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**SUSTAINABLE WATER AND SANITATION SERVICES  
FOR ALL IN A FAST CHANGING WORLD**

**Sustainable urban water and sanitation in India:  
review of a national programme**

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*Since 2005, the Government of India has been financing a massive urban infrastructure programme called Jawaharlal Nehru National Urban Renewal Mission (JNNURM) with the objectives of 'encouraging reforms' and 'fast tracking planned development of cities'. Targetted mainly at 65 cities, the JNNURM made available financing for urban infrastructure and governance improvements, and for extending shelter and basic services to the urban poor. A large proportion of the investments made by cities under the programme were in the water and sanitation sector. This paper examines the results and emerging issues related to the programme investments, and assesses whether and how these investments appear to have contributed to promoting sustainability in water and sanitation services in urban India.*

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## **Introduction**

Most cities in the global South are confronted with the twin challenges of extending service provisioning to the growing population, and simultaneously transitioning to a more sustainable regime. However, this infrastructure deficit could also serve as an opportunity, if cities can leapfrog to sustainable systems of infrastructure and service delivery.

In this context, this paper examines the largest urban infrastructure programme in India-Jawaharlal Nehru National Urban Renewal Mission (JNNURM), and the opportunity it presents for making water and sanitation sector in India sustainable. While the JNNURM did not have an explicit environmental sustainability focus, it has been the primary line of government funding in urban India (during the 2005 – 2014 period) and thus presented a significant opportunity for promoting environmentally sustainable urbanisation in India.

The paper begins with an overview section that provides an introduction both to JNNURM, and to the water and sanitation sector in India. It then presents the methodology used for a review of JNNURM. The next section provides an assessment of JNNURM from a sustainability stand point, and is divided into two major parts: technical concerns; and process/ institutional concerns.

## **Overview: urban water and sanitation in India and JUNNURM**

### **Water and sanitation in urban India**

According to the Census 2011, about 62 percent of urban households in India have access to treated tap water (mostly piped water), 9 percent to untreated tap water, 66 percent to wells, 12 percent to hand-pumps and 9 percent to tube-wells. Even though Indian cities currently do not have universal access to potable water, the more pertinent issues, as clearly evident in Service Level Benchmarking (SLB) are insufficient and unreliable supplies (MoUD, 2010). There is also anecdotal evidence to show that even households with access to public supply often complement this by water from other sources, especially for potable water. Further, water quality is also a major concern at household level. In most cities, the water infrastructure is often old and dilapidated, and is not adequately maintained. This leads to highly inefficient systems with huge water losses. On the water resources side, Indian cities are increasingly depending upon surface water

from far-away places. In addition, both households and public utilities often depend on ground water, leading to depletion of aquifers.

Access to improved sanitation still remains one of the key issues even in urban India, although the record here is better than in Indian rural areas. About 12 percent of urban households still defecate in the open, another six percent have access only to public toilets, and another two percent have access to unimproved sanitation (Census of India, 2011). 33 percent households are connected to sewers, 38 percent depend on septic tanks, and 6 percent on improved pit latrines. According to NSSO 2009, only 70 percent of households had access to exclusive use of latrines.

In addition to lack of universal access to safe sanitation, adequate and safe management of waste remains a concern. Both collection and treatment rates for sewage remains abysmally low. Despite of high dependence on on-site systems, there are hardly any septage management facilities in most cities. There is often improper, unsafe collection, transportation and disposal of waste from on-site systems.

One of the biggest concerns both for water and sanitation remains lack of adequate operations and maintenance (O & M). O & M is affected by lack of adequate funding, shortage of personnel and lack of procedures.

The environmental challenges posed by the water and sanitation sector are two-fold. As stated earlier, cities increasingly depend on water from either far-away places or on ground water (Narain, 2012). This has particularly caused extraction of ground water beyond sustainable levels. Secondly, inadequate waste management systems have led to pollution of all major rivers in India, and also to ground water pollution.

In the past decade, there has been considerable movement in the policy space in the water and sanitation sector in India. While it is beyond the scope of this paper to articulate this policy shift completely, it is important to highlight three significant initiatives. In 2008, Government of India formulated a National Urban Sanitation Policy. The policy was a departure from earlier government initiatives and it placed a premium on specific outcomes (100 percent open defecation free cities, 100 percent treatment of waste, etc.) and processes (preparation of state sanitation strategies, and city sanitation plans), rather than specific technologies or methods. The Government of India also initiated a Service Level Benchmarking (SLB) exercise to enable cities to benchmark their service levels against a series of parameters, and also measure their progress. The government has also launched National Sanitation Rating, which collates information to enable inter and intra city comparison, and also recognizes good performance by cities.

