



# **Regulatory framework for water services in the state of Gujarat**

## **Volume I**

*Prepared for*

**Gujarat Infrastructure Development Board  
Gandhinagar**

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Thanks are also due to Ms K Radhika for secretarial assistance.

# Abbreviations

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ADB	Asian Development Bank
AMC	Ahmedabad Municipal Corporation
AMC	Ahmedabad Municipal Corporation
AUA	Ahmedabad Urban Agglomeration
AUDA	Ahmedabad Urban Development Authority
BIS	Bureau of Indian Standards
BIS	Bureau of Indian Standards
BOD	Biochemical oxygen demand
BOOT	Build own operate transfer
BOT	built operate transfer
BWSSB	Bangalore Water Supply and Sewerage Board
C&AG	Controller and Auditor General
CA	Concession agreement
CA	Constitutional Amendment
CERC	Central Electricity Regulatory Commission
CMA	Chennai Metropolitan Area
CMC	Chennai Metropolitan Corporation
CMWSSB	Chennai Metropolitan Water Supply and Sewerage Board
CPHEEO	Central Public Health Environmental Engineering Organisation
CrPc	Code of criminal procedure

K&C	Koramangala and Challabhata
KUWSDB	Karnataka Urban Water Supply and Drainage Board
LPCD	Litres per capita per day
MAF	Million acre feet
MCM	Million cubic metre
MLD	Million litres per day
MoU	Memorandum of understanding
MUD	Ministry of Urban Development
NMC	Narmada Main Canal
NRV	Net rateable value
NTADCL	New Tirupur Area Development Corporation Limited
OE	Over exploited
O&M	Operation and maintenance
OERC	Orissa Electricity Regulatory Commission
OFWAT	Office of Water Services
OSN	Obras Sanitarias de La Nation
PSC	Public Service Commission
PSP	Private Sector Participation
PUC	Public Utilities Commission
PWD	Public Works Department
QOS	Quality of service

ULBs	Urban local bodies
USAID	United States Agency for International Development
USERS	Urban Services Environment Rating System
WHO	World Health Organization
WRA	Water Regulatory Authority
WRO	Water Resources Organisation
WTP	Willingness to pay

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# Executive summary

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## Introduction

A review of the current state of the water sector in Gujarat revealed that distribution of water resources in Gujarat is uneven leading to significant over exploitation of groundwater in the water deficient areas. In addition, the state has a complex institutional structure with multiple agencies and overlapping jurisdictions with many SPVs (special purpose vehicles) in the water sector for the execution and operation of specific projects, principally those linked with the Sardar Sarovar project.

Augmentation of water supply and improvements in water quality will call for significant investments. It has been recognised that the state cannot finance these activities on its own. That private investment in the water sector would be required to augment the efforts of the state has been recognised in Gujarat. A need was felt to have an enabling framework to introduce private sector participation, which would address many complex issues to balance the interests of both the consumers and the investors in the liberalised environment in Gujarat. In this context, the Government of Gujarat undertook a study, and the GIDB (Gujarat Infrastructure Development Board), Government of Gujarat, assigned the task to TERI (Tata Energy Research Institute), New Delhi.

The objectives of the study were two fold. One, to identify and suggest changes in the provisions in the existing legislation to facilitate the privatisation in the water sector. Second, to develop an enabling regulatory framework to facilitate private sector involvement in the water sector. The methodology adopted was a combination of literature surveys, interaction with experts, discussions with agencies and organisations in this area, field visit to Ahmedabad Municipal Corporation, Rajkot Municipal Corporation, and water supply agencies in Bangalore and Chennai, and a review of the current regulatory structure in place along with the legal provisions in Gujarat governing such regulatory structure.

## Gujarat's water sector

While south Gujarat has abundant water resources, North Gujarat, Saurashtra and Kutchh are water deficient areas. This has adverse effect on exploitation of ground water. However, the proportion of groundwater in the total supply is

initiatives have already taken place in Karnataka for augmentation of its water supply in Bangalore as well as treatment of wastewater in the city.

Private sector participation in areas such as billing and collection, meter installation, etc., as in Mexico City; for contracting out operation of the existing treatment works as in Puerto Rico, and for creating new assets through BOOT options as in Thailand, for managing the water services through concession contracts in Bolivia, Chile and through divestiture in UK, are some international examples of PSP.

## Scope for private sector participation in Gujarat

The major area of concern in Gujarat's urban water supply is how to minimise losses in the distribution network as well as to augment the water sources. In spite of being identified as priority areas for initiating private sector participation, there does not appear to be any significant privatisation initiative in the water sector in municipal corporations in Gujarat. It is important to recognise that given the criticality of the demand-supply gap in the area, and the consequent investment requirements, private sector involvement may result in additional investments in this sector, given right kind of the enabling environment. The GSDWICL (Gujarat State Drinking Water Infrastructure Company Ltd) has also identified some projects for the purpose of construction of the bulk distribution network for the Sardar Sarovar scheme to be executed with substantial private sector participation.

The following methodologies for introducing sectoral reforms as well as for introducing private sector participation in the water sector in Gujarat, may be examined in greater detail:

- Since the Sardar Sarovar Narmada Nigam Ltd has raised a large amount of capital on commercial terms for the laying down of the canal network for bulk transmission of water, it is recommended that the company operates on commercial lines by charging an economic price for the water supply.
- Given the marginal share of GWRDC (Gujarat Water Resources Development Corporation) in the groundwater sector in the state, it is recommended that GWRDC be completely privatised either by transferring the tubewells to farmers' co-operatives, or by divesting it to the private sector.
- All projects owned and operated by Department of Narmada, Water Resource and Water Supply should also be operated on commercial lines and each project should be made into a profit centre.

How will  
sub soil  
water be  
identified  
delimited  
rights  
compared  
with other  
the common use

process is the likely increase in transaction costs, which have to be mitigated. The activities of the service providers in the monopoly segments of the water cycle would have to be regulated for protecting the interests of consumers. A strong regulatory framework, which would not only protect the interests of the investors, but also balance them with the public interest in general would be called for. Such a regulatory framework has to exist outside the existing governmental set up, and should have an arms-length relationship with the government as well as local bodies.

It is recommended that there should be a WRA (Water Regulatory Authority) which should maintain an arms-length relationship with stakeholders, including government as well as local bodies, and regulate segments of water supply. It is further recommended that the WRA should be constituted before the water sector is opened in Gujarat. The WRA should be positioned through independent legislation incorporating various provisions as discussed below. The WRA should have jurisdiction over the whole state of Gujarat and should regulate the following segments of water supply system:

- Capturing the sources
- Transmission (also called 'conveyance') of water
- Distribution of water

## *Design issues*

### **Scope**

It is recommended that the WRA should have the following functions.

- To frame principles for determination of tariff for water services during Phase I of the regulatory process, not exceeding 3 years. During the Phase II of the regulatory process, the WRA should regulate tariff – retail and bulk.
- To lay down and enforce minimum standards of service, and to also monitor the above standards through surveys. As regards the water quality, either the regulator or the relevant government agency should be assigned to determine the minimum water quality standards, and ensure their enforcement.
- To promote economy and efficiency in the water supply services in Gujarat.
- To facilitate competition in water sector in Gujarat.
- To adjudicate disputes and differences amongst various service providers or / and between a service provider and a group of consumers.
- To recommend generic terms and conditions of the new concession agreement in water sector as well as to recommend terms and conditions of a specific concession agreement, if required by the Government.

## Accountability

To ensure accountability of the regulatory process, it is recommended that:

- The authority should ensure transparency during the regulatory process.
- The WRA should undertake judicial proceeding while discharging its dispute settlement function.
- The consultative process is preferable to formal hearings in as much as it provides for a comprehensive discussion of issues with different stakeholders and, thus, is less costly and less time consuming. Thus the consultative processes should be encouraged in the regulatory process except in the dispute settlement cases.
- An appeal against the decision of the WRA must be to an independent body and should be on a question of law. The appellate authority could be a High Court or a Tribunal in Gujarat with quasi-judicial powers.
- The authority should maintain proper accounts, and prepare an annual statement of accounts in such form as may be prescribed in consultation with the Comptroller and Auditor-General of India.
- Its accounts should be audited by the Comptroller and Auditor General of India.
- Its accounts must to be certified by the Comptroller and Auditor-General, and shall be forwarded annually to the State Government by the authority. The State Government shall cause the audit report to be placed/labelled, as soon as may be after it is received, before the State Legislature.
- The authority shall prepare, once every year, in such form and at such time as may be prescribed, an annual report including a summary of its activities during the previous year and copies of the report shall be forwarded to the State Government. A copy of such report should be labelled before the State Legislature.

## Powers

The WRA should have adequate power to ensure compliance of its order and 'directions'. If these are violated, there should be adequate punishment. The WRA shall, for the purposes of any inquiry, have the powers of a Civil Court while trying a suit. The Authority may call upon the specified Government company or any person to furnish to the authority periodically, or, as and when required, any information concerning its or his activities related to water supply.

bodies. The regulator would specify the objectives, the principles and the procedure to be followed for the determination of the tariff. The local body, according to the specified formula would then determine the price. It would be necessary to file with the regulator, all necessary information whenever a change in the tariff is effected.

During Phase II, a two-tier regulatory structure is suggested: demand charge to recover a portion of the fixed costs associated with the cost of providing supply, and variable charges to cover the OM cost and the balance of the fixed costs. The principles to be followed during the tariff design are:

1. To promote efficiency and economy in the activities of the sector.
2. To secure the financial viability of the entities in the sector.
3. To provide incentives for optimum investment.
4. The tariff should reflect the cost of supply of providing water.
5. The tariff should be fair, just and non-discriminatory.
6. The tariff structure will be unbundled to reflect the cost of providing different services.
7. The tariff, to the extent possible, should be simple and easy to understand and implement.

The tariff determination process should be invariably consultative, and should not be quasi judicial.

## Framework for water quality standards

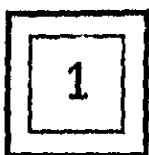
The Government of Gujarat or WRA should formulate the minimum drinking water quality standards as per the BIS standards and the framework for water quality surveillance for the service provider. The scope of water quality monitoring, number of parameters to be analysed and sampling and analysis methodology could be modified as per the WHO/ EC guidelines taking into consideration local conditions, raw water source and past track record.

The Government of Gujarat or WRA, as the case may be, should always ensure that the service provider meets the bacteriological quality and residual chlorine requirements, irrespective of the local conditions and the raw water source.

## Legislative changes

The positioning of the WRA and with the functions as stated above, would require certain changes in following acts/laws, a tentative list of which has been placed at Chapter 9:





# Introduction

## Background of the study

Due to increased urbanization, population growth, rising incomes etc., the demand for water in India is rapidly increasing. Its use, however, remains inefficient, although it is becoming scarcer day by day. Water supply in urban India is both inadequate and inefficient despite universal acknowledgement of water as a fundamental requirement of life. About 18 percent of the urban population does not have access to safe drinking water. Only 58 percent of urban households have access to drinking water on the premises. Compared to the minimum acceptable availability level of 40 litres per capita per day (lpcd), current availability is only 27 lpcd (Ministry of Finance 1996) — caused not only due to the inefficient end use of water but also on account of enormous distribution losses. Other problems associated with water supply are the presence of impurities in the supply of drinking water and the water supply being largely unmetered.

Augmentation of water supply and improvements in water quality call for significant investments. The Rakesh Mohan Committee estimates the magnitude of investment to be of the order of Rs 860.2 billion in the period 1996 to 2006 in India's urban areas. The Planning Commission estimates that Rs 200.7 billion would be required during the Ninth Five-Year Plan (1997–2002). As in other core infrastructure sectors, the state cannot finance all such development activities on its own. Thus, private investment would be required to augment the efforts of the state in this key sector. This has been recognized in Gujarat as well — the state that is the focus of this study.

The peculiarity of the water sector in terms of being one of the basic minimum services, makes private participation in this sector particularly complex. First, since water is essential to life, its availability to the economically disadvantaged groups at low delivery prices has to be ensured. Thus, the universal service obligation in this sector is much stronger than say in the telecom sector, and this has implications for tariff determination and levels of subsidy. Second, the health and sanitation aspects associated with water-supply services are important, and these cannot be left to private operators without appropriate regulation. Third, unlike in other sectors, the predominant cost in water supply is the cost of transmission and distribution, and not the cost of production or storage. As the scope for competition in distribution

- To develop a framework that will protect consumer interests while ensuring private sector participation in the water sector

## Study approach

In order to meet the objectives, the methodology adopted is as follows.

An extensive survey of literature on privatization of the water supply sector and the issues involved therein

- A review of the current regulatory framework for water supply in Gujarat, including the laws governing municipal administration, the legal provisions and the rules and regulations for water supply
- Extensive discussions with experts in the water sector, and stakeholders associated with water services in Gujarat
- A review of the privatization experience of other urban centres—both domestic and international
- Study tours to other urban centres like Chennai and Bangalore to facilitate a better understanding of the organizational dynamics of urban services, especially water supply services

## Structure of the report

The second chapter reviews the water sector in Gujarat including an overview of the water-resource situation and the institutional structure of the water sector in the state. Chapter 3 analyses lessons drawn from national and international experience in the privatization and regulation of the water sector. Chapter 4 investigates the scope of private sector participation in all the segments of water supply and related services. The legal impediments to private sector participation are identified in Chapter 5. The enabling regulatory framework, to facilitate investment and to promote efficiency and economy in the sector, is presented in Chapter 6. This chapter elaborates the need for a regulatory framework and the issues involved in the design of a regulatory authority. It details the regulatory functions and the need for regulatory independence, apart from delineating the powers of the regulator. Chapter 7 provides a framework for tariff regulation while Chapter 8 provides a framework for setting water quality standards. Chapter 9 enumerates legislative changes to remove impediments and to facilitate the regulatory framework. Finally, Chapter 10, lays down the agenda for action.

Gujarat is situated on the west coast of India, between latitude 20°2' and 24°N and longitude 68°8' and 74°23' E. The geographical area of the state is about 196 000 square kilometre or 19.6 million hectares. The coastline extends from Lakhpat in the north to Daman in the south. About two thirds of the total area is covered by rocky formations, while the remaining area is covered by alluvial deposits. Gujarat adjoins Rajasthan in the north, Madhya Pradesh in the east and Maharashtra in the south. For administrative purposes, Gujarat is divided into 19 districts and 183 talukas.

