodia, and 64% in Bangladesh (Ministry of Urban Development 2011: 47). The poor rate of recovering costs from Indian water utilities is over and above the commercial and physical losses incurred by losing water during distribution, theft, storage, and faulty metering among others. Overall,

Residents of Delhi's Bandhu Camp would either walk or cycle their way to collect water from tankers everyday as they had no piped water supply. Eventually, after pressurising the local authorities with the help of NGOs, there is a water point in almost every household. Their bicycles, now obsolete, have been left behind close to the abandoned tanker indicating that the both are not needed anymore.

Location: New Delhi
Photo by *Poshali Goel* / WaterAid WASH Fellow

municipal revenue/expenditure accounts for about 1% of India's GDP compared to 7.4% in Brazil and 6% in South Africa (Indian Council for Research on International Economic Relations [ICRIER] 2019: 2-3).

CONCLUSION

Under the Atal Mission for Rejuvenation and Urban Transformation [AMRUT] — launched in 2015 and considered a successor to the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) — the central government has made universal water supply a core aim along with sewerage and septage management. The focus on these areas can be gauged by the fact that out of the total planned allocation of INR 77,640 crore under the mission, 50% (INR 39,011 crore) and 42% (INR 32,456 crore) were made available for water supply and sewerage management respectively (AMRUT n.d.b). A cursory look at the Mission website, and media reports on the mission's first extension till March 2022, reveals that almost none of the targets under the mission were met. Between 2015-2019, only 2316 projects worth INR 7195 crore, or just 9.2% of the total mission outlay, were completed (Sharma 2019). These projects resulted in 46% of the water connections target and 28% of sewerage targets being met (ibid). As of March 2021, the mission website's dashboard indicates that 3401 projects have been completed that are worth INR 17431 crore, or roughly 22% of the total mission outlay (AMRUT n.d.a).

While completion of the mission targets seems unlikely by March 2022, one can notice that under the mission there is a lack of monitoring and availability of disaggregated district-level or town-level data. Most of the recent mission updates are available on the official AMRUT Twitter handle. An update made on 16 March 2021, reports that out of a target of 1,39,000 water tap connections across 500 cities, 1,01,000 have been provided through the mission (Ministry of Housing and Urban Affairs

2021). While the progress is commendable, there is no supplementary data available on the quality and functioning of the connections made. This is in tune with what the NITI Aayog's CWMI report has noted about the nature of collection, monitoring, and reportage of data on urban water governance. A majority of the urban population does not even have access to public water supply due to the insufficient, inequitable, and infrequent nature of urban water utilities, forcing them to rely on groundwater. Not to mention, they are also forced to rely on commercial water providers that usually charge exorbitant prices. This problem is further compounded by a serious lack of data on regular water supply monitoring across cities. For efficient urban water governance, integrated data centres that monitor service levels against set benchmarks are necessary. This is because every city and town in India has distinct water management needs based on demographic, geo-physical, and climatic predispositions that require distinct water management plans. Furthermore, policy prescriptions must prioritise improving access to public water utilities by strengthening the financial, technical, and human resources available to ULBs. While the urban policy framework developed by NIUA and MoHUA, as well as missions like AMRUT, acknowledge and prioritise building the capacity of ULBs, there is finite data publicly available to gauge any improvement in the same.

Not only is the policy push for demand-side measures in urban water management unreasonably early, but it is also based on a poor reading of available statistics from an obsolete Malthusian lens. While much of the demand for water in India still comes from rural areas, concerns around the efficient usage of water in irrigation dictate that strict demand-side measures need to be prioritised for that aspect. That is not to say that demand-side measures like recycling and reuse of water should not be prioritised in cities. However, a differential approach to framing and implementing such measures is a better alternative as it takes into account the inequitable nature of urban water supply.

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