

# Reforming Urban Water Supply Sector in India<sup>1</sup>

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## ABSTRACT

*The progress of the urban water supply sector has been somewhat slow in India, in spite of the policy initiatives, because of the improper focus and inadequate reforms in the urban local bodies (ULBs). Urban water supply is still largely characterized by the public good provided by a local government or a parastatal agency lacking viable mechanisms of financial and economic cost recovery. The approach to its development is also based on the supply expansion within the means of budgets. Even large metropolitan cities are yet to undertake basic reforms for improving the efficiency of water service provision and making it financially self sufficient. There has hardly been any strategic focus on 'demand management' and on improvement in service delivery efficiency. This paper provides a quantitative and analytical overview of water resources status at the macro level and then outlines the need for reforms in water supply and service as well as water service delivery. The reform agenda thereafter sets out the kind of reforms that can be envisaged in terms of water institutions, finances and governance and attempts to detail out some of them. Here, balancing of the financial sustainability/cost recovery and affordability/access to the poor may be balanced both through tariff design as well as new institutional finance models. It is hoped that with the large capital investments that are expected to come through partnership funding under JNNURM should provide some incentive for the ULBs to move on a reform path so that the assets created in the process are maintained and are utilized well beyond their design life span. This calls for building up a more comprehensive management in the ULBs that meets the varying demand criteria.*

**Key words:** water resource management, urban water supply, water governance, financial and institutional reforms

## 1. INTRODUCTION

Water is an important resource available for humans and fresh water is much more important given its limited availability and erratic distribution over space and

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time. India roughly accounts for 4.5 per cent of the World's fresh water resources, while at the same time it accounts for 2.5 per cent of total land mass and 16 per cent of total population. However, the availability of fresh water per capita itself has come down from about 5,177 cubic meter per head in 1951 to 1,820 cubic meter per head in 2001 and it is expected to further go down to 1,140 by 2050 AD (Sankarnarayan 2005).

Fresh water resources are increasingly becoming scarcer across the country, particularly with respect to catering to the human activities, due to several reasons: (a) the existing water resources have already been tapped through various development projects but have been utilized inefficiently, leaving little water available for the actual use (b) water pollution has rendered several of the water resources – both surface and ground water – unfit for use by any sector (c) the rising population and the trends of rapid urbanization necessitate a good amount of water devoted to human consumption, thereby not only reducing the per capita availability but also raising competition with other sectors.

The total water availability in India is 2,301 bcm, of which surface water source accounts for 1,869 bcm and ground water source accounts for 432 bcm. However, not that the entire water can be utilized: only 690 bcm of the surface water can be utilized through storage structures and ground water can be utilized only to the extent of its annual recharge. According to assessment made by the Ministry of Water Resources, the total water requirement of the country for various sectors was estimated to grow from 694 km<sup>3</sup> in 2010 to 973 km<sup>3</sup> in 2050. The utilizable water resources by 2050 were estimated to be 996 km<sup>3</sup>, suggesting no overall deficit like situation, which is not correct. The water availability is highly skewed in the Eastern part of the country, whereas the population and economic activities are concentrated in the Western part of the country, thereby an accentuating water availability problems in the West.

## **2. WATER POLICY AND PLANNING STRATEGIES**

The importance of the water sector is well recognized by the Indian Government. However, Water supply and sanitation is a State subject according to the provisions of Indian constitution, and State/Urban Local Bodies (ULBs) are vested with constitutional right for planning, designing, implementing, operation and maintenance of water and sanitation projects. The union ministry provides technical assistance to the states/ULBs in the project formulation. The National Water Policies provide guidelines to state governments on the priorities of allocation, methods of management, resource management and institutional issues, emerging approaches and trends. The first National Water Policy was prepared in 1987, which was revised and brought out in 2002. The National Water Policy, 2002 assigns overriding priority to drinking water in planning and

operation of water resources. The water allocation priority is given to the major sectors in the following order (decreasing order of priority)

1. Drinking water
2. Irrigation
3. Hydropower
4. Ecology
5. Agro industries & non-agricultural uses
6. Navigation and other uses

Urban water supply and sanitation sector remained an important area of concern from First Five-Year Plan. The plan outlay has constantly increased from Rs 43 crores (1.28% of public sector outlay) in the First Five-Year Plan to Rs 18,624 crores (2.17% of public sector outlay in the Ninth Five Year Plan; the Tenth Five-Year Plan outlay was estimated as Rs 44,206.55 crores. The estimates of likely available funds from various sources were Rs 35,800 crores. Moreover, the millennium development goals (MDGs) for water supply and sanitation laid down to reduce half the proportion of population without access to safe and sustainable water supply and sanitation by 2015. The Tenth Plan however had laid the target of achieving 100 % drinking water supply and 75% coverage of sewerage and sanitation facilities and is more comprehensive.