Gujarat has a tropical monsoon climate. Annual rainfall ranges from less than 300 mm in the northwest to over 2000 mm in the southeast. Most of the rain (90-95 percent of the annual total) falls between June to September, when the southwest monsoon prevails. Saurashtra, Kutchh and the northern part of Gujarat are very often subject to drought.

According to the 1991 census, the total population of Gujarat was 42 million. It is the tenth most populous state in the country, with an estimated population of 44.9 million as on March 1998.

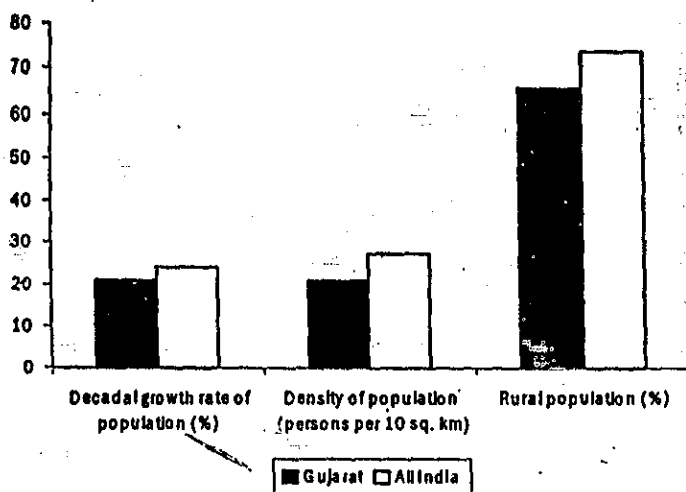


Figure 2.1 Population characteristics of Gujarat

Source CEPT (1997)

scarcity every two to three years. Due to the unequal development of water resources, some areas face water logging while in the others, there is an acute shortage of drinking water supply and irrigation for supporting life. The state has faced at least three drought years in the last 10 years. The worst affected regions are districts in Saurashtra and Kutchh, which neither have a perennial river, nor any sustainable ground water source.

Table 2.2 Distribution of water resources in Gujarat<sup>2</sup>

	South Gujarat	Saurashtra	Kutchh	North Gujarat	Total
Number of districts	7	6	1	5	19
Area (sq km)	47 557 (24.27)	64 337 (32.83)	45 612 (23.27)	38 478 (19.63)	195 984
Rainfall (mm)	1448	105	45	594	
Number of rivers	11	71	97	6	185
Surface water (mcm per year)					
Available	17510	4550	2430	7940	32430
Utilizable	13 900	1500	400	2000	17 800
Groundwater (mcm per year)					
Available	8000	6620	810	5000	20 430
Utilizable	6800	5625	689	4250	17 364

Source Hiraway (1998)

It has been estimated that this imbalance in water resources would continue in the future. This is displayed in Figure 2.2.

<sup>2</sup> Figures in parenthesis indicate percentages of the total

**Table 2.3 Details of requirement and availability of water resources in the river basins of Gujarat by 2010 and 2025 (mcm per year)**

River basin	2010	2025	River basin	2010	2025
<b>North Gujarat</b>			<b>South Gujarat</b>		
Rel	-41	-50	Mahl	1604	1239
Banas	-644	-797	Dhadhar	-882	1017
Saraswati	-425	-512	Namada	9656	10558
Rupen	-524	-632	Kim	-253	-292
Sabarnati	-3154	-3838	Tapl	1294	2960
Remaining river basins of north Gujarat	-2222	-2579	Mindhola	-315	-378
<b>Saurashtra area</b>			Punma	-235	-17
Shetrunji	0	0	Ambika	-364	-374
Bhadhar	0	0	Auranga	-106	0
South Saurashtra	0	0	Par	-104	-82
North western Saurashtra	0	0	Kolak	-84	-103
North and north eastern Saurashtra	-1976	-2503	Damanganga	188	185
<b>Eastern Saurashtra</b>			<b>Kutchh area</b>		
	-702	-906	Kutchh	-690	-859

Source Tahal (1997)

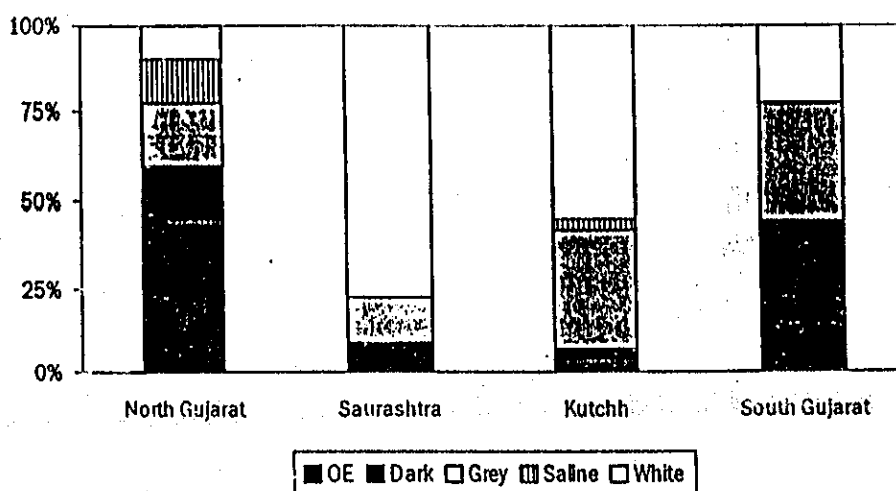
## Surface water

Gujarat has given priority to the construction and development of surface water reservoirs in the form of major, medium and minor irrigation schemes so as to tap the rivers and impound water for use in irrigation as well as drinking water.

The surface water potential of Gujarat has been evaluated at 20 486 mcm per year at 75 percent dependability in Gujarat, 60 percent in Saurashtra, and 50 percent in Kutchh. An additional volume of 18 047 mcm per year has been allocated to Gujarat by interstate agreements, mainly with Rajasthan and Madhya Pradesh.

It should be emphasized that utilizable surface water, which is generally lower than the water potential, is determined by the existence of surface water schemes, including dams and reservoirs, their technical features and storage capacity, sedimentation, programme of operation and water losses (by evaporation and seepage in reservoirs).

Most of the reservoirs in Saurashtra and Kutchh are rainfed. Thus, Saurashtra and Kutchh have been significantly dependent on monsoons. The performance of rain-fed reservoirs in this region varies from year to year depending upon the rainfall performance. During the drought years, most of these reservoirs were empty and as a result emergency pipelines have been laid to provide water to rural and urban areas in Saurashtra.



**Figure 2.4** Groundwater exploitation in Gujarat

Source Hiraway (1999)

The natural replenishment has been estimated at 10 862 mcm per year and the net available groundwater at 11 176 mcm per year. In the future, as a result of the development of irrigation in new areas, the return flows are expected to increase, and therefore, the groundwater potential and availability will increase.

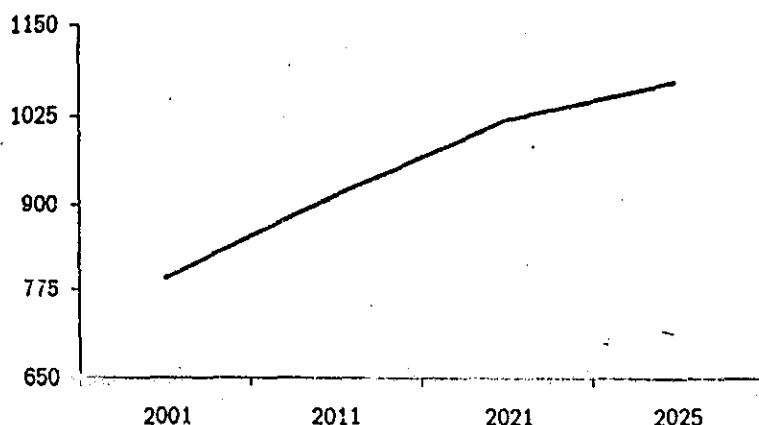
### *Demand-supply scenario in Gujarat*

This section is based on the demand-supply scenario prepared by Tahal Consulting Engineers Ltd., Israel in their study of water resources in the State and reproduced in GIDB (1999). The water balance in 2010 is presented in Table 2.4.

**Table 2.4** Water balance in the year 2010

Resources	Mcm per year	Percentage of total supply
<b>Supply</b>		
Ground water - Existing exploitation (1991)	10416	20.41
Surface water - Existing exploitation (1991)	9019	17.67
<b>Total</b>	<b>19435</b>	<b>38.08</b>
Regulation and artificial recharge	6180	12.11
Recycling of sewerage water	710	1.39
<b>Total</b>	<b>6890</b>	<b>13.50</b>
Ground water - Ongoing and proposed schemes (Till 2010)	10524	20.62
Surface water - Ongoing and proposed schemes (Till 2010)	14191	27.80
<b>Total</b>	<b>24715</b>	<b>48.42</b>
<b>Total supply</b>	<b>51040</b>	
<b>Demand</b>		
Domestic and Industrial use	2010	3.94
Irrigation	49030	96.06
<b>Total demand</b>	<b>51040</b>	

Source Tahal (1997)



**Figure 2.5** Demand for drinking water in urban Gujarat (mcm per year)

Source Tahal (1997)

GIDB (1999) also analyzed the demand and supply scenario for the six Municipal Corporations in the state in detail, and based on the demand-supply gap, estimated the investment requirement. These estimates were prepared assuming a norm of 160 lpcd. The demand-supply gap has been presented in Table 2.6. The gap shown in Table 2.6 has been calculated on a cumulative basis assuming no capacity addition in the previous years.

**Table 2.6** Demand-supply gap for Municipal Corporations in Gujarat

Year	Ahmedabad	Vadodara	Surat	Jamnagar	Rajkot	Bhavnagar	Total
Demand supply gap (mld) assuming no capacity addition							
1998	190.84	-57.43 <sup>3</sup>	141.70	7.33	37.20	15.26	334.91
2001	252.44	-36.46	173.90	14.43	49.37	22.83	476.49
2004	319.84	-13.52	209.12	22.19	62.69	31.10	631.42
2007	393.59	11.59	247.66	30.69	77.26	40.15	800.94
2010	474.28	39.06	289.84	39.98	93.21	50.06	986.43

Source GIDB (1999)

As Table 2.6 shows, the demand-supply gap is expected to grow by nearly 300 percent if supply is not augmented. This is especially true for Ahmedabad and Surat.

The cost of provision and distribution of the above estimated additional water supply has been estimated at Rs 8607 million (GIDB 1999). This figure was arrived at assuming a cost of provision as Rs 7922 thousand per mld and the

<sup>3</sup> Figures with a negative sign indicate a surplus capacity based on the supply norm of 160 lpcd.

(GWSSB) is the State level autonomous organisation responsible for development and regulation of drinking water supply and sanitation services in the State (except for the cities and cantonment areas). Also, since Gujarat is a water scarce state, the strategy in the water sector has been to develop new schemes. Thus, some Special Purpose Vehicles (SPVs) have been set up in the State for executing and managing large projects. The key SPVs are the Sardar Sarovar Narmada Nigam Limited (SSNNL) and the Gujarat State Drinking Water Infrastructure Company Limited (GSDWICL).

The institutional structure of the water sector in the state is given in detail in Table 2.8 and Figure 2.6.

Table 2.8 Institutional structure of the water sector in Gujarat

Agency	Jurisdiction	Role
<b>Administration and regulation</b>		
Department of Narmada, Water Resources, & Water Supplies	State level	<ul style="list-style-type: none"> <li>Regulatory oversight of the water sector in the State</li> <li>Oversight of State government owned corporations involved in the implementation and operation of water schemes</li> </ul>
Department of Urban Development	State level	<ul style="list-style-type: none"> <li>Oversight of urban local bodies, excluding corporations, in matters of financial, planning, and management issues</li> <li>Regulation of political and administrative appointments in the local authorities</li> </ul>
Municipal Corporations	Major cities	<ul style="list-style-type: none"> <li>Provision of retail water supply services for domestic and industrial purposes in the area of their jurisdiction</li> </ul>
Municipalities & Nagar Palikas	Smaller cities	<ul style="list-style-type: none"> <li>Provision of retail water supply services for domestic and industrial purposes in the area of their jurisdiction</li> </ul>
Gram Panchayats	Villages	<ul style="list-style-type: none"> <li>Provision of retail water supply services for domestic and industrial purposes in the area of their jurisdiction</li> </ul>
Gujarat Industrial Development Corporation	State level	<ul style="list-style-type: none"> <li>Provision of retail water supply services in industrial estates owned by GIDC</li> </ul>
<b>Implementation and operation</b>		
Gujarat Water Supply and Sewerage Board (GWSSB)	State level	<ul style="list-style-type: none"> <li>Mainly implementing water supply and sewerage schemes for urban local bodies</li> <li>Operation of some schemes</li> <li>Inspection of schemes where State government funding is provided</li> </ul>
Gujarat State Drinking Water Company Limited		<ul style="list-style-type: none"> <li>Bulk transmission and bulk supply of drinking water to local bodies, GWSSB, and industrial estates</li> </ul>
Sardar Sarovar Narmada Nigam Ltd	State level	<ul style="list-style-type: none"> <li>Wholesale supply of water</li> </ul>
Department of Narmada, Water Resources, and Water Supplies	State level	<ul style="list-style-type: none"> <li>Operation and maintenance of some river schemes like the Ukai Dam</li> </ul>



Under the BPMC Act, Corporations have wide ranging powers to ensure water quality and can set water tariffs independently. The tariff for the provision of water services is being collected in a number of ways by the corporations. This is being either collected as a part of the property tax (Section 129[a]), or as a water charge on the volume of water supplied, or on the basis of the size of the connection (Section 134). It must be noted that if the tariff is collected as a part of the property tax or the size of the connection, as is mostly the case, there is no relationship between the tariff that is charged and the consumption of water.

Detailed case studies of two corporations in Ahmedabad and Rajkot, are given in Annex A and Annex D.

