Institutional Change Needs for Sustainable Urban Water Management in India

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ABSTRACT

Rise in population coupled with rapid economic growth is seen as a major factor resulting in higher rate of water resources depletion globally. The problem of water scarcity is more acute in cities and towns of the developing world, where most of the challenges of water supply, sanitation and environmental sustainability are still unanswered. In these towns and cities, urban water systems are troubled with: 1) inefficient water pricing; 2) heavy leakage & unaccounted for water losses; 3) contamination of the supplied water and; 4) lack of political will, and institutional & financial capability for carrying out reforms. Situation in Indian urban centers is much alarming where distribution losses alone are in the order of 30-50 per cent of the total water supplied. The condition is even worse for informal settlements and slums in these urban areas where basic water and sanitation infrastructure are altogether missing. In order to meet these growing urban water management challenges, there is need for paradigm shift, i.e., shift in the way the urban water resources are managed.

This research paper highlights the institutional change needs for sustainable urban water management in India. The institutional change will involve: 1) one or combination of organizational change measures comprising decentralization, private sector participation and, community-based management; 2) directive reforms and; 3) human resource development. The finer aspects will depend upon the physical and socio-economic environment, political situation and administrative set up that exist in the urban area. The institutional changes will be more so important for small urban towns where public utilities are given little attention. All these together can contribute to making Indian cities better prepared for averting the risk, in face of rapid urbanization, climate change and water scarcity.
Key Words: India, urban water management, organizational change, directive reforms, human resources management

1. BACKGROUND

Population growth coupled with rapid economic development has resulted in accelerated freshwater withdrawals, leading to global water scarcity.

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Urbanization, technological change and changing consumption patterns are further influencing water use. In 2001, the 10 largest water users in terms of volume are; India (646 km^3), China (630 km^3), the United States (286 km^3), Pakistan (169 km^3), Japan (88.4 km^3), Thailand (87.1 km^3), Indonesia (82.8 km^3), Bangladesh (79.4 km^3), Mexico (78.2 km^3) and the Russian Federation (76.7 km^3). However per capita water withdrawal (per inhabitant/year), which is considered to be better indicator of the impact of population on water, is highest (5324 m^3) in Turkmenistan and lowest (20 m^3) in Uganda (Source: FAO Aquastat; UNESCO, 2009). At present, some 30 countries are considered to be water stressed, of which 20 are absolutely water scarce (Khatri and Vairavamoorthy, 2007) and about one third of the world's population lives in countries with moderate to high water stress.

The problem of water scarcity is more acute in cities and towns of the developing world, where most of the challenges of water supply, sanitation and environmental sustainability are still unanswered. As per one estimate, one-third of the population of this region will face severe water shortages by 2025. Water withdrawal (per inhabitant/year) for domestic use has increased substantially between 1987 and 2002, in some of the developing countries. In India it increased from 20.7 m^3 to 48.3 m^3, in China from 25.9 m^3 to 32.0 m^3 and, in Bangladesh from 6.4 m^3 to 17.5 m^3. By 2025, the situation will become more acute as over two billion people will be added to the world urban population (mostly in developing region), posing additional challenges for municipal water supply (Meinzen-Dick and Rosegrant, 2001). Rapid urbanization and climate change will further deteriorate the already poor urban water management systems in some of these countries.

Providing water security is a serious challenge of the twenty-first century world considering that more than 2.5 billion people live without access to improved sanitation and about 0.9 billion survive without access to improved water supply. Of these, nearly one-half of people without access to improved water supply and almost 70% of those (1.8 billion) without access to improved sanitation live in Asia (WHO-UNICEF, 2008). A UN assessment suggest that 18 out of 38 countries in Asia-Pacific region are off-track (expected to reach the MDG target, but after 2015) for providing their rural populations with access to safe water, and 17 out of 32 countries are off-track for providing rural areas with access to basic sanitation.

Since 1990, 926 million urban dwellers (till 2006) gained access to improved drinking water sources but at the same time around 137 million urban people are still without access to improved drinking water sources. Although most of this increase in access took place in urban areas of the developing region but the public service delivery systems in these countries are struggling to keep pace with rapidly growing urban populations (UN, 2008). The water supply systems in these urban areas are troubled with: 1) inefficient water pricing; 2) heavy leakage of water from old distribution systems & unaccounted for losses resulting from

faulty meters, unbilled consumption, illegal tapping etc; 3) contamination of the supplied water and; 4) lack of political will, and institutional & financial capability for carrying out reforms.

Thus there is an urgent need for planned action to manage urban water resources in developing countries effectively and efficiently, especially in Asia. More importantly to achieve the United Nations (UN) Millennium Development 2015 target (UN, 2000) of "Halving the proportion of the population without sustainable access to safe drinking water and basic sanitation (base year 1990)" for ensuring environmental sustainability and eradicating poverty.

2. URBAN WATER MANAGEMENT IN INDIA: PRESENT STATUS

MDG progress chart (2008) doesn't show encouraging results in respect of access to improved water supply and sanitation for the Asian region (Figure 1). Further various projected estimates regarding increased urbanization and population pressure on urban cities of Asia (Brennan, 1999; Berk and Rothenberg 2003), indicates higher dependence on water resources which are already under tremendous stress.

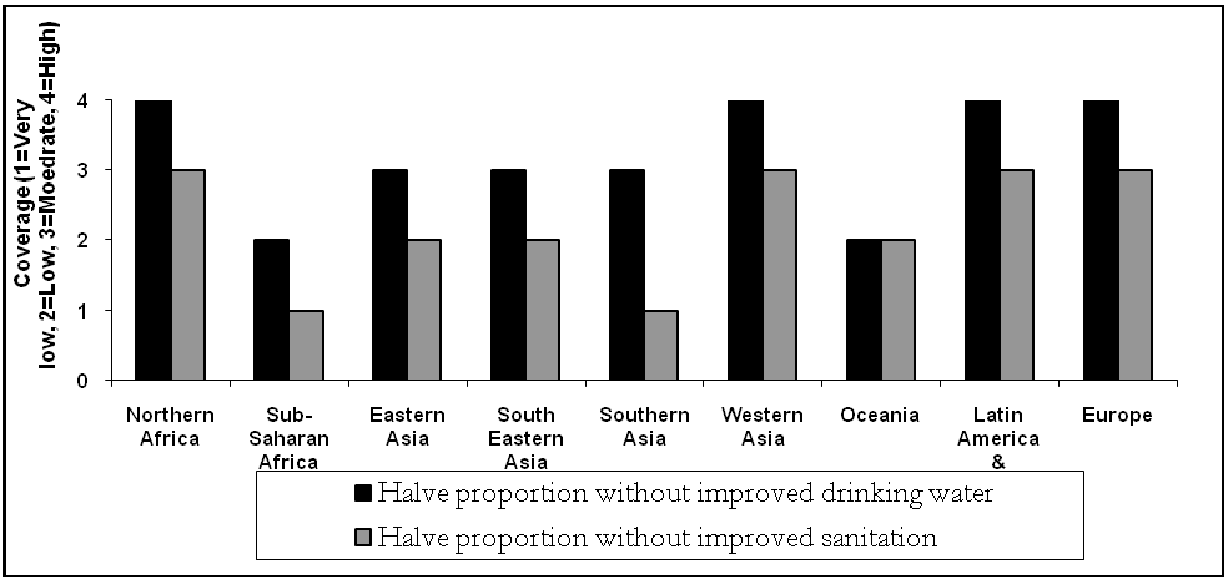

Figure 1: Progress on coverage of MDG target on water and sanitation, 2008 *(Source: Derived from MDG progress chart, 2008)*