## **JNNURM**

Although there have been a few government schemes directed at urban India since independence, and a renewed interest in urban areas since 1980s, the Indian government has only recently recognised the importance of urbanisation. A review of the Five Year Plans, the primary instrument of planning in India, shows that though there were some investments made towards infrastructure development in urban India since independence, rural and industrial development was the primary focus of public investment for the first three decades. In 1993-94, the Government of India financed a national-level Accelerated Urban Water Supply Programme (AUWSP) with the objective of providing safe drinking water to towns to population less than 20, 000. The funding was partly from government of India, and partly from respective state governments. The Government of India also launched Integrated Low Cost Sanitation Scheme (ILCS) in 1980 with primary objective of abolition of manual scavenging. It aimed to do so by converting existing dry latrines to low cost pour latrines and constructing new ones where none existed.

After decades of neglect of the urban sector, the Government of India identified the lack of adequate infrastructure and poor governance as one of the constraints to urban development, and aimed to close the investment gaps in urban infrastructure by launching the national flagship programme, the JNNURM in 2005. While the majority of funding was to be from the Government of India, state governments and Urban Local Bodies (ULBs) were expected to contribute to the investments. The JNNURM was not envisaged merely as an investment programme, but was linked to a set of reforms that would improve urban governance, extend services to the urban poor, and also catalyse further investments.

The duration of the Mission was seven years beginning from 2005-06 to 2011-2012 (MoUD and MoUEPA, 2005a). The on-going projects have been given a two-year extension period upto 2013-14 to complete implementation (MoUD, 2012). The programme comprised two sub-missions and many components. The two missions were Urban Infrastructure Governance and Basic Services for the Urban Poor.

The analysis presented in the paper (unless otherwise mentioned) pertains to Urban Infrastructure and Governance (UIG) mission. The focus area of the UIG programme was urban infrastructure: water supply,

sewerage, drainage, solid waste management, road network, urban transport and redevelopment of inner (old) city areas. This mission was targeted at 65 cities in India (35 million plus cities and 30 others including capital cities/ the cities of religious/ historic/ tourist importance). Analysis of utilisation across sectors shows that Water (34 percent) and Sewerage/ Sanitation (21 percent) account for more than half the investments made under UIG (Wankhade, 2012). The total utilisation under UIG was around Rs. 360,000 million (6085 million USD) as of September 2012.

Since the objectives of JNNURM were not limited to only providing funding to urban areas, but also to initiate reforms, a comprehensive set of guidelines and toolkits were prepared. These documents included: JNNURM Overview; Toolkits for Project Preparation, DPR Preparation and Appraisal; Primers for Mandatory and Optional Reforms.

The JNNURM required the cities to decide their own development priorities. The cities were required to develop a comprehensive, cross-sectoral City Development Plan (CDP) that would carry out a detailed situational analysis for the city, and then prioritise different infrastructure projects. CDPs were envisaged as key planning instruments that would enable the cities to move from project based implementation to more comprehensive city-wide planning.

## Methodology

This paper builds upon an earlier review that examined sustainability of JNNURM across various infrastructure systems (Wankhade, 2012). Based on a literature review, a framework for environmental sustainability was developed. The broad themes of the sustainability framework proposed were:

- Environmental (sustainability of source/ sink, resource use, waste)
- Design and Technology (performance, efficiency, adaptability)
- Social and Public Health (equity, reduction in diseases)
- Economic (per capita investments, operations & maintenance (O&M))
- Process (inter-linkages with other sectors, integration, capacity building, monitoring and evaluation).

While the indicators have been classified into a particular theme for convenience, many of these indicators are cross-cutting e.g. O & M has been placed under economic sustainability, but it is also related to process and technology.

To understand whether environmental sustainability has a place in JNNURM, the programme was examined at multiple levels for sustainability markers. One, the various brochures, guidelines and toolkits prepared and disseminated for JNNURM were studied. Two, City Development Plans (CDPs) of 20 cities (available on the JNNURM website) were reviewed for the above sustainability indicators. Finally, the findings from the above steps, were then validated and contextualised by set of interviews in one Indian city (Nanded in Maharashtra State). While the earlier review examined JNNURM against each of the indicators at different levels in detail, only a summary of the findings for the water and sanitation sector, are presented here.

## JNNURM: assessment of sustainability

This section presents summary of an assessment of sustainability within JNNURM, based on perusal of programme documents, CDPs of 20 cities, and a primary study in Nanded, Maharashtra.