- **Other local bodies:** The operational management of drinking water services in the urban sector is the responsibility of the urban area local bodies; rural water supply schemes covering more than one village (comprehensive) are run and maintained by GWSSB. Individual village panchayats are responsible for the operation and maintenance of village water supply schemes.
- **Gujarat Water Supply and Sewage Board:** GWSSB has been constituted as a corporate body under the Gujarat Act No. 18 of 1979 (GWSSB Act) for the rapid development and the proper regulation of water supply and sewerage services. Its jurisdiction extends to the whole State of Gujarat, excluding cities, that is municipal corporations and cantonments. GWSSB acts as the nodal agency responsible for implementing bulk drinking water supply schemes in urban and rural areas.

The GWSSB Act envisaged that the board would operate as the nodal agency for all water supply and sewerage projects in the state. Additionally, the Act also envisaged a planning and regulatory role for the board. For instance, section 14(c) requires the board to prepare draft state plans for water supply, sewerage, and drainage, on the directions of the government. Moreover, the board is to review and advise on the tariff, taxes, fees, and charges of water supply and sewerage systems, in the areas comprised within the sphere of operation of the board (Section 14[d]). Also, the board is required to *establish the state standards for water supply*. For this purpose, the board was given wide powers such as *to approve tariffs for water supply and sewerage applicable to areas comprised within the sphere of operation of such services of the board*. Also the board can *abstract water from any natural source*. Interestingly, the board can *enter into contract or agreement with any person... for performing its duties and discharging its*

transmitted by the Gujarat State Drinking Water Infrastructure Company Ltd. The bulk purchasers of this water would be local authorities like municipal corporations and municipalities, GWSSB and industrial estates. Furthermore, GSDWICL is authorized to purchase water from any agency, in addition to the SSNNL. The company would thus operate as a *bulk carrier* of drinking water in the State. GSDWICL has already been incorporated by the State government as a SPV for the laying down and subsequent management of 2500 km-long drinking water trunk transmission mains.

## The state of the water system

The increasing water demand in Gujarat, stemming from the population growth and from enhanced economic development, must be met from the diminishing water resources. To combat the water scarcity problem, the State government has given top priority to the construction of water resources schemes based on surface water and tubewells. However, due to the topography, multipurpose and major projects are feasible only in the eastern and southern regions of the State. Thus, appropriate water resources development and management, and water management strategies are required to alleviate the uneven spatial and temporal distribution of the natural water resources in order to sustain economic development.

Most water service providers in Gujarat are not financially viable, and have to depend heavily on government subsidies. Sometimes, the existing law encourages a service provider to run contrary to basic financial principles. For instance, Section 35 of the Gujarat Act No. 18 of 1979 stipulates that 'the Gujarat Water Supply and Sewerage Board shall not, as far as practical and after taking credit for any grant or subvention from the State Government carry on its operation under this Act at a loss'. This implicitly implies that the Board is not required to earn a profit.

There is also no incentive amongst various players to initiate change in the existing unsustainable water management system. Since the accountability of service providers to its users is low, they have little incentive to provide cost effective water supply services, to become financially self sufficient, to improve quality of services and to consult various user organisations for better services. At the same time, the users have little incentive to pursue reforms in the water sector since most of them are highly subsidized. Political groups are reluctant to antagonise these users due to obvious compulsions.

As the provision of irrigation water, drinking water supply and electricity are dependent on water resources, there is an acute need to plan the development

sion

- Water resource distribution in Gujarat fails to cross all geo-hydrological zones. While south Gujarat has abundant water resources, north Gujarat, Saurashtra and Kutch are water deficient areas. As a result, there is significant over exploitation of groundwater in the water deficient areas.
- The proportion of groundwater in the total supply is projected to decrease in the future as large surface water schemes are commissioned, notably the Sardar Sarovar based Narmada Main Canal. Even after accounting for the groundwater and surface water availability, there would be a significant shortfall in supply. This is proposed to be met by water conservation and recycling activities.
- The shortfall in urban areas is even more critical and requires substantial investments in developing new sources of water. Investments are also required to rehabilitate the existing distribution network.
- The State has a complex institutional structure with multiple agencies and overlapping jurisdictions. A new phenomenon that has been observed in the state is the emergence of a number of SPVs in the water sector for the execution and operation of specific projects, principally those linked with the Sardar Sarovar project.



## Private sector participation in India and other countries

### Rationale for PSP (private sector participation)

Water supply in urban Gujarat is inadequate and inefficient despite universal acknowledgement of water as a fundamental requirement of life. As mentioned in Chapter 2, the causes identified for such a dismal scenario are a complex institutional structure in the sector leading to a diffusion of responsibilities and enormous lag in investments leading to inefficient supply. Augmentation of water supply and improvements in water quality call for significant investments. GIDB estimates that the magnitude of investment to augment supply in the six Municipal Corporations would be of the order of over Rs 8.60 billion in the period 1998 to 2010.

It is becoming increasingly difficult to meet the existing demand for better water supply and sanitation services, and to expand as well as to improve the same due to growing urban pressure, population growth, and economic growth. Public utilities are unable to meet such demand due to various reasons. Urban water supply and sanitation systems, in many countries including India, face very complex problems: existence of financially non-viable water utilities, water tariffs below cost recovery levels, poor quality of service, poor institutional structure, poor governance, and limited access to additional resources of capital. Obviously, the state cannot finance all such developmental activities on its own. Thus private investment would be required to augment the efforts of the state in this key sector. In this situation, many governments are looking for private sector participation, which could bring additional resources, provide technical and management expertise, and bring about operational efficiencies in the water sector.

### Modes for private sector participation options

The private sector participation option in a segmented fashion can take different forms. The water cycle can either be unbundled and opened in a segmented fashion to private sector participation, or the entire water cycle can be opened to such process. These options are discussed below.

### *Lease contract*

It typically lasts for 10 to 20 years. Under this option, a private firm leases assets of the public utility and takes on the responsibility for operating and maintaining them. The operator may pay the public utility a fee for use of assets and will not have the responsibility of financing new investment, which will lie with the public utility. This contract could bring in technical expertise, managerial expertise and operating efficiency to the sector. While investment risk lies with the public utility, the commercial risk is shared between the private operator and the public utility.

### *Concession contract*

A concession agreement or franchise is a means of awarding fixed term monopoly rights to provide a service to a private firm within a geographical area. Under this option, a private operator not only has the responsibility for the operation and maintenance of the existing assets but also for new investments. He has rights over the full use of all assets, although their ownership lies with the government or with the public utility. The contract usually lasts for 25 to 30 years. The concession is governed by terms and conditions set through a contract, which outlines main performance targets (such as quality or coverage or both), arrangements for capital investments, performance standards, mechanisms for tariff adjustments, and arrangements for dispute resolution. This option could bring in technical expertise, managerial expertise, operating efficiency, and additional investment to the sector. The investment risks and commercial risks lie with the private operator.

### *Divestiture*

This option, through the sale of assets or shares or through management buyout, can be partial or complete. It gives the private operator full responsibility for operation, management and investment. Unlike the concession, it transfers ownership of assets to the private sector.

**Table 3.1** Private sector participation and objectives

Options / Objectives	Service contract	Management contract	Lease	BOT	Concession
Technical expertise	Yes	Yes	Yes	Yes	Yes
Management expertise	No	Yes	Yes	Some	Yes
Operating efficiency	No	Some	Yes	Yes	Yes
Investment in bulk	No	No	No	Yes	Yes
Investment in distribution	no	No	no	No	Yes

### *Treatment of water in Chennai*

The operations and maintenance of one of the treatment plants, the water treatment plant at Redhills, has been entrusted to a private contractor. As per the existing arrangement, the operating personnel, supply of chemicals and minor repairs to equipment and meeting the prescribed water quality standards are the contractor's responsibility. The Board meets the power cost.

### *Reverse Osmosis Plants in Chennai*

Metro Water had three small Reverse Osmosis Plants constructed by a private operator to supply water to the local community. These have also been given out to the same party for maintenance.

### *Proposals in the pipeline in Karnataka*

To review and update the improvement plans for the water supply system in Bangalore, the Bangalore Water Supply and Sewerage Board (BWSSB) has initiated steps for a study with the support of eight million French Francs as aid. Two firms have been identified for this purpose, namely Vivendi and Lyonnaise des Eaux. It is expected that once the above study is over, the Government of Karnataka would enter into management contract for five years with these two firms for different zones. The study is yet to be commenced.

## *Service contracts*

### *Water sourcing in Chennai*

One of the first efforts in involving the private sector on water sources can be traced back to the drought in 1987, in Tamil Nadu. At that time, excess water drawn by farmers in the surrounding areas was bought by the Chennai Metropolitan Water Supply and Sewerage Board or Metro Water. This was a short term proposal involving 12 wells which supplied about 3.3 mld to the city.

### *Transportation of water by tankers in Chennai*

Water is transported through tankers for filling static water tanks. This transportation of water through tankers has been privatized in the following form. Tankers are taken on lease from the private sector. At present, 338 hired tankers perform an average of 2740 trips daily filling about 4290 tanks, and supplying a total quantity of 24.66 mld. The privatization of tanker operations is one of the earliest initiatives to involve the private sector, started about 13 years back and is still in operation. In fact, the cost quoted by the operators is being

The State government through Concession Agreement has agreed to introduce appropriate legislation, which would prohibit the extraction of ground water for non-domestic use for a minimum of 15 years from the commencement of services by the concessionaire. Further, the concessionaire would be given the right of first refusal for provision of like services within the concession area.

The concessionaire would be allowed to levy a composite water charge to supply to industrial units and on a bulk basis to the Tirupur Municipality and Tamil Nādu Water Supply and Drainage Board for wayside villages. The charge is set to recover a fixed rate of return on total investment over the concession period, initially set at 30 years. The concession assures a post tax rate of return of 20 percent on investment.<sup>7</sup> The concession would be terminated whenever the target rate of return is achieved.

Thus the concession provides an assured return to the project, thus allowing recovery of project investments through a regulated water tariff. There is also a provision to generate additional revenues through real estate development.

The details of this project are given in Volume II (Annex E) of the Report.

### Proposals in the pipeline in Karnataka

BWSSB initiatives included private sector participation in sourcing water from the Cauveri river. Under the CWSS (Cauveri Water Supply Scheme) Stage IV-Phase II, a proposal to produce and convey water over a distance of 98 km from the city is being considered under the BOOT modes. Under the project, a private partner would lay a separate pipeline for bringing water to a treatment plant, pump and store the same at three stages, and finally bring water to distribution points in the city. A consortium headed by Biwater International has emerged as the preferred bidder in the competitive bidding process. A final decision on the project is yet to be taken.

The board has also initiated a proposal under BOOT mechanism for utilization of its treated water and for the use of recycled water for other purposes. A tertiary water treatment plant of 50 mld capacity is proposed for implementation in Bangalore at the Koramangala and Challabhatta valley. The details are indicated in Volume II (Annex B) of the Report.

The extent of responsibility of the stakeholders in each of the above initiatives is described in Table 3.3.

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<sup>7</sup> The duration of the contract can be extended if the guaranteed rate of return is not achieved within the concession period.

enterprises was not satisfactory. A need for the reduction of the fiscal burden, the improvement of efficiency and quality in the provision of water and sewerage services was recognized, and the government resorted to PSP through the concession option rather than a management contract or lease, as it wanted to attract additional resources in the sector through private operators. It did not opt for the divestiture mode of PSP, as that would have meant a delay in collecting requisite information on valuation of water resources. The other details for private sector participation in Argentina may be seen in Volume II (Annex F) of the Report.

In the case of Bolivia, the government was firm on universalizing the access to water services and sewerage system in the country as a whole and it introduced national regulations from time to time to achieve this goal. Its public utilities in water and sanitation services were not in a position to implement the above regulations, and were unable to expand and ensure water supply and sewerage connections effectively to many parts of the urban areas. As a part of the government's initiatives for PSP, a concession contract (1997) was awarded to Aguas del Illimani under which the latter undertook the responsibility of providing water and sanitation services in the La-Paz-El-Alto metropolitan area. SAMAPA (Servicio Autonomo Municipal de Agua Potable y Alcantarillado), being the erstwhile public service provider in the city, continues to exist as legal entity whose activity is limited to administering the assets leasing contract with the company. The concession contract was subject to strict performance standards such as: a) output standards (i.e., type of service, service quality, source reliability and customer service), b) input standards (e.g., materials and design standards) which are subject to approval by the regulator, and c) expansion mandates. Further, while designing the national regulations for PSP, the government took into account the need for the low-income users group through a well designed subsidy program.

In the case of Chile, the need for additional resources for undertaking expansion and maintenance of various services was felt. In the early 1990s the government set up 13 state owned corporations with responsibility for asset management, operation of water and sanitation services and investment decisions in the water sector. Subsequently, these corporations had to execute concession contracts and were brought under a new regulatory framework. The new regulation reduced information asymmetries, increased managerial incentives, and brought efficiency gains to the public corporations in the water sector. Privatisation through concession ultimately occurred in late 1990s. The other details can be seen in Volume II (Annex H) of the Report.



## *Divestiture*

Prior to 1989, water and sanitation services in England and Wales used to be the responsibility of the Regional Water Authorities. As a public sector activity the government felt the shortage of funds of maintenance for improvement of the infrastructure required for water services. Along with these financial pressures, there was increasing pressure for higher standards for drinking water and waste water treatment. This came from the public and also from European Legislation. About 50 billion pound was estimated to be required between 1989 and 2005 to meet the standards required by the EC (European Commission).

In England and Wales, privatization was seen as the only answer to achieve the government's aims of increased efficiency and access to private funds for investment. So, in 1989, the water industry in England and Wales was privatized. The operational and regulatory functions of the Water Authorities were separated. Companies were created with responsibility for the authorities' operations, and the authorities' assets were transferred to them. These companies were then sold to the public. Initially, the Government kept a golden share in each company, so as to retain some measure of control over their ownership, but these were soon sold, and the Government now owns no part of any of the water companies. The companies operate under licences, granted initially for 25 years. The licences can be terminated after that period, although ten years notice has to be given. If that should happen, the assets would be transferred to another company on appropriate terms. The old private water companies which had continued to exist were brought within the same licensing and regulatory system as the newly privatised companies. Under their licenses the privatized companies are required to provide waste water services for all the customers in their areas, and to provide water for customers who are not served by the old water companies.

The options for PSP and extent of participation in various segments of water services in various countries under study, are summarised in Table 3.4.