Fast urbanization and population pressure have greatly impacted water supply systems in Indian towns. The distribution of population in different size class of settlements has become highly skewed over the years. In urban population, the share of Class I towns or cities, with population size of 100,000 or more, has gone up significantly from 26 per cent in 1901 to 65 per cent in 1991. The percentage share of class IV, V and VI towns, with less than 20,000 people, on

the other hand, has gone down drastically from 47 to 10 only. This is largely due to the fact that the towns in lower categories have grown in size owing to population growth and moved to the next higher category. Unfortunately, however, there is no corresponding increase in the number of urban centres, especially at the lower levels, through transformation of rural settlements. During the 90-year period from 1901 to 1991, the number of urban centres doubled while urban population has increased eight-fold. Indeed, the absence of a process of graduation of large-sized villages into towns, through growth of industrial and tertiary activities, poses a major problem in India's urbanisation.

The larger urban centres have experienced faster demographic growth as compared to smaller settlements. The class I cities, for example, registered an average annual growth rate of 3.0 per cent during 1981-91, which is higher than that of lower order towns. Scholars have argued that the former experience relatively high and stable demographic growth because they are linked to the national and sometimes international market (Bhalla and Kundu, 1982; Kundu, 1983; Nagraj, 1987). It can be concluded that the larger cities are likely to grow much faster in the future, and would account for a larger share of total urban population; the smaller towns would experience lower growth rate, and their numbers is likely to reduce over time, with not many big villages transforming into towns.

2.1 Inefficient water pricing

Analysis of data from 301 cities/towns belonging to Class I and Class II cities of India shows that the cities having very high density of population have as much high cost of production of water as those with low density of population. But in regions of natural water scarcity (which also experience physical scarcity of water going by Kumar *et al*., 2008), the cost of production & supply of water is far higher than that of naturally water-rich regions (Figure 2). The figure shows that the cities (23 nos.) that are falling in the naturally water-rich regions, have much lower cost of water supply (ranging from 0.05 to 0.88 Rs/m^3 of water) as compared to those falling in naturally water-scarce regions (ranging from 1.47 to 3.69 Rs/m^3 of water).

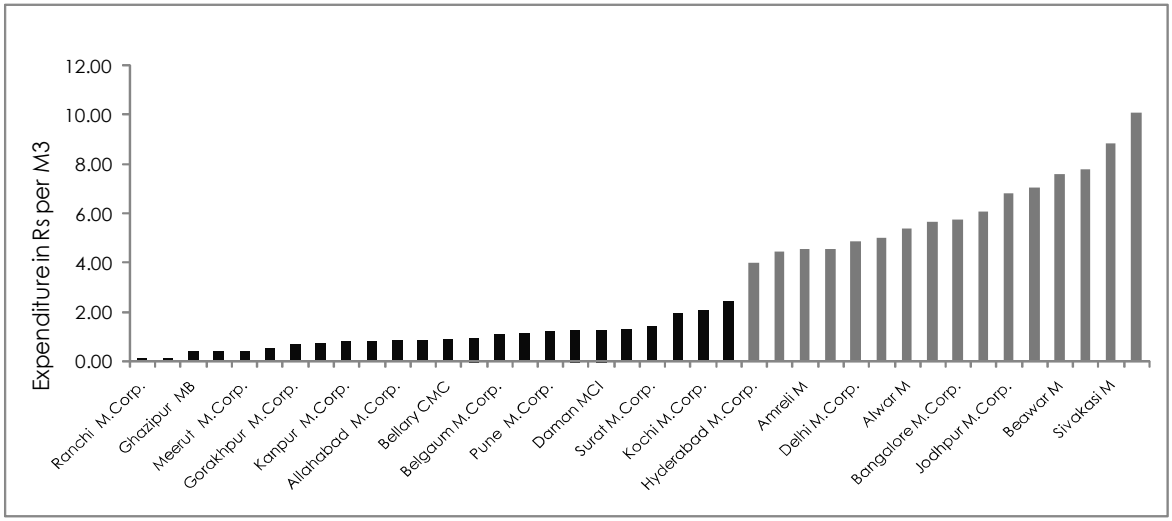

Figure 2: Expenditure per cubic metre of water supply in water scarce and water-rich regions

Considering the cost of production, domestic water supply is highly subsidised in several Indian cities, including Kolkata, Bhopal and Indore (table 1). Though in many cities, the average water tariff is higher than the cost of production & supply of water, the high average is because of high tariff levied from industries and commercial connections, and domestic supply is actually heavily subsidized (ADB, 2007). The second factor is water supply administration. Domestic water supply is not fully metered even in large cities. In more than 50% of the cities falling under Class I and Class II category, household connections are either partially metered or un-metered (NIUA, 2005). The third factor is the way water tariff is administered. Many large cities viz., Kolkata, Jabalpur, Jamshedpur, Mathura, Rajkot, Varanasi, Bhopal and Indore meter only less than 1% of the connections, whereas cities such as Ahmedabad, Vijayawada, Amritsar, Chennai, Surat and Visakhapatnam meter 1-10% of the connections (ADB, 2007).

Table 1: Cost of production of water and water tariff in 20 Indian cities

Sr. No	Name of the City	Average Water Tariff (Rs/m^3)	Average Cost of Production of Water (Rs/m^3)
1	Bhopal	0.6125	3
2	Mathura	0.612	2.2
3	Kolkata	1.25	3.5
4	Ahmedabad	1.5	1.5
5	Jabalpur	1.6	1.8
6	Surat	1.7	2.1
7	Vijayawada	2.5	2.25
8	Indore	3	13.2
9	Varanasi	3.12	2.25

10	Coimbatore	3.75	1.5
11	Nashik	4.2	2.15
12	Jamshedpur	4.32	2.5
13	Mumbai	4.4	3.75
14	Chandigarh	5.05	4
15	Rajkot	5.05	2.85
16	Nagpur	6.5	2.15
17	Vishakhapatnam	8.5	4.9
18	Amritsar	9.32	4.5
19	Chennai	10.8	6.05
20	Bangalore	20.5	10.2

(Source: Derived from charts in ADB, 2007)

Often the use of block rates in urban water pricing causes the poor people to pay more for water creating negative impacts on access equity (UNDP, 2006). The people living in city slums, who account for a major proportion of the population, access water from public systems through common stand-posts and taps. Due to the limited amount of water that is accessible through common taps, they are left to manage their water supplies from a myriad of sources such as water tankers; private water vendors; and fetching water from long distance sources, spending substantial amount of time and labour. It is also important to note that water supply from public systems is the cheapest, and the costliest being the water supplied by vendors (UNDP, 2006). A study carried out for the preparation of *White Paper on Water in Gujarat* among urban populations showed great inequity in access to water supplies between different classes. In Rajkot city, the slum dwellers were using 18 litres per capita day (lpcd) of water a day on an average, against 63lpcd by middle class societies and 83lpcd by upper class societies (IRMA/UNICEF, 2001).