***Box 1: Sector issues to be addressed for achieving Tenth Plan goals and MDG***

- ⇒ Rapid pace of urbanization
- ⇒ Inadequate service coverage
- ⇒ Regional imbalance in availability of water
- ⇒ National water policy to be fully operationalised
- ⇒ Decreased availability of fresh water resources
- ⇒ Unreliable service provision
- ⇒ Need for water conservation
- ⇒ Need for institutional and fiscal reforms
- ⇒ Lack of private sector participation/involvement
- ⇒ Culture of treating water as a social good
- ⇒ Lack of reliable and dependable information system and database at State, Center and Local level
- ⇒ Inappropriate pricing policies
- ⇒ Deteriorating environmental conditions
- ⇒ Inadequate central and state budget provisions
- ⇒ Sizeable investment needs
- ⇒ High unaccounted for water

- ⇒ Inadequate and improper water quality surveillance
- ⇒ Lack of commercial orientation
- ⇒ Lack of autonomy to water supply and sanitation utilities
- ⇒ Lack of bankable projects to attract institutional financing and external funding agencies.

Source: Shankarnarayan (2005)

However, the National Water Policy (2002) is very weak in translating the ideas into becoming effective on ground as urban water supply is the matter of state and local governments. The Plans are also limited by taking no other role than allocating finances for the sector, without any understanding of how these investments are being used to achieve the results, even which are laid in a top-down manner. It has been observed that some of the deleterious implications of current approach include (World Bank 1999): (a) large foregone benefits to urban water sector, thereby to the citizens of urban areas; (b) high fiscal cost without achieving the objectives; (c) exorbitant costs of future provision (d) closure of various income-generating water uses and activities (e) continued high incidence of water borne diseases.

### 3. CHALLENGES OF URBAN WATER SECTOR

Undoubtedly, rising population and increasing urbanization are rendering high demands on water in India. Urban population has grown to the level of 285 million out of total population of 1.02 billion in 2001 and the 35 metros (million plus population) accounted for 37% of the urban population (Sankarnarayan 2005). The India Infrastructure Report (2004) mentioned that in terms of water supply service India appears on par with the Asia-Pacific and South Asian countries (see table 1).

Country	Access to Water Supply (as %)	GDP per capita (US\$)
Philippines	87	3805
Sri Lanka	83	3279
China	75	3617
India	89	2248
Pakistan	88	1834
Bangladesh	97	1483

Source: India Infrastructure Report (2004)

However, the service levels and quality are very poor, for example the average water supply is just 2-4 hours a day. Moreover, in terms of absolute figures, only 36.86 million of the 53.69 urban households have tap water supply, of which 26.67 have in their premises, 8.08 million have outside their premises and 2.09 million have within 100 metres (Sankarnarayan 2005). Large metropolitan cities, in particular, are becoming critical areas due to increasing water demand for domestic consumption, which often competes with other uses of fresh water. Apart from the challenges of water availability, major attention needs to be paid to their management in the urban context i.e., achieving maximum gains within the constraints through efficient use of all resources (Saleth and Dinar 1997).

Yet, in spite of the enormous challenge, water resource management in India, in general, in urban areas, particular has heavily focused on the supply expansion, whereas a good scope exists for demand management and improving use efficiency, which means taking a balanced approach to water management (Maheshwari and Pillai 2001). Whereas the water scarcity calls for an efficient utilization of water at all levels in order to meet with the sustainable development goals of human society, few cities are gearing up their water systems towards efficient water management and improved service delivery. In reality, Indian cities are not fully geared-up for reforms as (i) they are highly top-driven and follow the old guiding principle of water development and supply expansion, (ii) they use irrational water pricing methods and inefficient tariff structures, (iii) they persist with ill-adequate organizations and systems and are yet to formulate their agenda in implementable terms. Service delivery organizations have to reform organizational design to be effective (Rangachari 2003).

The World Bank (1999) mentions that the two critical challenges for urban water sector in India today are the need to:

- (i) improve resource allocation (both inter-sectoral and spatial) and management of water (both quantity and quality)
- (ii) improve service delivery in the water sector (towards efficient, equitable and customer oriented service)