### Infrastructure and service delivery

For both water and sanitation, the aspect that receives maximum attention at all levels is coverage. This is in line with one of the primary objectives of JNNURM which was to address infrastructure deficits. In case of water supply, coverage has meant extending piped water supply to households. For sanitation, coverage has taken the form of extension of the sewerage network, and construction of sewage treatment plants (STPs). Comparing different CDPs, it is clear that the attention given to water supply is higher than to sanitation. In addition, both in the guidelines and CDP, concerns of equity and extending services to the poor have been given priority.

Apart from coverage, Operations and Maintenance (O & M) has been highlighted as a major concern. The term 'sustainability' is only used in relation to functioning of an O & M system. The strategy for O&M is a pre-condition to avail JNNURM funding. However, the discussion of O & M in JNNURM documents has mostly been restricted to the issue of availability of funds for O & M. The discussion on procedures and

operational systems for O & M, institutional capacities and staffing were observed to be largely missing in the investments proposals viz. the Detailed Project Reports (DPRs) presented by cities to Government of India for funding.

Some other issues with respect to water supply system like service quality (frequency and reliability of supply, drinking water quality), efficiency and reduction of non-revenue water find mention in guidelines and many CDPs- however not all of these concerns necessarily translate into project DPRs. Two of the optional (recommended) reforms - promoting rainwater harvesting and re-use of waste water, relate to the water and sanitation sector.

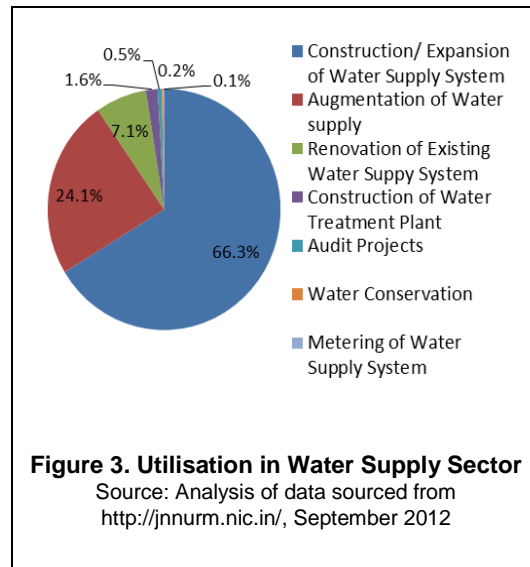
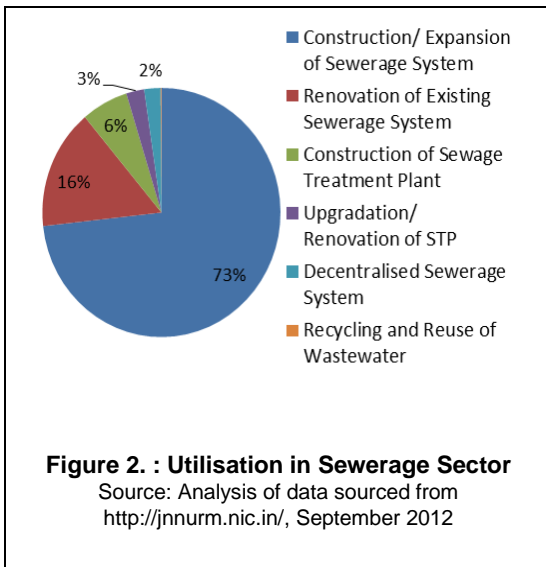
In general, the appreciation of environmental sustainability (at all levels) appears to be limited to certain issues like O & M. Both coverage and O & M are serious concerns in India, and hence these steps are in the right direction. However, they constitute a small and partial subset of sustainability. The review of CDPs and discussions with selected stakeholders in the study city did not show a high priority being accorded to environmental sustainability issues. The solutions proposed in the city were not addressing some of the bigger environmental concerns e.g. that of increasing dependence on ground water, and of pollution. It may be noted that while the pollution issue is highlighted in various documents, it is addressed only partially in the proposals and DPRs.

Moreover, the issues of coverage and access, particularly for sanitation, are fundamentally inter-linked with other concerns of sustainability, but this link does not seem to be given importance in the proposals. In most cases, coverage is often proposed to be achieved by certain methods and technologies- there is often a focus on specific technologies rather than larger sustainability goals. In case of sanitation, this often translates into 100 percent coverage of the city by sewers, instead of access to safe sanitation facilities for all and the full cycle of treatment (that is mandated by India's National Urban Sanitation Policy, 2008). Incidentally, the JNNURM guidelines recognise sewerage as a sector, and not sanitation. Most CDPs reveal that sewerage is the preferred choice. In addition, analysis of utilisation of funding clearly indicates this preference. Out of the total amount utilisation of Rs. 77,152 million (USD 1305 million) (till December, 2012), almost three-fourths of the spending in this sector has been on the construction and expansion of sewerage system (cf. Fig. 1). Only one project on decentralised sewerage system and one involving recycling and reuse of wastewater have been implemented.