While incremental block rates are advocated for urban water supplies for bringing in equity in access to water, efficiency in water use, and improve affordability, they are not widely practiced. The striking reason for this is the poor coverage of public systems vis-à-vis individual connections. As studies in Bangalore, Kathmandu, Bogotá and Chile show, when the private connection charges are low, incremental block rates can produce undesirable equity consequences with a disproportionately larger share of the water subsidy benefits going to the richest and the middle income groups (Komives *et al*., 2005). The ability of resource rich urban dwellers to access water from private sources such as wells is another issue in proper pricing. Hence, the issue is also about building adequate water supply infrastructure and creating sufficient incentive structures, apart from administering water supply, and introducing an efficient tariff policy to address efficiency, affordability and equity concerns and administering it.

2.2 Unaccounted for water losses

The single most important parameter impacting urban water resources management is unaccounted for water (UFW). This includes losses mainly through faulty meters, unbilled consumption, and illegal tapping. In India, daily water supply rate ranges from 16 to 300 litres per day depending on the locality and the economic strata (Singh, 2000), whereas this figure ranges from 100 to 600 litres per day in the developed countries. Many studies have highlighted that water losses in cities of developing countries are at levels of between 40-60% of water supplied (Mcintosh and Yniguez, 1997; Arlosoroff, 1999; WHO-UNICEF, 2000; Mwandosya, 2007). In Indian urban cities, distribution losses alone are in the order of 30-50 per cent and the total unaccounted for water (UFW) losses accounts to 45 per cent of the total water supplied (and further increasing), the highest (in %) being in the city of Nashik (Figure 3). The condition is even worse for the informal settlements and slums in these urban areas where basic water and sanitation infrastructure is completely non-existent.

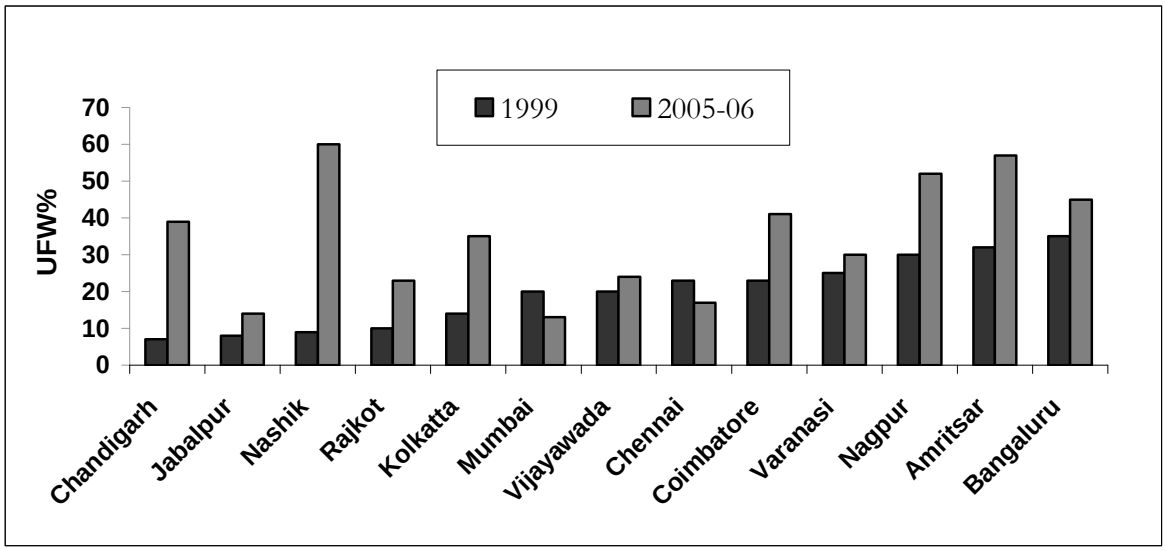

Figure 3: Unaccounted for water (in %) across Indian Cities
(Source: Complied from NIUA water supply and water tariff statistical volume 1, 1999 and ADB benchmarking and data book of water utilities in India, 2007)

The main reason for the distribution losses is poorly maintained infrastructure, whereas for UFW losses, unbilled and illegal connections are the biggest causes. Scholars have argued that metering will help reduce UFW losses in utilities[4] (ADB, 2007). Pricing of water on the basis of volume of use, for which metering is a pre-condition, will encourage urban water users to prevent wastage, thereby saving on their monthly water bill. Since metering water supplies and charging on

[4] While it would reduce the administrative losses, it would also help us assess the amount of water lost in pipe line leakages.

volumetric basis are cost affairs, and therefore should be based on benefit-cost calculations. Metering in cities/towns falling in regions that are water-scarce makes more sense because: 1) the cost of production and supply of water is high in such regions, which in turn makes the net cost saving from prevention of thefts significant, thereby justifying the high cost of installation of meters and meter reading; and, 2) improved efficiency of water use achieved through volumetric pricing leads to greater social benefits, as the environmental cost of wastage and effluent would be high in water-scarce regions. Whereas in a water-rich area, though normally the cost per unit volume of water would be low, it is also found to be increasing with increase in size of population. Therefore, it is important to do metering and volumetric pricing in large cities falling in such water endowments.

2.3 Water quality

About 3.6 billion people in world use a piped water connection (WHO-UNICEF, 2008). But the quality of water supplied, especially to urban cities of developing region is questionable. In India, eighty-five per cent of urban population has access to drinking water but only 20 per cent of the available drinking water meets the health and quality standards set by the world health organization (WHO) (Singh, 2000). A study by NIUA (2005) covering 109 Class I and 65 Class II cities find out that 13% of Class I and 17% of Class II cities even lack presence of any water treatment plants. Water quality monitoring is even worse for the selected Class I and Class II cities (figure 4). Almost 63%, 35% and 22% of the class II cities do not monitor the quality of raw water, quality of water at treatment plant and water quality at distribution network respectively.