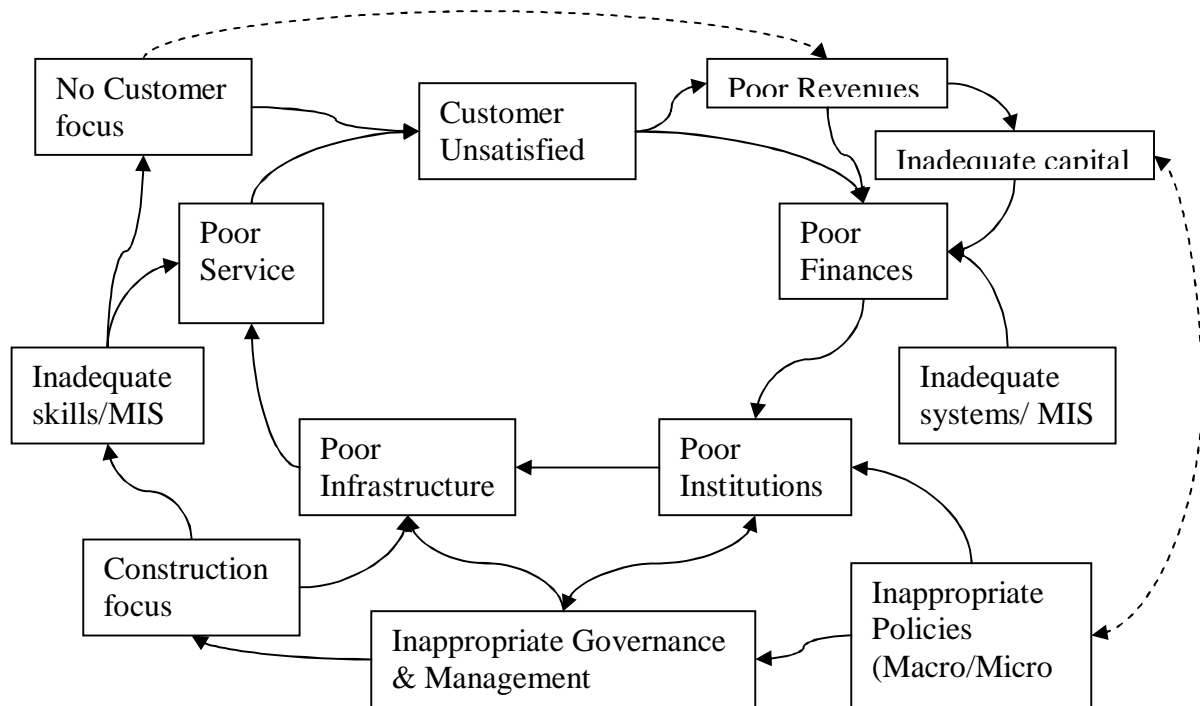
To meet these challenges, it suggests the following major in the current approaches towards water resource management in general and urban water in particular, which is laid down in the following table. This calls for wider range of reforms in urban water sector, which we explore in this paper. The fact that India's large metropolitan cities are also not setting on the reform path is discernibly outlined in Nallathiga (2006) and Nallathiga (2003), which provide framework for reform at ULB level.

<b>From</b>	<i>Towards</i>
Water resource development	Water resource management
Supply-oriented approach	Demand-driven approach
Disjoint water management	Conjunctive water management

Use maximization and extraction	Use efficiency and conservation
Treating water as social good	Treating water as economic and social good
Public sector management	Public-private partnerships
Public sector monopoly	Private sector participation
Top-down approach	Participatory approach
Centralised operations	Decentralised operations
<b>Government responsibility</b>	Stakeholder engagement

#### 4. NEED FOR URBAN WATER SECTOR REFORMS

Water sector, in general, and Urban water supply sector, in particular, is plagued by several factors contributing to their poor status. Some of these will be discussed in the following sub-sections. The current status of water sector performance – both resource allocation and service delivery – can be characterized by a vicious circle of various causative forces. We will examine these underlying structural and non-structural variables as how they interact yield such poor outcome in this section (see figure 1) and then embark on the reform agenda that is needed to overcome this problem in the next section.



**Figure 1: The Vicious Circle of Urban Water Sector**

Source: The World Bank (1999)

## **4.1 Water Resource Allocation and Management**

Given the central need is to introduce comprehensive measures to handle urban water resources issues in India, the following needs and options shall be explored in terms of the intervention areas like (a) policy, legislative and regulatory framework (b) institutional arrangements and mechanisms (c) economic and financial incentives and (d) information, technology and database systems.

### ***Policy, Legislative and Regulatory framework***

The National Water Policy, 1987 proposed several desirable objectives towards better water resources management and these include (a) assigning top priority to drinking water (b) discussion of wider environmental aspects (c) participation of beneficiaries in water management (d) allusion to water as a social and economic good, and (e) increasing water tariffs to cover operation and maintenance and part of the capital costs. The revised policy in 2002 went further by advocating community participation, public-private partnerships. However, the missing element was an enabling framework for implementing sound water allocation, planning and management. Moreover, the policy documents do not go beyond the 'conventional thinking' of fixed allocations and utilizing administrative mechanisms for achieving the goal.

The constitutional provisions and water legislation in India do not provide appropriate framework for tackling water issues across jurisdictions, between sectors as well as individuals. The current set-up has following short-comings: (a) water has been delegated as state subject but water resource issues cross these boundaries (b) surface water rights are ill defined, unsecure and non-transferable leaving little scope for their utilisation, whereas ground water rights are purely private causing environmental damages (c) environmental laws have not been comprehensively operationalised and regulatory standards are either not enforced or do not exist.