Table 3.4 Extent of responsibilities for PSPs - international experience

Option	Country	Operation	Management of system	Maintenance <sup>a</sup>			Investment		Ownership of assets	Duration (years)
				A	B	C	Planning	Financing		
BOOT (new assets)	Thailand	R	P	R	R	R	R	R	Company-public sector	10+
Management contract	Trinidad & Tobago	R	R	R	Q	P	P	P	Public sector	3-5
Concession	Buenos Aires, Bolivia, Chile	R	R	R	R	R	R	R	Public sector <sup>b</sup>	20-30
Asset sale	England and Wales	R	R	R	R	R	R	R	Company	Perpetuity

**Note.**

<sup>a</sup>Under maintenance, three functions (A) planning, (B) carrying out the work, and (C) financing maintenance

<sup>b</sup>assets are transferred to concessionaire for a fixed period of time, but are owned by state

R - Responsibility varies according to contract

P - Responsibility lies with Public Sector

Q - Responsibility lies with private sector

Source: World Bank (1998)



## Scope for private sector participation in Gujarat

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The various options and forms of private sector participation (PSP) in water sector have been discussed in detail in the earlier chapter. Also, national and international experiences in PSP have been outlined and lessons for Gujarat have been drawn. This chapter reviews the PSP initiatives in Gujarat in the water sector and recommends a future course of action.

### Private sector participation in Gujarat

The major area of concern in urban water supply identified in the Gujarat Infrastructure Agenda–Vision 2010 is the losses in the distribution network. To quote the document, 'the reduction of these losses needs to be the prime agenda in the urban water supply sector, especially because it can be done without major capital expenditure, and would help reduce the need to develop fresh bulk water supply schemes'.

#### *Urban areas*

Thus the distribution network in urban areas has been identified as a priority area for initiating private sector participation. However, even though the magnitude of investments required for augmenting and improving the distribution network is relatively less, and benefits are substantial, this segment of the water cycle is politically sensitive due to issues of water subsidy and universal availability.

Bulk water supply is relatively amenable to privatization, since it does not involve substantial social commitments or subsidies, and is therefore a less politically sensitive area. However, only limited benefits would be obtained at the consumer's end if the distribution network were not improved.

The following options are listed in GIDB (1999) for initiating private sector participation in this sector.

- *BOT (Build Operate Transfer – for new assets) / ROT (Rehabilitate Operate Transfer – for existing assets)*. This would ensure that the project is of reasonable size and hence attractive to the developer.

execution would be faster and perhaps cheaper. However, there would have to be a budgetary allocation for the project. Also, the true cost of water supply would not be reflected.

- A joint venture company can be formed by GSDWICL with a private operator, and the project is executed by this joint venture. This has been the model followed for the Tirupur project in Tamil Nadu. However, the following prerequisites have been identified for such an option: establishment of a letter of credit, an escrow mechanism, and government guarantees. Also, as has been the case with the Tirupur project, achieving financial closure for such a project can be difficult.
- A Build, Lease, Manage, Transfer project. Here the project is executed by a private operator, and then leased to GSDWICL by the private operator. The project is managed by a private operator (not necessarily the executing entity). Such a model would not require any contribution from the government.

## Scope for private sector participation

The following section outlines the recommended strategy for initiating PSP in all segments of the water sector in Gujarat.

### *Sourcing of water*

#### **Sardar Sarovar Narmada Nigam Ltd**

The SSNNL (Sardar Sarovar Narmada Nigam Ltd) was formed as a company to construct and manage the bulk supply of water from the Sardar Sarovar project. The majority of the supply would be for irrigation purposes, which would be supplied by SSNNL itself. The remainder would be for industrial and domestic use. For supply for domestic use, the SSNNL would sell the water to GSDWICL (Gujarat State Drinking Water Infrastructure Company Ltd.), which in turn would sell this to local bodies, etc.

The company has raised a large amount of capital on commercial terms for the laying down of the canal network for bulk transmission of water. Thus it is recommended that this company operates on commercial lines charging an economic price for the water supply.

#### **Gujarat Water Resources Development Corporation**

The GWRDC (Gujarat Water Resources Development Corporation) is a State Government-owned corporation that supplies water from groundwater

## Gujarat Water Supply and Sewerage Board

Substantial reorganisation of the operation of the board is recommended. Its regulatory and advisory role should be taken away and it should only remain as an agency for the execution and operation of water sector projects.

### *Distribution of water*

For the distribution segment of the water sector, the following three routes could be explored.

#### **Divestiture**

A complete divestiture of the entire distribution network can be explored as an option for those sections of the distribution network that can be isolated from the rest of the network. However, this would require acceptability of the privatisation process and thus little social resistance to liberalisation. Also, as identified in the Karnataka case study, the consumer base would have to be sufficiently large to make commercial operations viable. This would also require a substantial information base on the physical characteristics of the distribution network to exist along with strong regulatory oversight of the sector.

An alternate path to divestiture could be to hive off the water supply activities of the local bodies as separate commercially operated entities, as it was done in Chennai. These water supply companies could then operate with assistance from a strategic partner. Over time, the local body could divest its stake in the company to the strategic partner or through the stock market, thus completely privatizing the sector.

We recommend the latter path for the large municipal corporations in Gujarat, especially Ahmedabad and Surat.

#### **Build-Operate-Transfer/Rehabilitate-Operate-Transfer**

For the existing distribution network in large urban local bodies, the ROT mode of privatization could be explored. Here, the existing distribution system would need to be repaired and restored to its desired condition by the private operator. This could be considered for some of the smaller municipal corporations and larger municipalities. Wherever the distribution network has not been laid, as in the urban areas adjoining the Ahmedabad Municipal Corporation (Ahmedabad Urban Agglomeration), PSP could take the BOT form, wherein the private operator would also lay down the distribution network.

The informational constraints on PSP would be not strong here, in the sense that complete information on the layout of the network and its present condition

## Legal impediments to private sector participation

Critics say that it would not be possible to introduce private sector participation in the water sector being managed by local bodies in view of the 74th Constitutional Amendment (CA) (1993). It may be recalled the Ninth Five Year Plan's (1997-2002) strategies for urban drinking water supply envisage PSP (private sector participation) in construction and maintenance of water supply schemes. Even in rural water supply the Plan Document outlines the need for private sector efforts in construction and maintenance of water supply. We now examine these issues in the context of Gujarat State.

The 74th CA, *inter alia*, says that subject to the provisions of the Indian Constitution, the Legislature of a State, may, by law, endow:

- a) the municipalities with such powers and authority as may be necessary to enable them to function as institutions of self-government and such law may contain provisions for the devolution of power and responsibilities upon municipalities, subject to such conditions as may be specified therein, with respect to -
  - i) the preparation of plans for economic development and social justice
  - ii) the performance of functions and the implementation of schemes as may be entrusted to them including those in relation to the matters listed in the Twelfth Schedule;
- b) the Committees<sup>8</sup> with such powers and authority as may be necessary to enable them to carry out the responsibilities conferred upon them including those in relation to the matters listed in the Twelfth<sup>9</sup> Schedule

Following the above Constitutional obligation, Gujarat Act No. 15 and 16, 1993 (in the case of Municipal Corporations), and Gujarat Act No. 17 of 1993 (in the case of municipalities) were enacted by the Government of Gujarat.

<sup>8</sup> It includes ward committees

<sup>9</sup> This includes water supply for domestic, industrial and commercial purpose (Serial 5)

into an arrangement with any person for the supply of water. Although the Act does not define a 'person', a person is a juridical person, and would include 'developer' as defined under the GID Act, 1999 (Section 2[c]). Hence, it is possible to entrust the water supply contract of city corporations to a private sector partner under the overall responsibility of the corporation.

### *Gujarat Act No.18 of 1979*

Section 15 (1) (f) says that the Gujarat Water Supply and Sewerage Board (GWSSB) can enter into contract or agreement with any person or persons as the Board may deem necessary while performing its duties and discharging its functions under the Act. Therefore, it is possible for the Board to perform its functions in water supply related matters through private sector partners.

### *Gujarat Infrastructure Development (GID) Act of 1999*

The GID Act, 1999 provides a framework for participation by persons other than the State government and government agencies in financing, construction, maintenance, and operation of infrastructure projects in Gujarat. Section 4 (1) says that a person may enter into a concession agreement with the State Government, Government agencies, etc., in respect of projects relating to water storage, water supply, and sewerage systems. The nature of concession agreement<sup>10</sup> has been identified in Schedule II under the Act. The Act further lays down the procedure for drawing concession agreement and the selection of a private partner through competitive public bidding or through selection by direct negotiations. It also lays down the procedure to charge for the goods or services provided so long as the project continues to vest in him. Financial security for maintenance of project, transfer of certain rights, termination of concession agreement, etc., have been laid down in the Act itself. Thus, a general framework has been provided for facilitating private participation in water supply in Gujarat.

### *Gujarat Bill No. 6 of 2000*

During the concession operation, a concessionaire often needs to acquire rights of way for laying water pipelines during the project period. The Gujarat Water

<sup>10</sup> It includes build own operate and transfer agreement, build own operate and maintain agreement, build and transfer agreement, build lease and transfer agreement, build transfer and operate agreement, lease management agreement, management agreement, rehabilitate operate and transfer agreement, rehabilitate own operate and maintain agreement, service contract agreement, supply operate and transfer agreement, and joint venture agreement.

## Regulatory framework to facilitate investment and to promote efficiency and economy

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Water resources are scarce in Gujarat, especially in the north, Saurashtra and Kutchh region. Water delivery systems in many local bodies are not sustainable due to externalities, leakage, and pollution. The groundwater extraction rate is very high compared to its recharging the aquifers, considerable leakage exists in the water distribution system and sewerage, and treatment of wastewater is inadequate. The situation is accentuated by the Government's inability to provide adequate funding to meet existing as well as future demand. A need to invite PSP, *inter alia*, in water supply, especially – to begin with – in city corporations, was recognised (GIDB 1999).

The options for such participation have been outlined in the GID Act 1999. They range from short-term service contract to long term concession<sup>13</sup> agreement. Our analysis in Chapter 3 shows that the longer the duration of the contract, the greater the gain from PSP. While a service contract could only ensure technical expertise, the long- term concession contract will also ensure, management expertise, operating efficiency, and additional investment in the sector.

In the water sector, it is difficult to bring in many players which could then result in competition in providing services within a given area, as such service providers would not enjoy economies of scale in providing such services. At the same time, if one were to introduce competition<sup>14</sup>, the selection of the right to supply such services has to be determined on a competitive basis, wherein many players can participate in bidding for such services. In fact, this has been recognised by GIDB under Section 9 of the GID Act 1999. The terms and conditions of such services are generally outlined through detailed contracts. If the contract period is short, it is possible to specify every aspect of contractual details. If it spans a long period of time, it is difficult to write 'time-consistent' enforceable contracts for the entire concession period covering all contingencies

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<sup>13</sup> Section 4 (3) of GID Act 1999 says "no concession agreement shall provide for transfer of a project by a developer to the State Government, Government Agency or a specified Government Agency competition ensures greater than 35 years from the date of agreement"

<sup>14</sup> Generally speaking an efficient outcome



water tariffs, approves and monitors investment plans and also disposes complaints.

Further, most of these countries have positioned their regulators at an arms length from the Government or local bodies. These bodies in most cases enjoy a certain degree of independence. The details of each of the country are given in Volume II of the report.

**Table 6.1 PSP and extent of regulatory oversight – International experiences**

PSP option	Country	Regulatory agency	Regulatory functions
Management contract	Trinidad & Tobago	PUC <sup>a</sup> (Govt)	<ul style="list-style-type: none"> <li>• Tariff setting</li> </ul>
Concession	Buenos Aires	ETOSS <sup>b</sup> (Independent)	<ul style="list-style-type: none"> <li>• Tariff determination</li> <li>• Approval, monitoring of investment plan</li> <li>• Complaint disposal</li> </ul>
Concession	Chile	SSS <sup>c</sup> (Independent)	<ul style="list-style-type: none"> <li>• Tariff setting</li> <li>• Setting and enforcing technical standards</li> <li>• Granting concessions</li> </ul>
Concession	Bolivia	SDA <sup>d</sup> (Independent)	<ul style="list-style-type: none"> <li>• Grant concessions and licenses</li> <li>• Monitor terms and conditions for Concessions and their revocation</li> <li>• Approval of investment plans</li> <li>• Set tariffs for water in concession areas</li> <li>• Recommend water rates in areas run by municipality excluding the concession Areas</li> <li>• Revoke concession</li> </ul>
Divestiture	England & Wales	OFWAT <sup>e</sup> (Independent)	<ul style="list-style-type: none"> <li>• Modification of license</li> <li>• Tariff regulation</li> <li>• Quality of service</li> <li>• Consumer complaints</li> <li>• Monitoring and enforcing terms and Conditions of license</li> <li>• Review investment plans</li> <li>• Promote competition and efficiency</li> </ul>

<sup>a</sup> - Public Utilities Commission; <sup>b</sup> - Ente Tripartite de Obras de Servicios de Saneamiento;

<sup>c</sup> - Superintendent of Water and Sewerage Services; <sup>d</sup> - Superintendencia de Aguas; <sup>e</sup> - Office of Water Services

## Regulatory framework – national experience

Unlike in the countries above, India has little experience in independent regulation in the water and sanitation sector. We discuss some of these issues below.

concessionaire initially proposes to levy a combined charge based on volume of water off-take.

### Regulation of service standards

In order to ensure satisfactory compliance and performance, the CA requires the concessionaire, the State Government and the local municipality to appoint reputed agencies with relevant track record as IA (Independent Auditors) and IE (Independent Engineers) to undertake a process of periodic technical and financial reviews and certification. The IE and IA would act as independent authorities and regulate the terms of the CA.

In sum, a project specific regulatory framework has been conceptualised in the form of the Tirupur concession agreement. The contractual regulators such as IE and IA are responsible to the authorities who are the executors of the project. This arrangement is in sharp contrast to the international experiences discussed above.

Only in respect of tariff matters under the Tirupur Concession Agreement, is there an independent Charges Review Committee.

## Need for independent regulation

In Chapter 4, we have outlined the scope of private sector participation in Gujarat's water sector. The corporations or the developer would be the service providers, and are expected to run on commercial principles. A fall out of the privatisation process is the likely increase in transaction costs, which have to be mitigated. The activities of the above monopoly service providers would have to be regulated for protecting the interests of consumers. A strong regulatory framework, which would not only protect the interests of the investors, but also balance them with the public interest in general would be called for. Such a regulatory framework has to be outside the existing Governmental set up, and should have an arms-length relationship with the Government as well as local bodies. Else, the requisite enabling environment which could ensure protection of consumer interests, generate consumer trust, ensure fair returns to utility, attract private investment in the water sector, better delivery of services, and transparency in governance, would not be created.