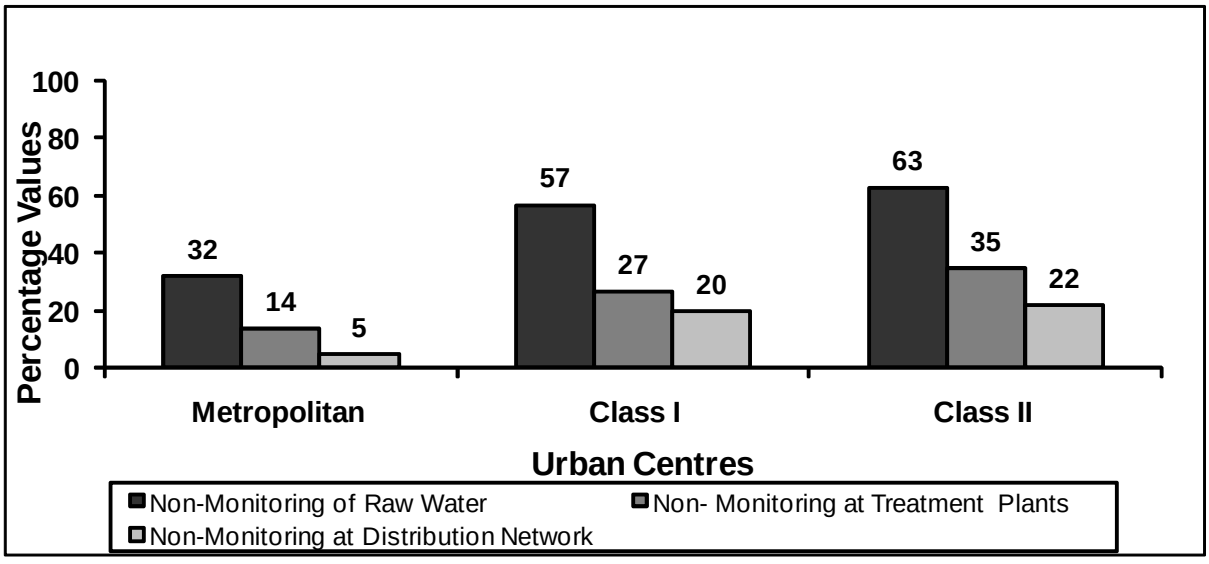

Figure 4: Non-monitoring of water (in %) at various stages of supply in urban centres
(Source: Data compiled from CPHEEO sponsored report on status of water supply, sanitation and solid waste management in urban areas, 2005*)*

Further most of the Indian cities have intermittent supply of water leading to high levels of contamination. This occurs in networks where there are prolonged periods of interruption of supply due to negligible or zero pressures in the system (Yepes et al., 2000; WHO, 2004; Vairavamoorthy and Mansoor, 2006). Poor quality of supplied water can have adverse health impacts on the population. Thus there is need for interventions and monitoring system which can strengthen the existing techniques for improving drinking water quality. However, such intervention may require huge financial investments.

2.4 Lack of reforms

Almost 74% of urban population in India has access to formal piped water supply system (World Bank, 2006). However, the term coverage only indicates the reach of the public water supply system but does not indicate the quantity, quality, and duration of supply to the covered population. It is estimated that people in Indian cities who are connected to a piped system, on an average receive less than 3 hours of water service per day. Moreover cities are increasingly facing water crisis due to mounting water demand and inadequate measure to meet the demand. This particular situation is arising because of increase in urban population, inefficient management of water supply systems, inefficient use of water and multiple institutional arrangements. There is progressive decrease in the frequency and duration of water supply along with increasing UFW and supply deficit in some of the major urban centers (Table 2). This situation is seen even when there is regular investment in developing water infrastructure in India during the last decade.

Table 2: Water supply status in some of the urban cities, India

Cities	**Total Population (in 000')**		**Population Covered by water supply (%)**		**Average hours of supply/day**		**Supply Deficit (as per city norm in million litres/day)**		**Operating Ratio****	
	Around 1999*	Around 2005	Around 1999*	Around 2005	Around 1999	Around 2005	Around 1999	Around 2005	Around 1999	Around 2005
Ahmedabad	3,500	4,491	100	82.8	2	2	109	247.76	14.62	1.43
Bangalore	5,000	6,800	100	91	12	2.5	0	253	0.97	0.98
Chandigarh	850	1,098	100	100	9	12	0	177.93	1.52	1.31
Chennai City	4,363	5,320	100	98	2	3	19	350	0.73	1.35
Hyderabad	4,163	5,351	100	95	2	1	0	91	0.95	1.13
Indore	1,600	2,200	100	77.3	1	0.75	82	264	3.55	5.45
Kolkata	2,936	3,998	100	98.7	10	8.3	327	272	7.9	4.73
Mumbai	11,100	13,000	100	100	4	2-6	0	975	0.74	0.49
Nagpur	2,100	2,350	100	98.9	3	5	0	19	3.04	0.76
Nashik	839	1,350	100	92.6	5	3.5	0	117.5	2.27	1.38
Surat	2,300	2,661	100	95	2	2.5	2	70	2.64	1.01
Vadodara	1,400	1,632	100	75	1	0.75	12	8	2.07	2.81

Varanasi	1,152	1,489	70	83.5	8	7	91	43.75	1.44	1.30
Visakhapatnam	1,280	1450	100	85	1	0.75	0	176	0.37	0.78
	Desired Level		**100%**		**24 hours/day**		**0 million litres/day**		**0.75**	
*** Estimated figures**					**** Equals to Annual O&M Expenditure/Annual Receipts**					

(Source: Data Complied through various sources such as ADB, CDP's of JNNURM Cities, NIUA, WB and author's own estimates)

Thus, the present scenario of the public water supply system needs overall reforms, which shall be targeted towards improving the institutional, administrative, managerial and financial aspects related to urban water management. However given the political economy and lack of administrative will, implementation of reforms is a difficult process especially in urban context.

The recent past has seen increased attention being given to carrying out reforms to improve the existing urban water supply system. In 2005, Government of India (GOI) launched Jawaharlal Nehru National Urban Renewal Mission (JNNURM), for a seven-year period beginning 2005-06. The mission covers 63 cities and has a total allocation of Rs. 50,000 crore. The JNNURM sub-mission on Urban Infrastructure and Governance, administered by the Ministry of Urban Development covers infrastructure projects relating to water supply and sanitation, sewerage, solid waste management, road network, urban transport and redevelopment of old city areas (Planning Commission, 2006). However little attention is paid to the institutional changes required for improving the urban infrastructure.

3. CAPACITY BUILDING FRAMEWORK FOR SUSTAINABLE URBAN WATER MANAGEMENT (SUWM)

The responsibility for operating and maintaining water supply systems rests largely with the local Governments. In Indian urban centres, this function is presently divided with capital works being executed by state level agencies and the operation and maintenance (O&M) function is performed by the local governments. However, different states have different arrangements and even within the same state different cities may have varying arrangements. The common pattern in most cities is that a state level agency (Public Health Engineering Department) or a state level water supply and sewerage board does the capital works and hands over the responsibility of O&M to the local government (NIUA, 2005).

It is well recognized that the problems associated with urban water supply are more of institutional than technical nature. If these institutional arrangements can be improved, structural constraints are removed. Therefore, it is essential to have right institutions for the delivery of urban water supply services (Naidu, 2002). However, different urban water contexts have variable institutional arrangements, peculiarities and capacity building needs. Thus it is important that a holistic

assessment of the existing capacity for SUWM within the local management dynamic be conducted to systematically design and develop the framework required for institutional change process. This is more so required to achieve higher efficiency in working of water supplying utilities and to improve the existing state of water supplying infrastructure. Institutional change can be brought about by: 1) organizational change measures comprising decentralization, private sector participation and, community-based management; 2) directive reforms and; 3) human resource development (Figure 5). Based on the above framework, the institutional change approaches will be discussed in detail in the following sections.