### ***Institutional Arrangements and Mechanisms***

The current institutional arrangements for water resource managements at all levels, central, state and local, and both formal and informal structures, do not enable comprehensive water allocation, planning and management. The main problems that exist are (World Bank 1999):

- (i) inadequacies in necessary institutions for comprehensive water allocation, planning and management at city, basin and state levels, which are frequently absent
- (ii) lack of coordination between the institutions; duplication of responsibility and accountability gaps
- (iii) inadequate fostering of grass root institutions

- (iv) lack of involvement of civil society – local community, NGOs, private sector and academia.

### ***Economic and Financial Incentives and Mechanisms***

The current incentive structure of water resource management leaves little scope for efficient use of water and its allocation between the sectors and users in an economically efficient manner. Bagchi (2003) clearly notes that cost recovery of water supply in major cities is far less from satisfactory. Inappropriate pricing, lack of well designed tariffs and absence of metering all lead to wastage of water and make the water services delivery to the risks of poor maintenance due to inadequate recovery of financial costs. Moreover, there is an absence of institutional, legal, administrative and technical mechanism for decentralized management, wherever possible, through development of formal water markets. However, there are some risks associated with such markets like unsustainable extraction of water especially ground water and imposition of barriers to access water on certain sections of the society.

### ***Information, Technology and Database Systems***

There is a great scope for improvement on these fronts, given the large gaps in these areas of water systems. The water losses at plants, during conveyance and distribution are very high to the tune of almost 30-50 per cent in many urban water systems. Database management and technology upgradation are not undertaken periodically and any type of audit is not prevalent. Water use efficiency is poor in all major uses/sectors – domestic, irrigation and industrial. Moreover, data and information systems of water availability and technology for monitoring water pollution are not given adequate attention. Likewise, metering, billing and pipeline flow inspection are not well executed and management structures are largely absent.

## **4.2 Water Resources Service Delivery**

However, apart from improving water allocation and management efficiency of water sector through reform process, it is also to undertake the reforms in the service delivery, wherein the potential is also very high due to the much closer interface with public. The major areas of reform in service delivery include:

- (i) Governance and management
- (ii) Organisational design and focus
- (iii) Information/ database management and technology deployment
- (iv) Economic incentives and accounting systems



### ***Governance and management***

Urban water governance is highly skewed towards bureaucratic or departmental functioning without much involvement of all stakeholders. Even in the current design, the institutional arrangements are weak and the management organization lacks incentives for giving better outputs. Most of the water supply functions are catered by the public health engineering, municipal water works and public works departments with little coordination among them. The organizational structures do not encourage efficiency and outputs, but reward positions based on the tenure and past experience. It is therefore geared towards serving the needs of public/departmental services rather than catering to the needs of the customers/citizens. Moreover, decentralized governance principles are yet to be followed i.e., citizen group empowerment, local level access and community/public involvement.

### ***Organisational design and focus***

The organizational design is hierarchical, which is mostly the case of large public organizations, and not suited to a customer-focused service delivery. The departments within the organization confine to the functions but their integration is a real challenge to the senior management (see Shanmugam 2006 for illustration in the context of Hyderabad). The technical staff members (engineers) are promoted based on their tenure but not outcomes; the service staff is assigned jurisdictions but its accountability is often poor. It is reported that the staffing ratio in water organizations in India is very high in the range of 40 – 60 persons per 1,000 service connections as compared to around 10 staff per 1,000 connections in South Asia and international benchmark of about 2-3 staff per 1,000 connections (The World Bank 1999). The focus of the organization has also to shift from that driven by supply expansion and bureaucratic style of functioning to that driven by customers' demand and service oriented functioning, which requires appropriate organizational design (Rangachari 2003).

### ***Information /database management and Deployment of technology***

For an effective functioning of any organization, information/database management is essential, particularly in the case of customer oriented organization. However, most of the water supply entities lack good management information systems (MIS) of their organization. The data generation methods and recoring are poor, data formats are not well designed, record maintenance and retrieval is done in a haphazard manner. The result is poor capacity of the organization to understand its own business and run it in an efficient manner. Not only that there is potential for automation of operations but also restructuring the organization and management structures. For this to be effective and to enhance the capacity to monitor water resources – both quantity and quality – deployment of new technologies is very necessary.

### ***Economic Incentives and Accounting systems***

The current structure of water tariffs do not provide any economic incentives in terms of recovering costs – both operation and maintenance and depreciation of capital – in the urban areas; rather, they provide incentives for over consumption and inefficient use while not reflecting the scarce conditions of water availability. Further, most of the water supply organizations face financial constraints as their business is not completely run on the revenues, especially when it comes to the capital works this is a major constraint. It is therefore imperative that they become more proactive and borrow finances from private sector to provide adequate returns. Bonds have been recently used by urban local bodies for financing their operations, which can be extended to water services exclusively. The accounting systems in most of the ULBs use single entry systems and are outdated in their design as well as operation. Many of them are of all services under one roof type, leaving little understandable in terms of the cost incurred on and revenue recovered from water services. Water accounting needs to be separated from general pool and it should be based on the double entry or fund based accounting systems.