To achieve both public health and environmental outcomes, it is imperative that Indian cities are able to achieve open-defecation-free status, and be able to safely collect and treat 100 percent of its waste-goals clearly articulated in the NUSP. Considering the low coverage by sewerage networks in Indian cities, considerable differences in per capita costs for sewerage systems and on-site systems, and limited financial resources, the most feasible way forward to achieve 100 percent coverage is through on-site systems, or a mix of on-site and sewerage systems. Hence, by choosing to address the issue of coverage through a particular technology, it seems that cities are fore-closing certain pathways by prematurely choosing particular technologies – that may not be affordable in terms of capital requirements. As a result, a large proportion of households might be left to fend for themselves, and might opt for a range of household systems, which may or may not be safe. In addition, choice of technologies might lead to consequent burden of O & M for which cities may not have capacities or financial resources. Finally, this means that cities might end up not attending to the urgent needs of treating all wastes in a safe manner.

Similarly for the water supply infrastructure, the bulk of the investment has been in creating new infrastructure. The total capital utilised in water supply sector is Rs. 123,009 million (USD 2080 million). Two-third of the investment in the water supply sector has been spent on laying new pipes, and expanding the water supply system, and almost a quarter was spent on augmenting water supply sources. Water treatment plants of the funding while projects like water conservation and metering of water supply system were a rarity.

The issue of technology/ system costs is also related to the O & M. Earlier in the paper, it was highlighted that different systems have different capital costs attached to them, similarly specific systems also have differential O & M costs attached to them. As Indian cities expand service provisioning, it also serves an opportunity to bring down these costs. However, the entire discussion on O&M focuses on raising sufficient funds to meet O&M costs, rather than analysing whether these expenses can be rationalized in the first place, by opting for a different mix of technology in different time-horizons and phasing these in step with tariff reforms and other forms of financing.



**Process and institutional concerns**

The technical options discussed above are linked to a wide range of process and institutional concerns. Since JNNURM allows each city to set its own priorities and plan accordingly; it could have been expected that cities have differences in their priorities, choice of technology and processes. However, the review of CDPs and the case study demonstrated that there appears to be a drill-down of technology and norm-specific proposals from the national level to the planning and implementation at city level. For example, sustainability has been associated with O&M in JNNURM brochures, and one finds this narrow association in majority of CDPs. Discussions with officers in Nanded City (Maharashtra) also revealed that sustainability was associated with O&M. Preferential choice to sewerage systems is another. There are several other examples from other sectors that are evidence of this influence of national level norms on local choices. This often means that priorities and choices are not reflective of unique local contexts, challenges and opportunities present in the city. This was not the intention of JNNURM, and the one of the purposes of mandating CDP preparation was to allow cities to assess their own situation, and then decide on their priorities.

Ironically, even while the concerns and discourses articulated at the national level within the JNNURM find strong reflection in local priorities, there is limited reference and integration with other policies, programmes and acts at the national level. For example, guidance laid down in the National Level Urban Sanitation Policy (NUSP) has not been incorporated in cities’ plans for sanitation (sewerage). Hence, it is clearly not sufficient to stipulate the concerns in specific policies, but ensure that these concerns are integrated with specific programme investments.

**Conclusions and lessons learnt**

JNNURM with its focus on coverage, O &M and other pertinent issues like Non-Revenue Water reduction has highlighted and commenced addressing some of the key issues in the Indian urban water and sanitation sector. However, to address issues of environmental sustainability, cities should take into account the entire gamut of environmental issues and impacts, right from resource use and efficiency of the system to the disposal/re-use of waste. For example, in case of water, it is not sufficient to only take issues of waste water and pollution into consideration; the intensity of water use needs to be considered as well, and plans made accordingly at regional levels.

The review demonstrates that questions of coverage, access and technology are not un-related to each other. Selection of particular technologies and systems may foreclose different pathways to sustainability. Thus, the selection of appropriate and context specific technology and systems, and bundling of different technologies, can be seen as a key element to urban sustainability.

This paper also highlights two concerns: national discourses and policies have a strong influence on city planning, and secondly, there is a tendency to confuse certain outcomes with specific systems/ solutions. Given this, it is imperative that the national policies/ guidelines emphasise broad outcomes, rather than highlight particular strategies or technologies.

## Notes

The list of references does not include specific JNNURM documents that were analysed. All of these accessed from [jnnurm.nic.in](http://jnnurm.nic.in). For a complete set of these documents, one can refer to the original study.

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