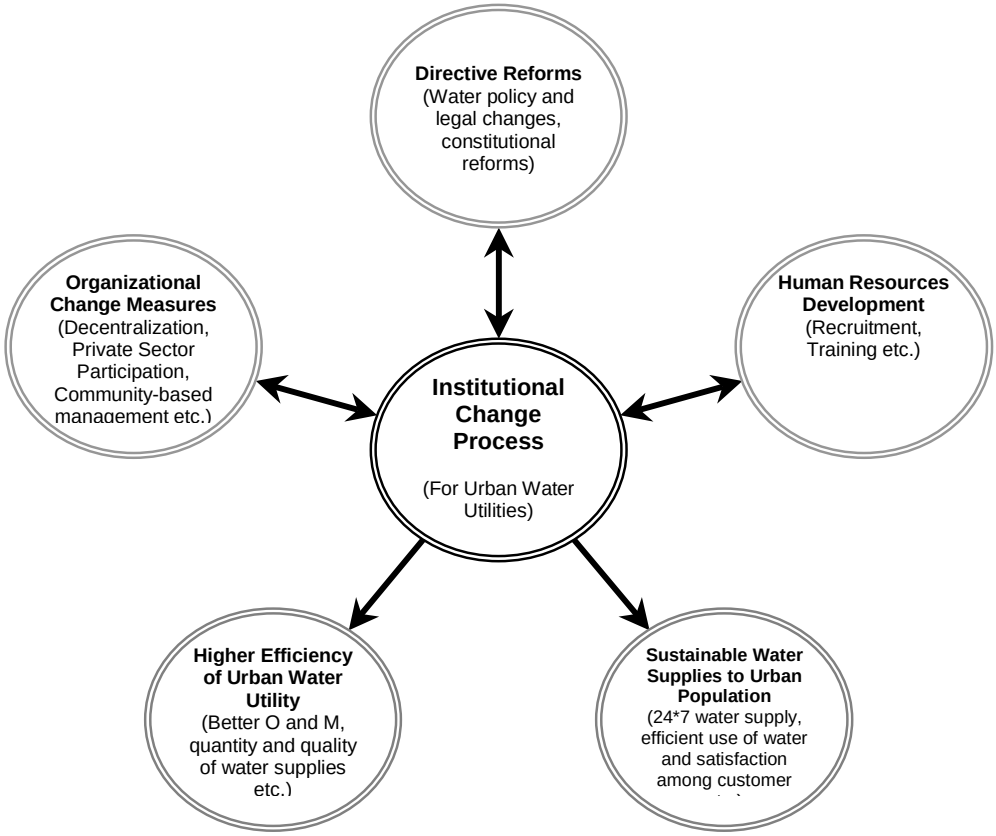

Figure 5: Institutional change framework for integrated urban water management *(Source: Adapted from Grindle, 1997 and Wakely, 1997)*

4. APPROACHES FOR INSTITUTIONAL CHANGE

Institutional change is prerequisite for achieving higher efficiency, transparency, accountability and, sustainability in urban water supply sector. In many instances, capacity building efforts have been typically implemented as training and education programs based on the idea that equipping individuals with new knowledge, skills and professional competencies will therefore enable them to successfully operationalise sustainable practices (Wakely, 1997; Harrow,

2001). However it is observed that organizational and broader institutional context presents as great an impediment to the sustainable management of urban places as the inability of professionals, technicians and ordinary people to operationalise sustainable development (Wakely, 1997; Brown, 2003). Therefore, local government capacity for urban water management involving effective, efficient and responsive environmental governance is dependent on not only having sufficiently developed human resource capacity but also sufficient capacity within organizational and directive contexts (Grindle, 1997; Wakely, 1997; UNDP, 1998; Peltenburg *et al*., 2000).

4.1 Organizational change measures for capacity building

Many studies have been undertaken both in developed and developing on restructuring of water institutions (Collignon and Vezina, 2000; Plummer, 2002; Kyessi, 2003; Brown, 2004; Singh, 2006; Stahlberg, 2006; Brooks et al., 2007; Zhong et al., 2008). Experience over the last decade suggests an emerging global consensus on some key principles of institution reforms. The key principles of institutional reforms include: 1) Decentralization of responsibility to the lowest appropriate levels of government to respond to local conditions and needs; 2) Building of autonomous utilities with commercial orientation and financial viability for service delivery in urban areas; 3) Private Sector Participation in the delivery of water-related services including that with small-scale providers; 4) Community participation in urban water management.

4.1.1 Decentralization

Decentralization in Indian urban water sector started with the passing of 74th Amendment to the Indian Constitution, granting Constitutional status to municipal bodies or urban local bodies (Johnson, 2003; Mathur and Peterson, 2006). The idea was to transfer administrative authority, public resources and responsibilities to the local level bodies and to make state as a facilitator than the service provider. The process was supposed to help the poor, as local level bodies can respond in much better way to the local needs and aspirations. However Indian model of decentralization only fulfills the modalities of administrative decentralization and lacks fiscal and political decentralization (Panickar, 2007). State governments continue to have a major say in the functioning of these empowered local bodies. The process only led to water supply system becoming more unequal, unjust, and highly biased in favor of the rich.

It is important to highlight that decentralization was not a studied response to the specific problems of the water sector, but rather a byproduct of wider state reforms. In a number of cases, decentralization preceded subsequent water sector reform by a number of years (Foster, 2005). As a result, local governments often found themselves in charge of service delivery while lacking the capacity to fulfill this function. Thus, the real transition for most water consumers has not been from public to private, but rather from unregulated

centralized public provision to regulated decentralized public provision, served by publicly owned and managed utilities. But in urban areas of many developing countries these public utilities do not perform well because of low motivation, poor management, inadequate cost recovery and political interference. Situation is even worse for the community living in informal urban settlements and slums.

Therefore, devolution of responsibilities to municipal authorities needs to be accompanied by mandating key good municipal and utility practices. Examples of good practices include preparation of long-term integrated development plans, inter-municipal cooperation and customer consultation and responsiveness (World Bank, 1998). The favorable and successful mode of democratic decentralization would be one in which citizens possess the right to hold local public officials to account through the use of elections, grievance meetings and other democratic means (Panickar, 2007).

4.1.2 Creation of autonomous utilities

Today, most of the utilities obtain water from the natural systems and do not pay for the resource. Neither do they pay towards the environmental cost of polluting the freshwater bodies caused by disposal of municipal effluent. This is because they are not concerned with water resources management (WRM) functions. Like the urban water utility, many agencies (like the irrigation department, the groundwater department) compete for the same resource. Often the sustainability of the resource base itself comes under threat.