### Recommendation 1

There should be a Water Regulatory Authority which should maintain an arms-length relationship with stakeholders, including Government as well as local bodies, to regulate segments of water supply as discussed below.

## Regulatory functions

### *Activities of the water cycle to be regulated*

There are four components in the water delivery system: a) capturing the sources, b) transmission (or conveyance) of water to a place, c) treating water, and, d) delivery of water to users. Unlike other sectors, fixed costs in all these segments are very high compared to variable costs. Some components in water system show economies of scale, and tend to promote / create a natural monopoly. For instance, water capture from a particular source is likely to have natural monopoly characteristics. So is the water transport and distribution system which exhibits engineering scale of economies. Pumping from underground aquifers may not have natural monopoly properties: pumping from many wells can be organised into multiple and independent sources. However, pumping from one well can cause a drop of water level so that pumping at the other wells is expensive. Thus, efficient exploitation of a single aquifer from many wells may require some form of centralised regulation of pumping. Water treatment is to some extent, a natural monopoly. While water treatment plant in themselves may not have scale economies, treating water that is delivered from a single transportation system is likely to be most efficiently undertaken at a single site or near the end of transportation pipe. Thus, it is evident that capture, transmission, and treatment from each water source all monopoly characteristics. Further, distribution is also a monopoly.

As stated in Chapter 2, surface water and ground water constitute different sources of water supply in Gujarat. Surface water in dams, reservoirs, and rivers are brought to the consumer through pipes or canals. Surface water is used for irrigation and non-irrigation purposes (for example, drinking water, industrial use etc). Similarly, the ground water is also used for irrigation and non-irrigation purposes.

The above monopoly service providers are spread over the entire state. It is thus logical that the jurisdiction of the Water Regulatory Authority should extend over the entire state too. And the segments of the water supply system such as capturing services, conveyance of water and distribution of water, which have monopoly characteristics, should be subject to regulatory jurisdiction.

However, it must be noted that with the 73<sup>rd</sup> and the 74<sup>th</sup> Constitutional Amendments, the water supply function vests with the local bodies. Thus any changes that are proposed should not violate the spirit of the 73<sup>rd</sup> and the 74<sup>th</sup> Constitutional Amendments. To ensure this, it is recommended that the regulatory reform process should be consultative and the State Government should establish a consensus with the local bodies which would fall under the purview of the independent regulator. This would be imperative given that the sector is socially and politically sensitive.

### Recommendation 3

The Water Regulatory Authority (WRA) should have jurisdiction over the state of Gujarat and should regulate the following segments of water supply system:

- Capturing the sources
- Transmission (also called 'conveyance') of water
- Treatment of water
- Distribution of water

### Tariff regulation

As stated earlier, monopoly service providers in Gujarat include the following.

- 1) Agencies for capturing sources
- 2) Agencies for transmission or convergence of water
- 3) Agencies for treatment of water
- 4) distribution (or retail supply) of water to end consumers

In Gujarat, agencies that capture water also convey the same. For instance, SSNNL captures water in the Sardar Sarovar dam, and sells it in bulk to intermediaries such as GSDWICL or directly to other bulk consumers. Similar is the case with the Department of Water Resources. Other bulk suppliers would include GSDWICL, GWSSB, etc. (Figure 6.1). Distribution or retailing on the other hand, would be performed by local bodies, or private 'developers', GIDC, etc.

of the concession<sup>19</sup> proposal and agreement beyond Rs 500 million of various agencies including these bodies.

The WRA, being an expert body, should be in a position to develop generic terms and conditions of various concession agreements keeping in mind the interests of the consumers as well as those of PSPs. Although GIDB would be the recommending body for such concession proposals, it is desirable that it should also take into consideration such recommendations of the WRA. Further, local bodies in charge of issuance of the concession agreement should take into consideration GIDB recommendations, while finalising the concession agreement. Further, if the Government directs the WRA to recommend the terms and conditions of a specific concession agreement, the WRA, being an expert body, should recommend the same.

### Recommendation 5

The WRA should recommend generic terms and conditions for all new concession agreements in the water sector.

### Recommendation 6

The WRA should recommend terms and conditions of a specific concession agreement if required by the Government.

Since the WRA would be recommending the terms and conditions of the concession agreement, it is desirable that the regulatory authority also monitor such terms and conditions over the duration of the agreement. This monitoring could be over and above the monitoring being envisaged by the GIDB and other local bodies. The WRA would act as an independent watchdog over the performance of the private concessionaire over the contract period.

### Recommendation 7

The WRA should monitor terms and conditions of the new concession agreement between developer<sup>20</sup> and local bodies in water sector.

## *Quality of service*

Water services in urban areas of Gujarat are far from satisfactory. A study by, the, Public Affairs Centre, Bangalore on the AMC (Ahmedabad Municipal

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<sup>19</sup> Concession agreement is defined in GID Act 1999

<sup>20</sup> Developer is defined under GID Act 1999

public as well as the Green lobby, by keeping this regulatory function under its ambit, the Government is regulating water quality standards through its Drinking Water Inspectorate under the Department of Environment, Transport, and Regions (DETR). It has two roles: through its audit role, it carries out annual inspections of companies, and checks the results of monitoring and the reliability of data on tests carried out by companies. It also investigates incidents where standards are breached. If monitoring shows that water companies are failing to meet required standards, the Inspectorate takes enforcement action. Under the current regulation, companies are required to say what they propose to do to secure compliance with the standards, and then, to give legally binding undertakings in relation to that action. The investigation of incidents can similarly lead to enforcement action, and can also lead to prosecutions of water companies if they have not exercised due diligence in carrying out their work. Drinking water standards in the UK derive mainly from the EC Drinking Water Directive. Companies are required to carry out nearly three million tests on their drinking water supplies each year, and to report the results to the Inspectorate.

In Gujarat, the Government may continue to regulate water quality standards through the existing Health Department. For this, the Health Department needs to be strengthened so as to be able to lay down and enforce the minimum standards of water quality in the State. Else, the Government may assign this function to the WRA, which can develop and lay down the water quality standards through the transparent regulatory process. Water quality issue is further discussed in the report under Chapter 8.

### Recommendation 8

There should be a minimum standard for water quality to be provided by various service providers to their consumers. Either the WRA or Government of Gujarat should lay down and enforce these minimum standards. They should also monitor and enforce the above standards through surveys. Standards of services to customers have been set by some corporations such as AMC through their Citizens Charters. These relate to setting a time-frame for repair leakage, remedy of contaminated water, repair for water stoppage, water connection, etc. The QOS (quality of service) parameters, as set by AMC, are a good step in its attempt to provide improved services to water customers. There are other parameters such as inadequate water pressure, supply interruption (Box 6.2), on billing contacts, etc., which could also form an expanded list of such QOS parameters. The QOS parameters would have to be determined and updated on a continuous basis, and should be enforced. The role of the WRA in facilitating a

## Recommendation 10

The WRA should promote economy and efficiency in the water supply services in Gujarat.

### *Promoting competition*

In Gujarat, as in many other countries, it may take time to introduce competition in the water sector in the real sense. It is, however, possible to provide a framework for introducing 'comparative competition'<sup>21</sup> among the various service providers in local bodies. It could start initially with six corporations in Gujarat, and gradually expand to other local bodies. The WRA can collect information on certain parameters, compare the same among various service providers, and set standards at a higher level, which could be comparable with the best performed utility at the national level or at the international level at a later date. This type of 'comparative competition' is being used in UK by OFWAT in bringing higher efficiency in the working of water companies, as well as to bring in economy of operation. At the State level in Gujarat, a framework is required to introduce such competition, and the WRA could be the appropriate authority for this purpose.

## Recommendation 11

The WRA should facilitate competition in the water sector in Gujarat.

### *Adjudication of disputes*

As stated earlier, with the introduction of new service providers including 'developers', there will be many players in Gujarat's water sector. While individual concession contracts would invariably incorporate a provision for dispute settlement between a 'developer' and an agency<sup>22</sup>, a framework for adjudicating disputes amongst different service providers such as wholesale suppliers of water, bulk suppliers of water etc., is essential. Further, such fora must also address consumer issues, especially quality of services.

## Recommendation 12

The WRA should adjudicate upon disputes and differences amongst various service providers or / and between a service provider and a group of consumers.

<sup>21</sup> It includes a) a pure version where the price a firm charges is set by costs of other firms in the industry, b) 'regulatory benchmarking of service providers' against each other to estimate efficiency, and setting price caps accordingly, c) publication of comparisons of companies' or service providers' performance in the media. (The World Bank 1998c)

<sup>22</sup> Agency has been defined in GID Act 1999

has to be defined in a broader context as well. Conservation of natural resources, improvements in the quality of water in conjunction with quality of air or land, improvement of standards of waste management and disposals, managing water resources to achieve the proper balance between societies' needs and the environment, etc., are some issues required to be addressed in the water sector. And, the advice of the WRA should be sought by the Government, and the WRA, being an expert body, should advise it accordingly.

### Recommendation 13

The WRA should aid and advise the Government for developing a Water Use Policy for Gujarat. The Government should call for an annual report on water use in the state from the WRA. The WRA should monitor such annual water use.

### *Relationship with other regulators*

The WRA in Gujarat would be required to interact with other regulators such as Gujarat Pollution Control Board. The Board is authorised to prevent and control water pollution. It has the power to take samples for analysing water quality from any stream, well or sewage or effluent passing from any plant, or vessel etc. into any such stream or well. As stated earlier, there is no law for efficient management of ground water in Gujarat. There is a need to formulate guidelines for sustainable water use in the State.

### Recommendation 14

The WRA should co-ordinate with other regulators such as Gujarat State Pollution Control Board for framing and evolving guidelines for sustainable water use in the state.

### *Other functions*

The WRA in Gujarat may be required to perform functions, which are supplemental, incidental or consequential to any of the functions stated above. In particular, it is felt that the limiting the jurisdiction of the regulator to the water sector may not be feasible as the water sectors has strong linkages with the sewerage sector. Currently, both the sectors are being regulated by the same agencies. For instance, the GWSSB undertakes construction activity in both the sectors. Similarly, the Municipal Corporations in Gujarat are responsible for the provision of both these services. Thus, if the regulatory functions in both the

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<sup>26</sup> Sustainable development is such development that meets the needs of the present without compromising the ability of future generations to meet their needs



- j) Co-ordinate with other regulators such as Gujarat State Pollution Control Board for framing and evolving guidelines for sustainable water use in the state.
- k) Perform such functions as are assigned to it by the Government of Gujarat at a later date.

So far, all the functions as indicated above used/are required to be exercised by the Government or local bodies in Gujarat. This arrangement did not yield a satisfactory outcome, as we have seen in chapter 2. No substantial private investments took place in water sector in Gujarat. Earlier in the chapter, we have argued the case for independent regulation. This can be accomplished through enactment of independent legislation. This is called for due to the following reasons.

- a) A new legislation will demonstrate the Government's commitments to the reforms and would thereby reduce the risk perceived by potential investors
- b) Introduction of a new legislation would eliminate the possibility of conflicting provisions and interpretations under different Acts

Further, the independent regulation through separate enactment will send a signal not only to potential investors but also to the public in general that the Government is committed to protect public interest even in the event of private sector participation. Therefore, regulatory functions as stated above should be given to WRA through independent legislation. Other aspects of the regulatory framework constitute of the WRA, are discussed below.

## Regulatory framework: design issues

### *Regulatory independence*

The WRA is required to effectively discharge its duties under the statute and for the purpose, it should enjoy some degree of freedom for its functioning. This independence, however, cannot be absolute. This means that it will be subject to the laws of the land, and the policy of the Government. Its autonomy has to be guaranteed by law.

Some parameters, considered essential to ensure the autonomy of a regulator, are as follows: transparent selection process, well laid-out qualifying and disqualifying criteria, a prescribed tenure, capability of the regulator to access expertise without seeking the Government's approval, authority to incur

for re-appointment has been dealt with differently in different countries. For instance, in USA and Argentina the regulators are eligible for re-appointment. In India, many statutes are silent on the issue. Considering that the expertise gained over a period of the tenure in the authority could be effectively utilised further, then is a case for the members being made eligible for re-appointment through the prescribed selection process along with the other candidates. Tenure of members of all the regulatory authorities in the electricity sector in India is five years, while it is three years in telecom sector. In Orissa, tenure of initial three members of the OERC (Orissa Electricity Regulatory Commission) had been staggered for a varying period of three, four, and five years respectively, so as to avoid the retirement of all members of the commission, and at the same time to ensure continuity in the functioning of the commission. However, the upper age limits between members and the chairperson should be made uniform.

Whenever a regulator is required to be removed from the office, it should be on stated grounds, and the process of such removal should be transparent. While the Government should be the authority for removing a regulator, it should do so on the advice of an independent authority such as the High Court, State PSC (Public Service Commission), etc.

The degree of financial and organisational autonomy of various regulatory authorities vary in India. For instance, the TRAI (Telecom Regulatory Authority of India) has been allowed to levy fees and charges and to set up its own fund whereas the CERC (Central Electricity Regulatory Commission) is wholly dependent upon the Government for funding, although CERC funds are charged to the Consolidated Fund of India, but not voted. The CERC also requires the Government's approval for the creation of posts. Further, in Orissa, (in the case of OERC [Orissa Electricity Regulatory Commission]) the Government's approval is required for the creation of posts, although the expenses can be charged to the consolidated fund of the State.

The regulatory authority should be able to hire expertise independent of the Government's approval. The salary structure of such staff should be determined by the regulator in order to attract the best expertise and it should not be subject to Government control.

There are two distinct methods available for dealing with the funding mechanism of a regulator, namely earmarked funding from the Government budget and levy from the consumers indirectly through the regulated utilities. For instance, in Argentina, the cap on the levy of fees is 2.67 percent of the consumer bill in the case of a water regulator. In India, since the concept of

The qualifications of the Chairman and Members should include:

- The Chairman should have special knowledge and professional experience in the field of administration, economics, commerce, law or management, consumer affairs, and should be a person who is or has been an Additional Chief Secretary to the Government of Gujarat or has held an equivalent post in the Government.
- One member should have qualification and experience in the field of engineering with specialisation in water supply, water resource management and planning, and should be a person who is or has been a Chief Engineer to the Government of Gujarat or has held an equivalent post in the Government.
- One member should have qualification and experience of not less than 15 years in the field of finance with a special reference to investment and cost analysis in the Government or in any financial institution or industrial or services sector.