## **5. REFORM AGENDA FOR URBAN WATER SECTOR**

The above discussion clearly implies that the urban water sector needs to be reformed on several major fronts, given the inadequacies and shortcomings of the current status. It becomes evident that the reforms are required on the fronts of water allocation and management as well as service delivery. We discuss the reform agenda for urban water sector hereunder under the broad headings of institutional, governance and financial reforms.

### **5.1 Institutional Reforms**

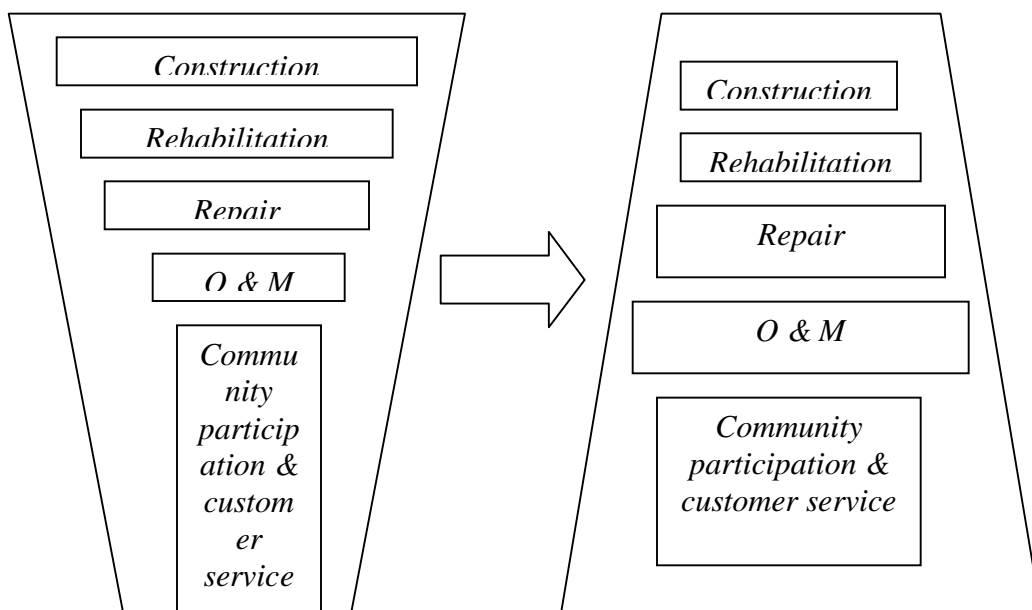
The above discussion clearly outlined that the current urban water management institutions are not well designed to provide incentives for better performance and efficient management.

#### ***Changing the priority***

The orientation of the water supply agencies has been not appropriate to the needs as they are more inclined towards supply expansion but not demand management in meeting with the challenges of providing water. However, this inevitably results in conflicts and pressures on inter-sectoral allocation of water; given the scarcity of water, a favourable shift towards higher allocation to urban areas requires all other means are exhausted. Instead of undertaking new water

supply projects, the options for repair and rehabilitation of water supply systems, at a low cost, need to be undertaken.

This is the case given that water losses in the conveyance and distribution are very high and so is the proportion of 'unaccounted for water (UFW)'. The operations and maintenance of water supply is a gigantic task that can be done much better with the help of participation of local community and private NGOs, which can also lead to savings on costs. Moreover, water supply service delivery requires an orientation towards customer needs and demand management by building the capacity to gauge the people's willingness to pay for higher water use, reliability of the system and even that for water tariff hikes. Participation of community, NGOs and private sector needs to be viewed as a positive step forward towards better results and the modes of partnerships need to be well designed. A shift in this focus is implied in the figure 3



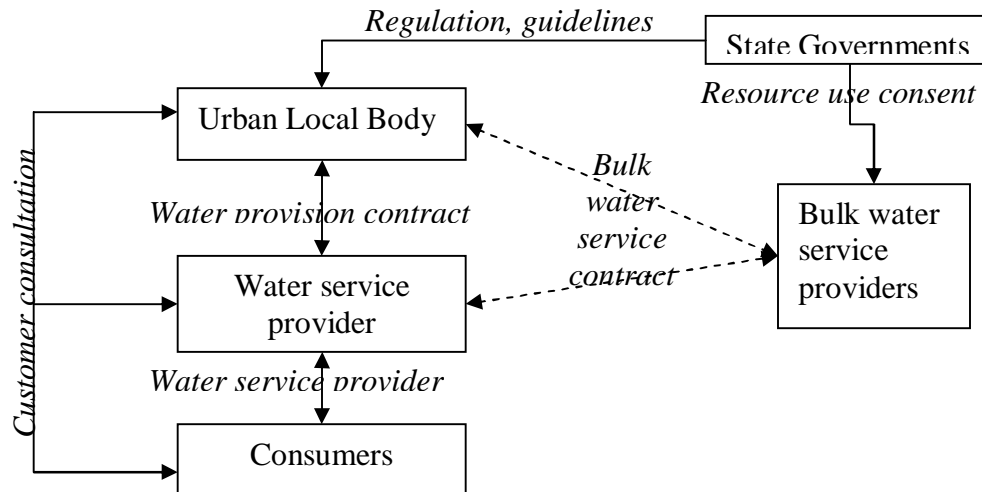
**Figure 3: Shifting priorities of water supply institutions**