The biggest intervention in institutional reform is the one by which the utility confront the opportunity cost of using water, which includes polluting the rivers and groundwater through sewage disposal. For this, the urban water utilities have to be financially autonomous institutions, where they have to manage their affairs without interference and support from the government. Hence, corporatization of the utility becomes a pre-requisite. Corporatization strengthens the political autonomy of a publicly owned enterprise by making it financially self-sufficient and introducing rules that protect directors and senior managers from being removed on political whim (Foster, 2005).

If the utility is autonomous and has to purchase water in bulk from the open market (which means the agency allocating water and the one using it are different), it will have strong motivation to recover the cost of supplying water by metering and pricing, and reduce the non-revenue water. Also, the utility would be under pressure to: reduce the dependence on purchased water by tapping the non-conventional sources such as desalination systems; and reduce the negative effects on environment caused by storm water disposal as these would increase its profitability.

Independent water regulatory authority can play a major role here. They can decide the pricing norms and tariff levels in consultation with the primary

stakeholders based on periodic review of the operating costs and efficiency figures provided by the utility. This essentially means that the utility will not be in a position to raise the water tariff on account of high operating costs. It will have to first raise the operating efficiency by reducing the non-revenue water, improving the staff efficiency and efficiency of the machinery and infrastructure. This will force the agency to be much more transparent in business.

4.1.3 Private sector participation

Privatizations in water and sanitation sector were vigorously promoted in southern countries during early part of 1990's. The main driving forces behind this were the conditionality imposed by the various international financial institutions. It was widely perceived that private sector participation will: 1) provide solution to the failure of many publicly owned and managed water utilities to operate efficiently and, 2) make the investments required to meet community needs (Rees, 1998; World Bank, 1998).

Governments can adopt various privatization models in transferring the physical assets into the private hands or contract the private sector to provide goods or services previously supplied by public bodies. These models mainly include: 1) Divestment; 2) BOT (Build, Operate and Transfer); 3) BOO (Build, Operate and Own); 4) Concessions; 5) Lease contracts and; 6) Management and service contracts (Rees, 1998; Budds and McGranahan, 2003). Refer table 3 for the arrangements under the above listed privatization models. Besides these formal private sector operators, there are small scale private water service providers, engaged in the provision of water and sanitation services to small-scale and low income urban settlements (Budds and McGranahan, 2003). To understand the extent of private sector participation, Perard (2006) constructed a world map showing the percentage population in different countries served by private water suppliers. It shows that developing countries of South Asia are fully covered by public water supply; and in countries like the United States and Australia, the degree of private sector involvement in water supply is less than 40 per cent in term of the population served (Figure 6).

Table 3: Responsibility arrangements under different privatizations models

	Asset Ownership	Capital Investment	Operations/ Maintenance	Contract Duration (years)
Divestments	Private	Private	Private	Indefinite
BOT Type	Private/Public	Private	Private	20-30
Concessions	Public	Private	Private	25-30
Lease Contracts	Public	Public	Private	8-15
Management Contract	Public	Public	Private	3-5
Service Contract	Public	Public	Private/Public	1-2

(Source: Adopted from Ress, 1998 and Budds and McGranahan, 2003)

International experience with private sector participation (PSP) in urban water supply suggest that it is likely to come up if countries are politically stable and governments are powerful, and economic condition does not have great bearing on this (Perard, 2006). There are mixed results of urban water supply privatization from across the world. PSP has proved difficult to implement, in larger urban centres this has been primarily for political reasons, while in smaller cities and rural areas economic viability is an additional problem. Further there are persistent concerns regarding access to water by the poor under privatization. There is no question that the private sector companies have improved the management efficiencies of water utilities in many urban centres significantly (examples include Buenos Aires, Casablanca, Conakry, Manila, Ostrava, urban centres of Puerto Rico). Equally, the results have been dramatically opposite in many other cities, where several major performance indicators of the utilities managed by the private sector companies have actually declined compared to even the earlier dismal efficiencies of the public sector (examples include Arequipa, Cochabamba, Rabat, Rio de Janeiro, Tegucigalpa, Tucuman). In India, PSP in water delivery is still in a nascent stage.

Results from pilot PSP projects mainly in service domain of water supply has shown mixed results with success in few (example include Chennai, Bangalore, Tirupur) and failure & public resistance for PSP in other urban centres (examples include Hyderabad, Pune). However, the informal small scale private water service providers (water vendors) are quite common in urban India, especially in the un-served areas of water-short cities such as Rajkot, Ahmedabad, Chennai and Delhi. These vendors play an intermediary role by providing water to low income and urban slum areas. Such privately vended water, which seldom has any quality controls, sells for from 5 to 50 times the price of piped water supply from the city (McKenzie and Ray, n.d.). While these private operators perform a vital function of bridging the water service gap, there is a need to regulate them to ensure the quality of services provided to the customers and to check customer's exploitation (Raghupathi, 2003).

Figure 6: Worldwide reach of private water suppliers

As per the World Bank's review of India water resources management sector (1998), PSP can be an effective tool for making urban water supply system efficient provided: 1) there is political and financial commitment from the government for developing public-private partnership; 2) contracts are developed carefully to ensure proper incentives for the private sector to achieve efficiency; 3) where large scale privatization options are not possible immediately, it is better to start with corporatization of utilities, tariff reforms and a series of management contracts which will pave way for greater private sector participation, and last but not the least; (4) contracts should ensure that disadvantaged groups are served, through providing appropriate incentives and explicit subsidies if necessary.

4.1.4 Community participation

Increasing community participation in urban water management (UWM) is a major step towards capacity building in urban water sector, and is part of the institutional change process. Community participation can be in two directions: 1) assigning certain decisive roles to the users, where they share the decision-making responsibility with the professionals and, 2) there is no shift of responsibilities between the users and professionals but instead only the opinion of the user is considered while making decisions. In UWM context, the involvement of community could cut across various spheres provided they are provided full initial support and technical guidance. These spheres can include: 1) planning of water supply & sewerage systems (influencing the selection of the type & nature of technical systems for water supply, sewerage disposal,

wastewater treatment supply, water supply schedules); 2) delivering certain services related with UWM; 3) Overall governance of urban water as civil society (making rules for fixing the price of water, introduction of supply water restrictions, deciding on investment/funding priorities, provision of budget for public auditing) and; 4) theft (water) detection, illegal dumping of solid and liquid waste, identifying the families eligible for receiving the benefits of subsidized WATSAN provisions.

However, delegating the entire responsibilities starting from planning to execution and operation and maintenance, to the communities without having a realistic assessment of its needs and concerns will not result in their effective participation. The upper boundaries of involvement for a local community institution in urban water management activities (either in planning or in execution, or in repair & maintenance or vigilance etc.) would be defined by its operational jurisdiction, the level at which the scheme operates and the physical characteristics of the scheme. As regards the first one, often local community institutions are created at the level of a ward or sub-unit of a ward, depending on the size of the population. But, the hydraulic systems boundaries of water supply, drainage or sewerage scheme may cut across the jurisdiction of several community institutions. Therefore, for participation to be meaningful, it would be advisable that the layer of community institutions is created at the level of the hydraulic infrastructure.