2. The tenure of the members of the WRA should be five years. The Chairman and the members should be appointed on a staggered basis with maximum age limit of 65. The reappointment of members should be allowed. Disqualification criteria should include interests in regulated entities, in addition to the following.

- Member of Parliament of any State Legislature or of any local authority, or political parties
- Insolvency, unsound mind, conviction of any offence etc.

3. The members of the authority should not be removed without a cause. Any member of the WRA shall only be removed from his office by order of the Governor on the ground of proved misbehaviour after an enquiry by the High Court on a reference by the Government. The Governor may suspend any Member of the Authority, in respect of whom a reference has been made to the High Court, until the Governor has passed orders on the receipt of the report of the High Court on such reference.

4. The members of the authority should not appear before the authority as a representative of any person for a period of three years of his completion of his tenure, and should not acquire any interests in the regulated entities.

settlement) in the case of the telecom regulator. The consultative process is preferable to formal hearings in as much as it provides for a comprehensive discussion of issues with different stakeholders and, thus, is less costly and less time consuming. In formal hearings, which are based on written submissions, there is a danger that the discussion may become adversarial rather than consultative. However, there are some areas such as dispute settlements, which necessarily have to be resolved through a quasi-judicial process. Thus, a case lies in demarcating the areas where the regulator should follow the process of hearings in decision-making. The areas should be restricted to those where the decision of the regulator requires imposition of a penalty or involves an award in favour of one party and is, therefore, judiciable. In other cases, the consultative processes should be encouraged.

An appeal against a decision must be to an independent body and must be on a question of law. The appellate authority should not deal with the substance of the regulatory decisions unless the evidence presented or the procedure adopted shows that regulatory decisions are unreasonable. The appellate authority could be the High Court or a Tribunal with quasi-judicial powers.

In addition, there should be a legislative scrutiny of the regulator's activities, as well as external scrutiny by, say, the C&AG (Controller and Auditor General) of India of the regulator's accounts and expenses. However, the extent of legislative scrutiny has to be clarified. The Annual Report on the regulatory activities should be tabled before the legislature. And the legislature should refrain from any substantive discussion on regulatory decisions, which have been arrived at through a transparent as well as consultative process. Similarly, care should be taken to ensure that external scrutiny by the C&AG should not also extend to substantive regulatory decisions, but be restricted to accounts and expenses incurred by a regulator.

- Its accounts should be audited by the Comptroller and Auditor General of India.
- Its accounts must to be certified by the Comptroller and Auditor-General, and shall be forwarded annually to the State Government by the authority. The State Government shall cause the audit report to be placed/labelled, as soon as may be after it is received, before the State Legislature.
- The authority shall prepare, once every year, in such form and at such time as may be prescribed, an annual report including a summary of its activities during the previous year and copies of the report shall be forwarded to the State Government. A copy of such report should be labelled before the State Legislature.

### *Powers of the authority*

In areas where issues are required to be resolved through adjudication, the regulator should be deemed to be a civil court and a quasi-judicial authority. It would require to have the authority to summon and enforce attendance, require disclosure and production of documents, receive evidence on affidavit, review its decisions, etc. For discharging its functions, the regulator would also require to have the powers to call for information and conduct investigations. Further, it would require sufficient powers to prosecute for the contempt of the lawful authority of a public servant, for offences against public justice, and for offences relating to documents given as evidence. The regulator being a quasi-judicial body, would require to have the powers to pass interim as well as final orders. In the first instance, it may make an interim order and may reserve its decision pending further proceedings. The orders and directions of a regulator must be enforceable in a court of law. In addition, every order passed by the authority should be deemed to be the decree of a civil court and be executable as such. If the directions or orders of the authority are violated, the violation should be adequately punishable with suitable fines. Regulatory authorities in different countries (Table 6.6) have been given the necessary powers to impose penalties for non-compliance of orders of the regulatory authorities.

periodically, or, as and when required, any information concerning its or his activities related to water supply. The WRA should have full powers under Section 195 of the Criminal Procedure Code to prosecute for contempt for lawful authority of public servants, etc.

6. The WRA should have full powers under Chapter XXVI of CrPc (Code of criminal procedure) in regard to offences affecting the administration of justice.

### *Miscellaneous*

In India, the Government's approach to statutory regulation is based on the notion that a regulator, while being autonomous, should be accountable for its actions and should also be subject to the policy of the Government. The policy directives of the Government should conform to the objectives of the relevant regulatory legislation. These directives should relate to policy and not to administrative and technical matters. Whenever the Government decides to issue policy directives, it must consult the autonomous regulator before such directives are issued. It is equally important that the directives issued and reasons behind them should be made public. However, in case of dispute, the Government decision should be final.

### **Recommendation 19**

The WRA should be subject to the policy direction of the Government. The policy direction should be consultative, reasoned and transparent. In case of dispute, the Government's decision is final.

### **Recommendation 20**

State Government should have the following powers to determine:

- the salary, allowances and other conditions of service of the members.
- the form and the manner in which and the authority before whom the oath of office and secrecy.
- the form in which and the time at which, the WRA shall prepare its budget.
- the form in which the annual statement of accounts is to be prepared by the WRA.
- the form and the time within which the annual report shall be furnished.
- any other matter which is to be, or may be, prescribed, or in respect of which provision is to be made by rules.

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## Introduction

Water is often regarded as a social good and the charging for water in the past has always been driven by the Government's social policy. Even in developed countries like the United Kingdom, where significant parts of the industry have been privatized, the government continues to have a substantial role in the pricing.

In many parts of the world, it has been observed that political interference in pricing results in low-level equilibrium<sup>32</sup> of low coverage, limited investment and poor quality service. Low-level equilibrium is often associated with high social costs, which includes a negative impact on public health. It also causes consumers to invest in generating private supplies at high cost and resulting in environmental damage.

In recent times however, there has been a noticeable trend to introduce reforms in several countries including United Kingdom, Chile and Mexico. While different strategies have been followed in different countries, limiting the role of government in pricing is the key element of the process. Even within India, there have been attempts to reform and introduce private sector participation in Chennai, Tirupur and Bangalore. The fundamental rationale for reforming institutions in the sector, as stated in earlier chapters, is to overcome the demand-supply mismatch, to improve the quality of service and efficiencies, and to reduce the financial burden on the government.

The Government of Gujarat has formulated a Water Supply Master Plan to deal with the problem of water scarcity. As part of the master plan, it is envisaged that private sector will play a role in the development of the sector. The involvement of the private sector would necessarily imply creating an enabling environment to attract investments in the sector. This would mean changing the existing legal, regulatory, financial and administrative framework to facilitate private sector participation. Providing adequate returns through building in a tariff would be essential to attract private sector players.

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<sup>32</sup> Spilled Water, Institutional Commitment in the provision of Water Services, Edited by William Savedoff and Pablo Spiller, pp. 13

1. Pricing which is not related to actual consumption is inherently inefficient since it provides no incentives to consume at optimum levels.
2. The current pricing structure does not bear any relation to the cost of providing the supply and service and, hence, does not provide any signal to the consumer about the value of demand placed on system due to consumption.
3. The prices do not bear any relation to the quality of supply and the efficiency of the serving utility and, hence, provide no incentive to the utility to improve its performance.
4. It also creates a problem of inequity, because different areas (within the same utility as also across different utilities) may be supplied with varying quantity and quality of water, while the charges are related to the value of property or a flat rate is levied. Hence, it is possible that consumers being provided low quantity or consumers with lower ability to pay, may actually be cross-subsidizing those consumers who are being provided with better quality and possess higher capability to pay.
5. The current system of functioning of the municipalities and local bodies is not based on commercial principles and there are no clearly defined accounting procedures. This results in lack of information on the cost structures as well as adequacy of charges for different services because –
  - a) Municipalities and local bodies have multiple functions and it is not possible to determine the proportion of total cost incurred in providing each of the services that they are required to.
  - b) Since property tax is a composite tax for multiple services bunched together, it is not possible to determine the proportion of costs recovered for each of the services rendered. Further, it is likely that some services may be overpriced while others are underpriced.

Besides the structural problems mentioned above, the pricing of water in Gujarat has always been a socio-political exercise rather than an economic one. It is understood from discussions that, in rural areas supplied by GWSSB, not more than 10 percent of the cost of providing water services is recovered through water charges. This has, over a time period, resulted in insufficient funds being made available for expanding the system and contributed to declining availability and poor quality of supply and service. Low availability has also resulted in water being sold by private firms at exorbitant prices<sup>34</sup> (much

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<sup>34</sup> This phenomenon is widespread in the State. Sale of water for domestic and irrigation purposes occurs commonly.



It is interesting to note that such institutional reform is already underway in a number of countries<sup>37</sup> and also within the country, including Gujarat. The Government of Gujarat, in December 1998, created the Gujarat Electricity Regulatory Commission and provided it with a number of powers—including that of determination the tariff for electricity for all consumer categories and for granting of licenses. Since then, the GERC has started functioning effectively and issued its first tariff award in October 2000. Smooth implementation of the award has demonstrated three clear advantages of tariff determination through independent regulatory process.

1. The willingness of polity to accept the tariff determined through techno-economic regulatory procedure.
2. The ability to create pressure on utilities to improve efficiency and quality of supply and service through internalization of these concerns in explicit and quantifiable manner.
3. The better acceptability by consumers of tariff determined through a transparent and participatory process.

It is evident that creation of independent regulatory authority for water sector is expected to yield similar benefits. It will also facilitate private sector participation and lead to required investments.

The creation of an independent regulator would obviously require a change in the existing legislation or the introduction of a new legislation. While it may be politically and administratively easier to amend the existing legislation, it is often desirable to introduce a new legislation for various reasons, discussed in Chapter 6.

The design of the regulatory framework needs careful consideration. It is considered desirable that substantive constraints are placed on regulatory discretion. This is required to reduce the regulatory risk and can be achieved by detailing in the enabling legislation the objectives and the principles, definition of variables and the process to be followed for tariff setting.

As discussed above, under the existing system retail pricing is under the purview of municipal corporations, municipalities and local bodies. They are also the suppliers of services and clearly these powers will have to be transferred from these bodies to the regulator. This will ensure separation of the role of the supplier and the regulator. Currently, there are no transfer prices for bulk transportation of water in Gujarat. However, with the creation of the GSWIDCL

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<sup>37</sup> Annexure 7.1 provides the details in this context

## *Phase II: Execution phase*

- a) Direct regulation for determination of bulk prices in all cases and, for retail prices, in the areas to be declared by the Government of Gujarat. It is suggested that the regulator may determine the retail prices in the six municipal corporations. This would imply that the regulator would actually determine the set of prices at periodic intervals. The concerned utility shall be required to file with the regulator an application seeking an amendment in the tariff structure.
- b) Indirect regulation for retail prices in areas other than the six municipal corporations. The power to determine the tariff shall still be with the regulator but it shall be executed through local bodies. The regulator would specify the objectives, the principles and the procedure to be followed for the determination of the tariff. The local body, according to the specified formula would then determine the price. It would be necessary to file with the regulator, all necessary information whenever a change in the tariff is effected.

A two-tier regulatory structure has been suggested for the following reasons.

- a) To reduce the regulatory burden that will be caused if the regulator were to determine the tariff for all local bodies because of their large numbers.
- b) Since, during the initial phase, private sector participation can be expected in urban areas only, the issue of pricing is more relevant in these areas.

## **Tariff setting - principles, design, process and issues**

### *Principles*

Tariff determination is the primary tool available for creating an enabling environment for dynamic and sustainable growth in the water sector.

The fundamental principle of tariff determination is to ensure that prices lead to an optimum level of investment, operation and consumption in the sector. The principles that need to be considered while designing the tariff are detailed below.

1. To promote efficiency and economy in the activities of the sector – meaning:
  - Only reasonable costs of operation will be allowed to be recovered from the consumers.
  - To provide incentives through tariff for good performance and for improving the quality of supply and service to the consumers.

- a. Demand charge – The demand charge seeks to recover the fixed costs associated with the cost of providing supply<sup>36</sup>. The demand charge is sometimes known as the standing charge or the fixed charge. The fixed cost includes the following components.
- I. Interest costs
  - II. Depreciation
  - III. Reasonable return on assets

The proportion of the fixed costs in the total cost, in case of the water sector is very high and, hence, it is possible to recover only a part of the fixed costs through the demand charges. Levying of the demand charge also secures the financial viability of the utility. This charge can be in form of a flat rate levied in Rs per month per consumer.

- b. Variable charge – To recover the operation and maintenance costs and the balance of the fixed costs. This includes the employee cost, cost of repairs and maintenance etc. This charge can be levied in form of Rs per KL consumed by the consumer.

The following paragraphs discuss the design for bulk and retail tariff separately.

### Bulk supply tariff

The bulk supply tariff constitutes the cost of capturing, storing and the cost of transporting water in bulk. The primary cost in the bulk supply tariff, is the fixed cost in form of the capital investment. This may in fact form close to more than 50 percent of the total cost of supplying water.

Following recommendations are made for design of the bulk supply tariff:

- a. The principle of marginal cost should form the basis of designing the tariff.
- b. Performance-based tariff design should be followed with efficient utilities being rewarded and inefficient utilities being penalized. Design of performance-based tariff would need careful consideration of the fact that the bulk supply companies may supply either through the canals or by pipelines. Further, it would also require identification of suitable parameters for measuring performance which can include the amount of water lost in transit, the employees per million kiloliters transmitted etc.

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<sup>36</sup> Recovery of fixed cost is a standard practice in all infrastructure sectors. Even for the water sector, the Ninth Five Year Plan recognizes the concept of recovery of capital cost from the consumers (Ref. Section on Drinking Water [Rural], Ninth Five Year Plan, Vol. II, pp. 271).

- e. The demand charge as well as the variable charge should be different for the three consumer categories mentioned above.
- f. The tariff should comprise a reasonable number of slabs with successively higher charges in the higher blocks.
- g. There should be a lifeline rate for marginal consumers. This can be provided through a targeted subsidy scheme supported by the government.