Source: The World Bank (1999)

### ***Organisational restructuring***

However, a sudden shift towards customer oriented functioning might not be possible in the current institutional arrangement wherein the organisations function more like a bureaucratic organizations rather than customer driven organizations. Water supply system is organized through departmental apparatus - water production is undertaken by public (water) works department, its conveyance and distribution undertaken by hydraulic/water engineering department, water pollution/quality is checked by either public health department or pollution control board. Coordination of these departments is very crucial but no mechanisms for their coordination are designed other than their function overseen by the municipal commissioner. It implies that the current institutional arrangements have little incentives for efficient functioning and lack a holistic

view of their management. However, this does not mean they need to be abolished; rather, adequate and appropriate participation of private sector will certainly help in overcoming the drawback. This is implied in the alternative institutional structure of urban water supply shown in figure 4.



**Figure 4: Possible institutional structure for urban water supply sector**  
Source: The World Bank (1999)

### ***Private sector participation***

It is also essential that for efficient management of water sector, the involvement of private sector is an essential ingredient. However, it needs to be distinguished from and not understood as total privatization, which can be undertaken only after a thorough analysis of the state of economy and depth of its institutions. This does not even mean total 'roll back' of State. It essentially means engaging private sector in those operations, which it can perform with better efficiency and improve the service quality more effectively. There are several variants of private sector involvement in the provision of urban water supply services in the form of public-private partnerships (PPPs), which are described in table 1.

However, it needs to be understood that the effective outcomes from involvement of private sector do not come such model cannot come without the necessary structural changes in governance and finances, which are explained in the next sections. Moreover, for realizing the full potential of contracts in achieving efficient service provision and equitable service coverage to the poor the following factors need to be incorporated into the design of the private sector participation in the service provision (Rosenthal and Alexander 2003):

- (i) *Efficiency gains used to place downward pressure on prices.* The 'efficiency dividend can be distributed in many ways.
- (ii) *There are incentives for expansion in poor neighbourhoods.* Incentives for expansion are no guarantee that the poor will benefit; in fact, several factors may lead to an anti-poor bias.

- (iii) *Multiple service levels are encouraged.* The poor benefit from innovation and multiple service levels.
- (iv) *All service providers are free to respond to demand.* Transactions that hinder service provision by alternative enterprises can do the poor a disservice.

**Table 1 Types of public-private partnerships**

<b>PPP Option</b>	<b>Asset Ownership</b>	<b>Operation &amp; Maintenance</b>	<b>Capital Investment</b>	<b>Commercial Risk</b>	<b>Duration (years)</b>
Management Contract	Public	Private	Public	Public	3-5
Lease Contract	Public	Private	Public	Shared	8-15
Concession/BOT	Public	Private	Private	Private	25-30
BOOT/BOO	Public/Private	Private	Private	Private	20-30

Source: Nallathiga (2007)

## **5.2 Financial Reforms**

Most of the urban water supply systems have not been able to perform well because of the inappropriate design of their finances and their monitoring systems. The first aspect refers to the design of financial mechanisms that adequately recover costs and make the service delivery a viable option, whereas the second one refers to the design of financial management systems – accounting, information/database management, financing capital. We will examine the scope for reforms on these aspects hereunder.

### ***Cost recovery***

An important aspect of the financial performance of the urban water supply systems is their ability to provide the service at a price that recovers the cost towards the production. A wide varying approaches and arguments exist in this case from full cost recovery to recovery or operations and maintenance. It is rationally argued that the water supply pricing should at least recover the costs incurred in the operation and maintenance of water supply system and part of the capital costs – especially either the depreciation cost of the asset or the interest payment costs on the capital deployed.

Capital costs, it is understood, are part of the municipal capital expenditure, which are financed either through general local taxes or through inter-governmental transfers (plan grants). It has been widely reported that most of the cities are not able to raise finances not even equal to operation and maintenance through the user charges, which led to the sheer neglect of the assets and inefficient service delivery i.e., high losses of water (e.g., see Bagchi 2003). An important part of this process is the water tariff design, which does not adequately address the issues of long-term financial viability of the systems.