Community participation will also be affected by both desirable level (how much) and degree (to what extent) of participation. The extensive literature and numerous research studies have identified many other factors that determine the degree of participation. Important ones include: 1] homogeneity of the group/community (communities from the same clan, religion, caste, creed etc. are likely to participate more and better than a heterogeneous society); 2] incentive (whether financial, natural or human asset gains, e.g. capacity building) which community see/perceive in case of participation; and 3] effective leadership (Wade, 1988; Baland and Plateau, 1996; Meinzen-dick et al., 2002). Experience from Senegal (Rufisque), India (Ahmedabad), Tanzania (Daar *e* Salam) and South Africa (Tshwane) shows that partnership between local communities and official agencies for improvement urban environment emerges under certain sets of conditions: when the urban environmental sanitation conditions are extremely poor; there is assurance of technical, legal and financial support from the external agencies including the local government; and there are proper financing frameworks at the community level are evolved for their contribution to be possible for building the essential private infrastructure.

It has been seen that most of the community participation activities start with some or other kind of support from government/International funding institutes/NGO’s and once the support or fund flow stops, involvement of people/community gradually dies off. Therefore, to sustain the participation or local institutions, important is to have proper exit point options before the project

gets completed. Therefore, requirement of an Institutional framework backed up by strong legal support becomes all the more important to allow communities to decide on the level and degree of its involvement in any urban water management interventions. But, from an operational point of view, the two aspects need to be kept in mind while thinking about the appropriate institutional framework for participatory institutions and the potential roles they could play in urban water management. They are: what is the desirable level and degree of participation?; and what is achievable in a given situation? The desirable level of participation is governed by the physical system characteristics, the community's knowledge, exposure, resource-mobilizing skills. The willingness to participate would depend on the opportunity costs of non-participation. The degree of participation is determined by homogeneity of the group, incentive structures, social/economic/human capabilities and leadership (Figure 7).

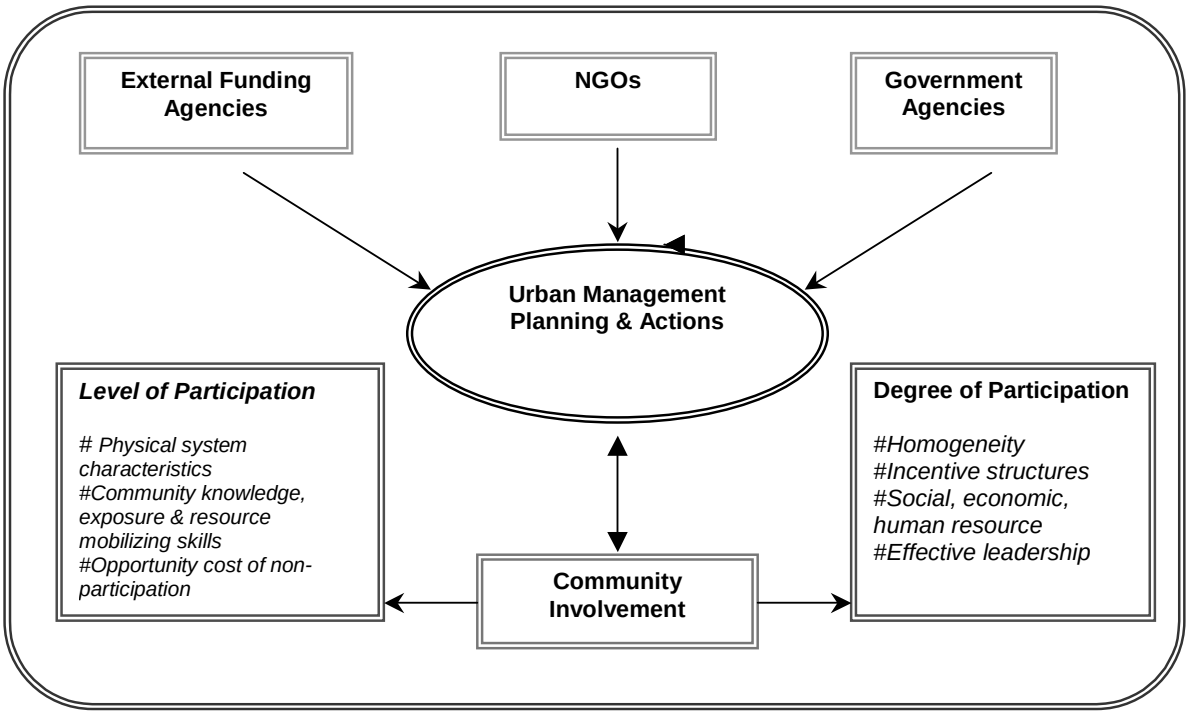

Figure 7: Factors affecting community participation in urban water management

The process involved in securing true community participation in the water and sanitation projects could, however, be complex and arduous, demanding greater amount of time and higher investments, than what would have been required to implement a project in a conventional techno-centric approach (James, 1998). Besides, there is a fear among governments of uncontrolled empowerment of people and lack of trust in their ability to make sensible decisions, which prevents the governments to change their paternalistic approach in decision-making. The only way that such issues against participation can be resolved is by looking at participation from a broader perspective and by weighing its benefits against

limitations. But, community participation could result in the project yielding greater social benefits and reducing the social costs. In addition to the positive externalities associated with community empowerment, community participation in planning could result in maximum benefits of WATSAN provision going to the poorest urban households and communities; reduced expenditure on guarding pipeline networks, reduced expenditure on detecting leaks, and leakage & theft prevention; reduced transaction cost of metering and pricing water volumetrically.

4.2 Directive reforms

Directive reforms refer to making legal and regulatory changes to enable organizations, institutions and agencies at all levels to enhance their capacities. Probable interventions required for such reforms include policy & legal changes and constitutional reforms (Brown, 2004). However, directive reforms are inherently political and typically slow and difficult, with stakeholders having their own interests. Some interests are more politically powerful than others, often distorting outcomes in favor of special interests. Policy actors and advisors need to make strategic assessments of how policies related to urban management can contribute in improving access, availability and quality of water services—a process of transforming perceptions, interests, and objectives into strategies. This means taking into account political feasibility as well as desired outcomes (Merrey et al., 2007).

The directive reforms in India's urban water supply sector are still in their infancy. Major reform was the transfer of the administrative and financial autonomy from the state to the urban local bodies through 74th amendment to the Constitution of India. But ULB's are yet to enjoy this autonomy status in spite of powers and authority (Panickar, 2007). Thus the major problem of urban water supply which includes system leakages and inappropriate water pricing mechanism continue to be left un-addressed. May be for some, the political economy is bigger than the need for improving the inefficient water supply system. The recently launched JNNURM does have strong focus on developing new urban water infrastructure in response to the ever increasing population and urbanization. But, any major commitment towards improving the deficiency plaguing the existing water supply infrastructure is yet to be seen. The need of the hour is to provide policy framework to the JNNURM program to make it much more effective in its reach and for its success.