### *Regulatory process*

This section discusses the regulatory process and related issues in context of tariff determination by WRA.

The regulator is expected to prepare the framework for tariff regulation, which includes the principles to be used, guidelines for filing of proposals, information requirements of the regulator etc.

In case of the water sector in Gujarat, two different processes, one for the utilities regulated directly and another for the utilities regulated indirectly are proposed. The following approach is suggested, during the Phase II, for utilities under direct regulation.

- a. The utilities would prepare and submit a tariff proposal to the regulator. It is suggested that the frequency of tariff review be every five years. The longer duration between successive filings is conducive for performance-based tariff setting and provides a stable regulatory framework thereby reducing the risk profile. It also leads to stability in the tariff. Long duration tariff review period also has the benefit of a reduced regulatory burden. The detailed regulatory procedure is discussed later.
- b. It would be possible to adjust the tariff, on a yearly basis, to reflect changes in the inflation level, and the price of major inputs like electricity etc. The regulator will determine the formula and procedure for such review and the utility will approach the regulator every year for such an amendment. It would not be necessary to follow the complete regulatory procedure for the annual review.
- c. The regulatory procedure for utilities regulated directly would typically comprises four steps, discussed below.

#### **Step-1: Filing tariff proposal**

The first step in the process is preparation of a tariff proposal by the utilities as per the guidelines specified by the regulator. The tariff proposals will have to include the details of technical, operational and financial parameters and any other related data that may be required by the regulator.

facts in brief, the points or issues for determination, decision thereon and the reasons for such decisions. The regulator is expected to provide a detailed written order along with the judgement containing the facts of the case, the Commission's analysis and the reasons for the decisions.

The enabling Act would normally specify a time frame for completing the whole process. It is suggested that duration of four months may be provided for completing the regulatory process of tariff determination.

## 2. Utilities under indirect regulation

In case of utilities regulated indirectly a different approach would be required during Phase II. Following recommendations are made in this case.

- a. The utilities will not be required to file a tariff proposal to the regulator but instead would have to complete all the details as per the guidelines and formats specified by the regulator. A time frame of five years is suggested as in the case of utilities regulated directly for similar reasons.
- b. The details would have to be filed with the regulator at least four months before the intended date of the tariff revision.
- c. The regulator would analyze the details and, if required, after holding a negotiation, on performance as well as other parameters, with the concerned utility, arrive at the tariff.
- d. It would be possible to adjust the tariff, on a yearly basis, to reflect for the changes in the inflation level, and price of major inputs like electricity etc. on the basis of approach determined by the regulator.

## *Issues in tariff setting*

The process of regulation and tariff determination as outlined above would imply a number of operational and managerial systems including information and accounting procedures, subsidy allocation from the government etc. These issues along with the recommendations are discussed below.

### Accounting procedures and information systems

Currently, the supply of water and related services are provided by the municipal corporations, municipalities, GWSSB and other local bodies. These organizations have multiple functions including providing for sanitation services, maintenance of roads and streets etc.

The existing accounting systems of these organizations do not have provision for segregating the costs related to providing each of these services. Hence, it is

## Subsidy support

Wherever the local bodies, due to their social policy, desire that a particular class of consumers be supplied at tariffs below those determined by the regulator, it is recommended that the allocation for the same should be made explicitly in the local bodies' budget.

The need for subsidy should be assessed rather than just assuming that it exists, because the inclusion of unintended beneficiaries reduces the efficiency of the subsidy and increases the burden on the taxpayer. It is important that the subsidies be well targeted and the inclusion criteria be such that it minimizes unintended beneficiaries. A proper assessment of the subsidy need and the willingness and capability to pay is required. However, design of complex inclusion criteria often results in high administrative costs of running the subsidy scheme. It may thus be desirable to jointly administer several subsidy schemes so that the administrative costs can be shared.

The provision of subsidy may also result in inefficient use of resources, in this case water, particularly when the subsidy is designed to cover either the full cost of the service or consumption at all levels or both. It is, hence, suggested that the consumers be required to pay a part of the total cost. Further, it is also important to cap the subsidy at minimum basic level of need.

## Willingness to pay for water in Gujarat

This section very briefly discusses the willingness to pay (WTP) for water in Baroda city in Gujarat based on a study carried out by the Human Settlement Management Institute<sup>40</sup> in 1998. The study used the contingent valuation technique for estimating the WTP in the household sector. The main findings of the study are listed below.

- I. Almost 80 percent of the households expressed that they would continue using the water from a house connection, even when the monthly charges were increased nearly three times (from eight rupees per month to Rs 25 per month). However, the percentage who would still use water from a house connection at Rs 40 per month and at Rs 60 per month declined dramatically to 35 percent and 9 percent respectively.
- II. The WTP as percentage of household income is quite low and varies from 0.55 to about 2.0 percent of the total household income.
- III. More than 62 percent of the households are willing to pay up to Rs 25 for improved water pressure.

<sup>40</sup> Located at the Integrated Office Complex, Hudco House, Lodhi Road, New Delhi 110 003

areas, the retail supply tariff would be regulated indirectly with the regulator prescribing the principles etc. and retaining the right to seek all necessary information.

The principles for determining the tariff have been prescribed in the chapter and it is recommended that the same may be incorporated in the proposed legislation. It is recommended that the tariff structure should provide signals for optimum consumption and also the value of consumption at different times. The tariff should be designed to have a demand charge and a variable charge. All consumers should be metered and tariff should act as an incentive to the consumers to move toward metered consumption.

It is often assumed that the price of water needs to be subsidized without determining the willingness to pay. It is recommended that the need for subsidy be assessed rather than assumed. Further, the subsidy scheme needs to be well designed so as to exclude unintended beneficiaries, minimize the administrative cost and retain the incentives for optimum consumption.

4. The tariff is determined through a process of yardstick competition by comparing the firm's performance with that of an efficient firm. The tariff is also indexed to a price index. Hence, a performance-based tariff setting methodology is followed. The firm is entitled to retain additional profits accruing out of better management. The employees had an incentive to increase returns since they were allowed to retain an equivalent of 10 percent of the profits for the first five years of reform.
5. The companies can appeal the decision of the regulator and a process for the appeal is specified.
6. The companies are required to file with the regulator on a regular basis, the information on cost and service. Companies failing to do so can be fined. This has resulted in better accounting policies and substantial increase in the information available compared to the pre-reform period.
7. The impact of tariff increase on poor households was mitigated through a well-targeted subsidy scheme.

### *United Kingdom*

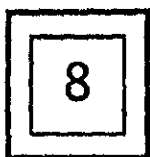
In UK, the Office of Water Services (OFWAT) established in 1989 is responsible for regulating the water industry, which was, privatized in 1989. Privatization of the industry was one of the key drivers of the reform process. The functions of OFWAT include setting price limits, ensuring standards of service, promoting economy, efficiency and competition, publishing information on industry performance and dealing with complaints and disputes. The key features in context of tariff determination are detailed below.

1. The process of tariff determination is carried out once every five years. However, the Water Industry Act 1999 introduced annual regulation of tariff structure in addition to five yearly regulation of price caps. The prices are set as caps with companies free to offer lower rates.
2. The process involves extensive consultations with all stakeholders including the government. This is carried out through issue of consultation papers issued by the regulator setting out various issues relevant to the tariff determination<sup>44</sup>.
3. There is a considerable focus on the quality of supply and service in the process of price setting, which takes into consideration the new investments, required for meeting the standards.
4. The government ensures that vulnerable consumers are protected.

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<sup>44</sup> Such an approach is possible as the consumers are well informed and the system makes available substantial information, which helps in providing inputs into the tariff determination process.





# Framework for water quality standards

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## Introduction

The criteria of water quality has become an important and sometimes controversial issue of the water supply field. As our ability to measure and treat trace quantities of contaminants in water improves and our knowledge of the health effects of these compounds increases, we are faced with increasingly stringent water regulations and consumer pressures. The regulations are vitally important for a number of reasons. Standards affect the selection of raw water sources, choice of treatment processes and design criteria, range of alternatives for modifying existing treatment plants to meet current or future standards, and treatment costs. Public health engineers associated with drinking water quality are required to be aware of regulatory requirements so as to design treatment plants in accordance with much higher acceptability standards.

The water quality regulatory process includes the following series of logical steps:

1. Beneficial use designation
2. Criteria development
3. Standard promulgation
4. Goal selection

## *Beneficial use designation*

Surface and ground waters are typically designated by a state water pollution control agency for beneficial uses such as municipal water supply, industrial water supply, recreation, agricultural irrigation, power and navigation, and protection or enhancement of fish and wildlife. In India, the Central Pollution Control Board has developed various designated water use classes (Table 8.1). These beneficial uses are based on the quality of the water, present and future pollution sources, availability of suitable alternative sources, historical practice and availability of treatment processes to remove undesirable constituents for a given use.

specification or treatment (2) product quality specification and (3) a combination of the above.

The ideal method for establishing standards involves scientific determination of health risks or benefits, a technical/engineering decision of costs to meet various water quality levels, and a regulatory/political decision that weighs benefits and costs.

### *Goal selection*

Water quality goals are contaminant concentrations, which an agency or water supplier chooses to achieve in order to ensure that it consistently meets regulated levels. Goals are typically more stringent than standards and include constituents not covered by regulations but of particular importance to the goal-setting entity. Decisions on setting goals involve determination of costs, benefits, and the overall philosophy or posture of a supplier.

## **Drinking water quality standards in India**

In India, the drinking water quality standards have been formulated by different agencies i.e., the MUD (Ministry of Urban Development) (Table 8.2), BIS (Bureau of Indian Standards) (Table 8.4), and Indian Council of Medical Research. The WHO (World Health Organization) (Table 8.4) has recommended a set of drinking water quality standards, which also form a basis for the formulation of national standards in certain countries. The standards lay down the minimum requirements with respect to chemical and bacterial quality of water for domestic use which local authorities are expected to meet with. Neither of the Indian standards includes parameters like hydrocarbons, pesticides, certain heavy metals etc. that are an integral part of the WHO or EC (European Commission) standards. The MUD standards are usually a guideline but public health engineering departments in India are also following the BIS standards by their face value or in stringent form, if required. In case of private sector participation, as a uniform code of conduct, it is recommended that all stakeholders aim and achieve a final delivered quality of water that meets BIS standards. The scope of quality analysis should also include other critical parameters listed by WHO / EC depending on local conditions.

**Table 8.3** Guideline values for bacteriological quality laid down by MUD

Organism	Unit	Guideline value	Remarks
<b>A. Piped Water Supplies</b>			
<b>A.1 Treated water entering the distribution system</b>			
Faecal coliforms	No./100 ml	0	Turbidity <1 NTU
Coliform organisms	No./100 ml	0	For disinfection with chlorine, pH preferably 8.0, free chlorine residual 0.2-0.5 mg/litre following 30 minutes (minimum) contact
<b>A.2 Untreated water entering the distribution system</b>			
Faecal coliforms	No./100 ml	0	
Coliform organisms	No./100 ml	0	In 98% of samples examined throughout the year—in the case of large supplies when sufficient samples are examined
<b>A.3 Water in the distribution system</b>			
Faecal coliform	No./100 ml	0	
Coliform organisms	No./100 ml	0	In 95% of samples examined throughout the year—in the case of large supplies when sufficient samples are examined
Coliform organisms	No./100 ml	3	In an occasional sample but not in consecutive samples
<b>B Unpiped water supplies</b>			
Faecal coliform	No./100 ml	0	
Coliform organisms	No./100 ml	10	Should not occur repeatedly; if occurrence is frequent and if sanitary protection cannot be improved an alternative source must be found, if possible.
<b>C. Emergency water supplies</b>			
Faecal coliform	No./100 ml	0	
Coliform organisms	No./100 ml	0	Advise public to boil water in case of failure to meet guideline values

Source: Guidelines for Drinking Water Quality, Vol.1, WHO Publication

Regulatory Authority), as the case may be should consider redefining the scope of the parameters to be analysed and requisite standards to be adhered to. This can be done after taking into consideration the following:

- The quality of raw water source (both surface and ground). This should then be compared with the quality of water when the system was designed / commissioned and a brief analysis of the causes of change.
- The present local conditions like the source's vulnerability to pollution or poor efficiency levels of the treatment process or age of distribution network.
- Past track record related to water-borne diseases and related causal factors should also be taken into consideration.

However, the bacteriological parameters and residual chlorine concentration should be the bare minimum that the service provider shall always comply to with immediate effect. The scope of parameters under the quality criteria should at least be the same as that practised by the AMC at present.

However, all local bodies associated with water supply may not be in a position, either financially or technically, to meet with the identified standards. The regulator through an interactive and consultative process with the local bodies / service providers, should frame a time-bound action plan by which a uniform standard shall be applicable throughout the State. The action plan should include the short-term goals to be achieved and long-term objectives vis-à-vis water quality.

## Surveillance systems

Water quality surveillance aims to reduce the risk of contaminated water to human health by way of a systematic and continuous monitoring of drinking water systems. A surveillance programme can ensure effectiveness only if supported by necessary legislation and regulatory standards. The scope of the surveillance programme is greatly influenced by the local conditions, technical and economic strength of the local municipalities. Surveillance programmes should not overlook the importance of co-ordination with health and sanitation departments. This would help in an inter-flow of information on water quality and health statistics in a transparent way so as to be able to draw correlations for future planning and disaster management.

The surveillance system to start with should be well defined including the scope of the parameters to be monitored and their frequency. This should initially be comprehensive in nature so as to include aspects related to the nature of source, type of treatment process, distribution network and other local

Similarly the minimum equipment requirements for physical, chemical and bacteriological tests have been defined by the MUD (Refer Annexure 8.1).

The framework for water quality surveillance, based on guidelines as stated above, should be formulated by the Government of Gujarat or WRA, as the case may be and the service provider should follow the same for the day to day surveillance. The regulator<sup>45</sup> should also consider setting up of an independent cell to monitor the performance of the service provider in this regard. This is proposed in view of the fact that there is no third party check in the existing set-up in many local bodies, such as the AMC leading to lack of accountability and transparency of operations. The system of checks and audit monitoring, as recommended by the European Commission Directive, for the service provider and the regulator respectively could be emulated as a model with suitable modifications (Table 8.6). The audit monitoring could be done through secondary surveys, sanitary inspections and limited primary monitoring using standard procedures. The agency for carrying out this third party audit monitoring should preferably be the regulator or else outsourced to organizations duly registered with the regulator.