### ***Tariff structure reform***

Water tariff is an important management tool, yet there is a general failure in using it to the potential because of the differences over its objectives and outcomes. Quite often, apprehensions are made over consumer choices and responses and market tests for the same are lacking. The water tariff setting needs to strike a balance between following different goals:

(a) **Economic efficiency:** Economic efficiency requires that the prices signal to consumer of the full costs (financial, environmental and social) of their decision to use water (on the rest of the system and the economy). The cost of bringing additional water is higher than the costs of supplying existing water in many cities, as the cheapest sources are exhausted first. Therefore, the marginal cost, which reflects the financial costs of laying down asset and the social cost of diverting water from other purposes, needs to become the guiding method according to this criterion of water pricing.

(b) **Cost recovery:** This criterion seeks to achieve the financial goals – recovering the full financial costs of water supply service, which includes both capital costs as well as operations and maintenance costs. The underlying reason is that urban water supply systems, like other assets, needs to be created to recover full cost so that the asset life is longer and its service delivery efficiency is not compromised.

(c) **Equity:** This criterion essentially seeks water tariff treats similar customers equally and that customers in different situations are not treated the same. Equity goals are pursued to ensure that the customers in same class/category are not treated differently and there should not be any price discrimination.

(d) **Affordability:** This refers to the aspects of treating water as a social good and providing it at a price which the various users can afford to pay. However, it does not mean uniform low pricing of services, rather it means designing water tariff such that the (rich) users of large amounts of water subsidize the (poor) users of small amounts of water. However, it is practically very difficult to achieve.

Water tariff design essentially seeks to strike a balance between various goals of the water supply system, but it cannot certainly meet all of them. There are a variety of tariff structures available which primarily meet one or a few goals, partially meet some of them and may not at all meet some. There are two main types of tariff structures used in the municipal water supply sector:

(a) Single-part tariffs

(b) Two-part tariffs

Single-part tariff uses only one type of calculation or charge (either fixed or variable) in fixing water price, whereas the Two-part tariffs use a mix of charges (both fixed and variable) in determining the water price. The various types of water tariffs/charges used in fixing the water price and their relative merits and demerits are shown in table 2.

**Table 2: Various types of tariffs and their characteristics**

<i>Tariff/ Charge</i>	<i>Rationale</i>	<i>Merits/Demerits</i>	<i>Examples</i>
<b>Fixed water charge</b>	Water tariff levied as a fixed water charge irrespective of the water use/ consumption (however, it can be made variable by discriminating user groups or classes or locations with differential fixed charges)	It is useful when water metering is not done and can be used where water available is plenty.  It does not provide any incentives for economic uses of water	Canada Norway United Kingdom
<b>Uniform Volumetric charges</b>	Water tariff levied based on the quantity of water consumption, while the unit price of water is fixed but subject to periodic revision.	It is simple and reflects the marginal costs of water provision to the consumer when the prices are fixed so.  It requires complete water metering and recording.	United States of America Australia European Countries
<b>Increasing Block Tariffs (IBT)</b>	Water tariffs are levied in consumption blocks such that the price charged increases with the increase of block. Consumers pay a uniform rate until the first block, and then they pay higher charges with every additional volume of water consumed in successively higher blocks.	It provides for affordability of the poor through a life line block; it promotes water conservation; it can achieve efficiency by confronting consumers in higher blocks with the marginal costs of using water; it can raise sufficient revenues to recover costs.  It needs to be designed very carefully and revised when required. Bad designs can adversely affect all consumers.	Canada United States of America
<b>Decreasing Block Tariffs (DBT)</b>	Water tariffs are levied such that the charges actually decrease with the increase in	It is primarily useful in the new townships and new industrial settlements, where	Canada United States of



	consumption blocks, in an opposite direction. The users of higher blocks pay lesser and lesser charges with every additional volume of water consumed.	economies of scale are important in providing water supply and meeting the costs.  It discourages conservation and can be politically unattractive as it results in high volume users paying low average water prices.	America
<b>Increasing Linear Tariff</b>	Water tariff continuously changes with the quantity of water consumed and users are confronted with the tariff prevalent at that point of consumption. The base and rate of tariff increase are set to achieve desired goals.	It sends powerful signals to the consumer that increased water use is costly as the charge is levied not alone on the last consumption unit but also on all preceding units. It is rarely used as it often confronts users with rates higher than marginal costs.	---

Source: Prepared based on Boland and Whittington (2002)

When reforms in urban water sector are undertaken, they need to specify the objectives of the reform process. They can also specifically weights attached to or the importance given to the various objectives, if not one of them is the main objectives. Based on this information, the appropriate water tariff structure can be chosen; or, even a combination of water tariffs can be used to satisfy the goals. It is important to understand that the water tariffs fixation is left to an independent regulator with little political intervention for better results.