The legislative framework for water in India, however, does not provide for tackling water issues across jurisdictions, between sectors as well as individuals. Nallathiga (n.d.) pointed out following short comings with the current set-up: 1) water has been delegated as state subject but water resource issues cross these boundaries; 2) surface water rights are not well defined, whereas ground water rights are purely private causing in-equity in access and environmental damages; 3) environmental laws have not been comprehensively implemented and regulatory standards are either not enforced or do not exist. Thus there is need

for a holistic policy framework to deal with the issues surmounting the urban water supply systems. In addition to the holistic framework, there is want to operationalise already existing legislations, especially constitutional amendments on decentralization (Cullet, 2008), which will surely result in empowerment of urban local bodies to manage water supply systems efficiently.

4.3 Human resource development

With the organizational changes, it is also important to provide technical assistance to develop local capacity of a municipality/water supplying utility for a variety of administrative, financial and managerial activities. The human resource development (HRD) is an important part of capacity building process, which will help in equipping the water utility staff with the understanding, skills and access to information, knowledge and training that enables them to perform urban water management functions effectively. HRD process can be undertaken by both professionally sound recruitments and providing training to existing staff to make them more competent in handling the water supplying functions. The HRD interventions should respond to local demand which, in turn, will be developed by the opportunities created by the systemic changes and from the greater awareness generated by dissemination of best practices (World Bank, 1998). One of the important tasks of urban water utility is the effective managerial performance (or staff performance) in terms of provision of water supply, sewerage collection and treatment, solid waste disposal etc. Staff performance is a function of the institutional regimes, especially the incentive structures; and training and skill development etc. It is also a function of the characteristics of the urban area, which is influenced by the way the areas are planned. In an urban area with high density population, the human resource required to maintain certain level of service with respect to water supply would be much less than that in another urban area where population is quite scattered. Number of staff per ‘000 connections and number of staff per ‘000 people are indicators of management performance or efficiency. Lower the figure, higher the efficiency. An ADB benchmarking report (2007) of 20 water utilities in India provide an average ratio of 7.4 for staff/000’ connections, but the average ratio for developing countries is around 5 and for developed countries is 2.1 (Figure 8). Thus there is need for HRD activities for staff of water utilities especially through training of staff in different aspects of operations (pumping, treatment plant operations, billing and collection, leak control and management, etc). For utilities of smaller urban centers, it is quite a difficult preposition especially in the initial stages of operations. This is where it would be good if regular training programs and advisory services are made available to these small utility operators.

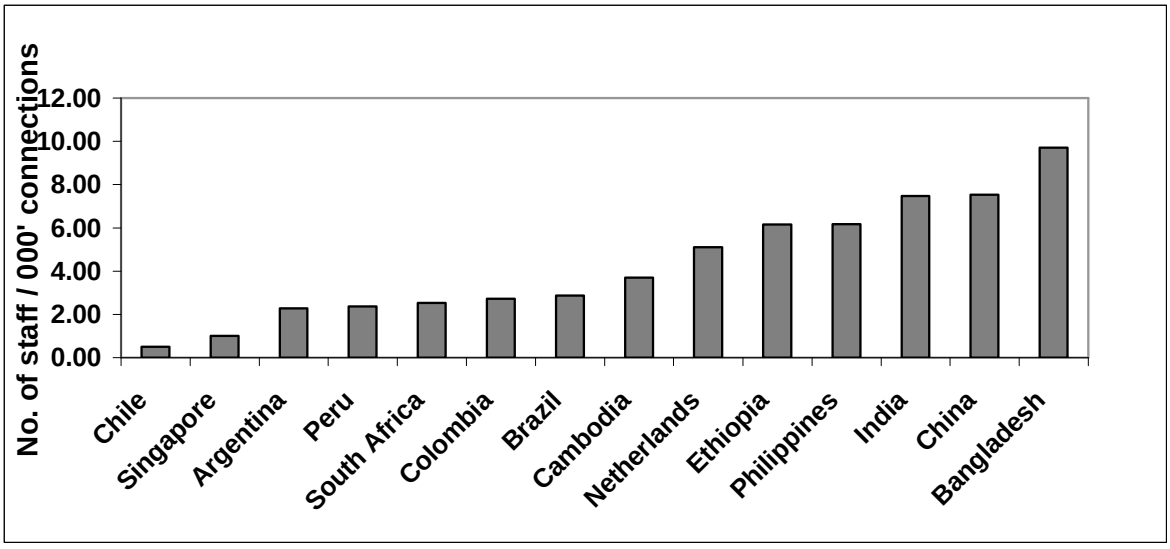

Figure 8: Staff ratio in urban water utilities across different countries
(Source: World Bank benchmarking of water and sanitation utilities)

The success of these HRD interventions will further be dependent on many other factors which can be grouped into driving forces, which will push for the success and restraining forces, which will try to obstruct the probable achievement (Singh, 2006). In Indian context, driving forces will be: 1) Institutional/Organizational capacity and support for HRD; 2) availability of finance to carry out the required training/recruitments, and; 3) desire for making the water supplying infrastructure (both physical and human) more efficient. On the other hand there will be restraining forces which will try to negate the positive effect of HRD interventions, and they include: 1) lack of political interest; 2) lack of policy framework for carrying out HRD; 3) Lack of skills and knowledge to carry out the required trainings, and; 4) lack of interest among staff members to undergo such capacity building exercises. However effort should be more on strengthening the driving forces and come out with clear strategies, structure and arrangements for carrying out the required HRD interventions so that it may ultimately lead to better and efficient performance of urban water supplying utility.

Apart from urban water utilities staff members training is also required for other concerned stakeholders. Tailor made programs should be designed for each audience to expand the reach of information program to all stakeholders. In addition, there is need for special attention towards small scale local private service providers, as they can play a major role in the delivery of water services in small town (World Bank, 2006).

5. CONCLUSION

Given the wide range of local and regional requirements in India, a "one size fits all" approach in implementing the recommended institutional change framework

may not be appropriate. The finer aspects of implementing the framework will depend upon the physical and socio-economic environment, political situation and administrative set up that exist in the urban area. It is considered that the institutional change process will be more so important for small urban towns where public utilities lack technical competence and are financially & managerially weak and so far have received little attention.

At present, the institutional change process in India's urban water supply sector is in various stages of development. Some reforms are in advance stage (decentralization, HRD but only in comparative terms) and some in infant stage (PSP, Community Participation, Directive Reforms). But all are in need of political and legal support to make them much more desired, effective and relevant. Improving urban water services will therefore require greater attention towards institutional restructuring, arrangements and reforms that can be sustained over the long run. Thus there is need to reform the overall urban water supplying utility set up in Indian in order to have: 1) greater financial & management autonomy; 2) transparency & accountability; 3) demand responsiveness; 4) cost-effective design & operation, and; 5) professional capacity, as well as elements of competition and the ability to expand. All these changes together can make Indian cities better equipped to avert risks, in the face of rapid urbanization, climate change and water scarcity.

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