While as a part of the reform process, the scope for financial reforms can be extended further by making use of several financing and pricing initiatives that enhance efficiency in water service provision. The five pricing related issues include (Mann 1992):

**Seasonal Pricing**, which recognizes that the unit cost of water provision in peak-demand periods exceeds the unit cost of provision in off-peak periods;

**Zonal Pricing**, which recognizes that the unit cost of providing water can vary substantially for customers at different locations within the utility service area;

**Conservation Surcharges**, which recognize that the conservation is a means of avoiding expensive capacity expansion;

**Availability Charges**, which recognize that future (but presently unconnected) customers cause certain costs to be incurred, prior to their actually being provided water service; and,

**System Development Charges**, which recognize that newly connected customers impose certain costs on the water system.

### 5.3 Governance Reforms

Governance reforms are an important constituent of the water supply reforms. In fact, the actual water supply reforms start from it through the changing conditions conducive to achieving the desirable results. Although a smaller entity, public utility is a part of government, either directly if it is publicly owned, or indirectly if it is privately owned but publicly regulated, and hence principles of good governance should apply to their management as is the case of other constituents of government (Dole and Bartlett 2004). The public utility – water supply undertaking of the Urban Local Body – has to primarily reform the way the business is run while committing itself to the principles of good governance. Some of the major reforms (although not complete) that we discuss include reforming the process of tariff setting, unbundling of the policy and regulation from the service delivery and charting alternate institutional arrangements.

#### ***Tariff setting***

Good governance applies to public utility management in a variety of ways: one of the important issues is the tariff setting process described above. Three aspects of good governance need to be considered in setting tariffs and tariff structure (*ibid*):

- (i) *Transparency*: The public should be able to understand the tariff setting process, how the charges were set for every type of customer;
- (ii) *Simplicity*: The charges resulting from the tariff should be clear and understandable, so that the customer can understand how they modify their use of the service and reduce their bills;
- (iii) *Predictability*: The tariff should not disrupt otherwise rational private decisions, especially investment decisions and others with long-term implications.

A simple decision rule that Dole and Bartlett (2004) suggest to set tariff to satisfy the multiple goals of tariff setting is as following:

- A. Set charges of water use for equity and economic efficiency
- B. If additional revenue is required for financial sustainability, set fixed charges for sustainability and fairness
- C. Increase or adjust at a rate consistent with the above three aspects of good governance.

### ***Unbundling***

However, apart from the tariff setting, governance reforms are required on several other fronts for the sustainability of water supply systems in the long run. An important aspect of the governance reform is how well the organization is structured and aligned to meet with the objectives of efficient service delivery. An important governance issue is the unbundling of pricing and services of urban water supply systems, which is akin to the unbundling of regulation and policy functions from the service delivery achieved in the case of electricity and telecommunication services. The water tariffs have to be set independently through a different process requiring social and economic analysis of the customers and achieving wider consensus through a variety of processes. Service delivery, on the other hand has to focus exclusively on the demands made, current capacity and the methods of handling customers.

### ***Alternative institutional arrangements***

Governance reforms also pertain to how institutions are arranged and structured while incorporating the principles of transparency, accountability and participation in the framework. The current institutional arrangements leave little scope for the participation of the private sector – both for-profit and non-profit organizations (NGOs) and community/ neighbourhood groups, which enjoy much closer rapport with the general public at local level. The for-profit organizations can potentially play a good supportive role as ‘Bulk water supply entity’ that can engage in the water production through extraction from the reserves upon the consent given by the government and sell it to the retail water suppliers i.e., the urban local bodies/ panchayats in the nearby and private/community water supply entities that undertake water supply service to these areas (in line with the structure presented in Figure 4). On the other hand, the community and neighbourhood groups could undertake the responsibility of monitoring piped water supply i.e., leakages from the system, its operation and maintenance, water quality at receiving end. This will not only improve the efficiency of service delivery but also make the retail water supply entities much better aligned towards becoming accountable and participative.

### ***Information Technology and Accounting systems***

As noted earlier, the information systems of the water supply entities follow archaic methods of information generation, recording, retrieval and data base management. Most of the water supply information is not generated in a structured manner following any standard designs of bills/vouchers and most of it is not recorded and stored. Data retrieval of any query requires case to case manual search and poor quality and reliability of retrieval. The management information systems (MIS) are not well established and unless they are well established it is difficult to see some visible progress in database storage, retrieval and management. Moreover, such data shall be of immense use for understanding the functioning of the organization by the human resources division or consultants to redesign/alter the structure. There is a tremendous scope for the application of information technology here, which can help the

concerned organizations to organize more efficiently and use the advantages of speedy data entry, processing and queries that can be performed on the computers. Moreover, most of the urban local bodies and water supply entities follow cash based accounting system, which does not reveal the assets and their value and lot of money gets wasted due to the unawareness of the asset base. It is important for the water supply entities to make use of the appropriate accounting systems based on the double entry of book keeping and the complete costs – capital and operation and maintenance – are known. This again requires deployment of low-cost but high value information systems – devices, software and application set.

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