Further, the service provider should take measures necessary to ensure that adequate and up to date information is available both to the regulator and consumer. In the event of the failure of the service provider to comply with the desired water quality, the consumers shall be informed promptly and given the necessary advice. The regulator and the service provider could take the remedial action jointly. The results of the check and audit monitoring and the follow up action (analysis and action) should be publicly available either on demand or disseminated through the electronic or print media. Further an effective system of redressal of complaints should also be in place.

The official journal of the European Commission Directive on the quality of water intended for human consumption specifies that samples must be taken at the point of compliance, within the supply zone or at the treatment works for particular parameters if it can be demonstrated that there would be no adverse change in the measured values of the parameters concerned. The minimum frequency of sampling and analysis as per its directive's guidelines is as Table 8.6.

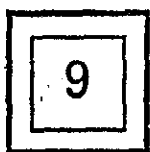
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<sup>45</sup> Here the regulator could be Government of Gujarat or WRA as the case may be.

## Conclusions

- The Government of Gujarat or WRA, as the case may be should formulate the minimum drinking water quality standards as per the BIS standards (Refer Table 8.3) and the framework for water quality surveillance for the service provider.
- The scope of water quality monitoring, number of parameters to be analysed and sampling and analysis methodology could be modified as per the WHO/EC guidelines taking into consideration local conditions, raw water source and past track record.
- The Government of Gujarat or WRA, as the case may be should always ensure that the service provider meets the bacteriological quality and residual chlorine requirements, irrespective of the local conditions and the raw water source.

- Wire baskets
- Cotton / Aluminium foils
- Brown paper
- Twine
- Burners (Bunsen)
- Suction flask (1 litre cap)
- Suction Pump
- Sampling bottles (reagent bottles of 250 ml capacity)
- Bacteriological media - M. Endo Broth (dehydrated), Peptone / Triptone  
Water, Lactose or Lauryl Tryptose broth, Mac Conkey broth, Brilliant Green  
Bile Lactose Broth, and Total Plate Count Agar.



## Legislative changes to remove impediments and to facilitate the regulatory framework

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In this chapter we discuss the existing legislation governing the water sector in Gujarat, and examine the extent of modifications required to enable the functioning of the regulatory framework as outlined in chapter 6. The legislation examined in this chapter are:

- The Gujarat Infrastructure Development (GID) Act, 1999
- The Bombay Provincial Municipal Corporations (BPMC) Act 1949
- The Gujarat Municipalities Act (GMA) 1963
- The Gujarat Act No. 18 of 1979
- The Gujarat Panchayat Act 1993

### Recommendation 1

There should be a Water Regulatory Authority which should maintain an arms-length relationship with stakeholders including government as well as local bodies, to regulate segments of water supply.

In order to give effect to the above recommendation, there is a need to enact a new legislation. In Chapter 6, we have argued as to why there is a need for independent legislation. The aim of the legislation could be to facilitate participation of private sector entrepreneurs in the water industry, and to take measures conducive to the development and management of the water industry in the state in an efficient, economic, and competitive manner, and to protect consumer interests including the constitution of a Water Regulatory Authority for the State of Gujarat.

Since the Gujarat Act No. 18 of 1979 established the GWSSB with the objectives of 'rapid development and proper regulation of water supply and sewerage services in the State of Gujarat', the regulation function of the GWSSB should be amended and be assigned to the proposed water regulator the WRA (Water Regulatory Authority). These are discussed subsequently in this chapter.



Section 43 stipulates that the Board should fix the cost of water to be supplied according to value and also the minimum cost to be charged in respect of each connection. Further, it may, in lieu of charging the cost of water according to value, accept a fixed sum for a specified period on the basis of expected consumption of water during that period for every consumer. Section 45 deals with the procedure and the manner in which the meter rate and fees for services such as connection, disconnection, reconnection, testing, supervision, etc., could be carried out by the board for the purpose of its services.

Section 31(2) empowers the local body to levy such rates for water supply as suggested by the GWSSB. Section 63 lays down the provision for general penalty for failure of compliance with the order of the Board.

Since the WRA will be regulating the charges for bulk water supply as well as for retail water, the Board's function for fixing tariffs and other charges and the manner of such determination should be subject to intervention by the WRA. Therefore, its function under Section 14 (d) in respect of water supply has to be amended. Its power under Section 15(2) (e) and 15(2) (h) in respect of water supply has to be subject to regulations by the WRA. Section 43 would need amendment. Section 31(2) should be amended as the WRA would determine such rates or set the principles for such determination.

In effect, the powers / functions of GWSSB should be subject to WRA's power of regulation of water charges. The Section 14, 15, 31, 43, 45 should be modified accordingly.

### *Gujarat Municipalities Act 1963*

Chapter VIII under the Act deals with municipal taxation. Under Section 99 (1) (ix), a municipality, subject to a general or special order of the State Government, can impose a general water rate or special water rate or both for water supplied by it in its areas. The process for fixing such a rate has been specified under Section 101. The municipality, by a resolution passed in a general meeting, can approve rules prescribing such rates. Under Section 102, a State Government has the power to sanction the said rules with or without modifications. Section 104 mandates the government to empower municipalities to levy tax or increase or decrease the tax levied under Section 99(1) (ix) within such variation as prescribed. Section 119 allows the municipality to fix water rates in lieu of taxes according to the consumption of water.

In Gujarat, the municipalities are in charge of distribution of retail supply of water directly, through GWSSB indirectly, or may engage another person such as a 'developer' to provide such supply. The municipality should be subject to

Gujarat Act 18 of 1979; should be amended suitably so that these authorities should have plans for progressive metering the water services in their areas.

## Recommendation 5

The WRA should recommend generic terms and conditions of the new concession<sup>46</sup> agreement in the water sector. The WRA should monitor the terms and conditions of the concession agreement.

### *Gujarat Infrastructure Development Act 1999*

The GID Act 1999 (Sections 3 and 4) permits participation of the private sector in the water and sanitation sector in Gujarat. GID Rules 2000 (read with Section 5 of the GID Act 1999) stipulate that a concession agreement along with the proposal, worth Rs. 50 crore or more, should be forwarded to the GIDB, which may either recommend with or without modifications or not recommend, or return the proposal and the concession agreement for reconsideration of the state government, the government agencies, etc. The GID Rules 2000, further proposed to constitute a committee on contract finalisation with one of the committee members being a regulator with a non-voting right.

Since the Water Regulatory Authority would be a regulatory body kept at an arms-length from the government, it is desirable that the above committee on the contract finalisation should exclude the regulator being a member of the committee. Instead, the GIDB should invariably consider recommendations of the WRA on the generic terms and conditions of the concession agreement (worth the prescribed limit of Rs 50 crores and above), before the recommendations are finalised by it and forwarded to the government or other agencies (as envisaged under the GID Act, 1999). It is suggested that the GID Rules 2000 should be amended and should incorporate a provision for taking into consideration such recommendations of the WRA.

### *Bombay Provincial Municipal Corporations Act 1949*

Section 189(2) (c) of the BMC Act, 1949 stipulates that the city corporation, for the purposes of supplying sufficient and proper water to its consumers, may enter into an arrangement for the supply of water. The provision does not envisage the obligation on the part of the corporation to seek the

<sup>46</sup> 'Concession agreement' means a contract of the nature specified in schedule II of the GIDB Act 1999 (which includes water storage, water supply and sewerage system) between a developer and the State Government, a Government Agency or a specified Government Agency. Government agency includes local bodies

The local bodies would also monitor the implementation of the concession agreement. The monitoring by the GIDB is in addition to such oversight. Regulatory oversight by the WRA in monitoring the terms and conditions of the contract (whose value exceeds a prescribed limit) could be incorporated in the concession agreement. Therefore, there may not be any need to amend the existing provision of the current Acts governing local bodies. Similar is the case with GWSSB for undertaking any such concession contract with any developer (Section 15 (2) (f)), which can always incorporate such monitoring power of WRA.

## Recommendation 8

There should be a minimum standard for water quality to be provided by various service providers to their consumers. Either the Water Regulatory Authority or the Government of Gujarat should lay down and enforce minimum standards. It should also monitor the above standards through survey.

### *Gujarat Act No. 18 of 1979*

Section 14 (f) enjoins upon the GWSSB to establish State standards for water supply. There is need to amend this section to give effect to the above recommendations. Section 15(2) (i) may also be amended to incorporate the fact that the Board should follow the standards set by the WRA / Government of Gujarat.

### *Gujarat Municipalities Act 1963*

Chapter VI relating to functions of municipalities should incorporate a provision after Section 90 to the effect that the municipalities should follow the standards set by the WRA or Government of Gujarat.

### *Bombay Provincial Municipal Corporations Act 1949*

Chapter XIII (Section 189) relating to water supply enjoins upon the corporations to supply the water 'proper and sufficient' for public and private purposes. This should be amended in order to incorporate the provision that the corporation should follow standards set by the WRA or Government of Gujarat.

### *Gujarat Panchayat Act 1993*

Schedule I to the Act says that whenever there is inadequate water supply or water supply which is unsafe for health, the village panchayat can arrange for additional supply at reasonable costs. This should be amended in order to

should earn a minimum rate of return as fixed by WRA. This Section should be amended accordingly.

### **Recommendation 11**

The WRA should facilitate competition in water sector in Gujarat.

No need to amend the existing legislation for giving effect to the above recommendation. The new legislation, which would constitute the WRA, should assign this function to the authority.

### **Recommendation 12**

The WRA should adjudicate upon disputes and differences amongst various service providers and / or between a service provider and a group of consumers on quality of water services. Section 31(3) of the Gujarat Act No. 18 of 1979 relates to settlement of disputes between the GWSSB and the municipality subject to decisions of government. Section 31(3) of this Act should be amended accordingly to assign this function to the WRA.

### **Recommendation 13**

The WRA should aid and advise the government for developing a Water Use Policy for Gujarat. The government should call for an annual report on the water use in the state from the WRA. The WRA should monitor such annual water use on the part of the local bodies.

The Gujarat Municipalities Act 1963 (Chapter VI), and the Bombay Provincial Municipal Corporations Act 1949 (Chapter VI), should incorporate the fact that annual water use by the local bodies would be monitored by the WRA. Section 15(2) (e) of the Gujarat Act No. 18 of 1979 should be subject to annual water use policy in Gujarat. Chapter VIII (Section 49) of the Gujarat Act 18 of 1979 should be amended accordingly.

### **Recommendation 14, and 15**

The regulator should coordinate with other regulators such as Gujarat State Pollution Control Board for framing and evolving guidelines for sustainable water use in the State.

The WRA should perform such functions as are assigned to it by the Government of Gujarat at a later date.

No need to amend the existing legislation for giving effect to the above recommendation. The new legislation, which would constitute the WRA, should assign this function to the authority.

Court on a reference by the government. The Governor may suspend any Member of the authority with respect to whom a reference has been made to the High Court until the Governor has passed orders on the receipt of the report of the High Court on such reference.

4. The members of the authority should not appear before the authority as a representative of any person for a period of three years of his completion of tenure, and should not acquire any interests in the regulated entities.
5. The authority shall have its own fund and all receipts of the authority, including grants from the State Government, should be carried thereto and all payments by the authority shall be made therefrom. The authority should prepare its own budget.
6. The authority should be able to hire expertise independent of government's control.
7. The WRA should be advised by an advisory committee. The composition of the advisory committee should be determined by the WRA, and it should include interests of local bodies in addition to representing interests of industry, agriculture, labour, consumers, non-governmental organizations, academic, research bodies in the water sector. The functions of the advisory committee shall be to advise the WRA on major questions of policy, on matters relating to quality of service, matters relating to protection of consumer interests and overall standards of performance of public service providers.

No need to amend the existing legislation for giving effect to the above recommendation. The new legislation, which would constitute the WRA, should assign this function to the authority.

## Recommendation 17

The following are recommended.

- The WRA should ensure transparency during the regulatory process.
- The WRA should hold judicial proceedings while discharging its dispute settlement function.
- An appeal against the decision of the WRA must be to an independent body and should be on a question of law. The appellate authority could be the High Court or a Tribunal in Gujarat with quasi-judicial powers.

to prosecute contempt in case of contempt shown for lawful authority of public servants, etc.

The WRA should have full powers under Chapter XXVI of CrPc in regard to offences affecting the administration of justice.

Section 78 of the Gujarat Act 1979 empowers the GWSSB to make bye-laws relating to water supply, water charges, etc. These should be subject to regulation by WRA. This section should be amended accordingly.

## Recommendation 19, 20, and 21

The other elements of the regulatory framework are recommended as follows:

1. The authority should be subject to the policy direction of the government. The policy direction should be consultative, reasoned and transparent. In case of dispute, government's decision is final
2. The state government should have the following powers over:
  - the salary, allowances and other conditions of service of the Members.
  - the form and the manner in which and the authority before whom the oath of office and secrecy.
  - the form in which and the time at which, the WRA shall prepare its budget.
  - the form in which the annual statement of accounts is to be prepared by the WRA.
  - the form and the time within which the annual report shall be furnished.
  - any other matter which is to be, or may be, prescribed, or in respect of which provision is to be made by rules.
3. The WRA should make regulations on the following matters.
  - the salary, allowances and other conditions of service of the employees.
  - terms and conditions of consultants.
  - the manner in which the charges for water are determined.
  - the manner in which the quality of service is determined
  - any other matter which is to be specified for carrying out its activities.

No need to amend the existing legislation, as the proposed legislation should contain such provision.

### Annex 9.1 Sections of the following Acts being affected in enabling the working of the proposed regulatory framework

Recommendations	GID Act 1999	BPMC Act 1949	GMA, 1963	Gujarat Act 18 of 1979
Recommendation 1	-	-	-	Regulation function of GWSSB in water sector be divested
Recommendation 2 and 3	-	-	-	-
Recommendation 4 <sup>48</sup>	-	Chapter XI: 129, 130, 134, 135, 136, 138, 141B, 141E	Chapter VII: 99(I) (ix) till 104, 119	14 (d), 15(2)(e)&(f), 31(2), 43, 45
Recommendation 5	GID Rules, 2000	189 (2) (c)	65	15(2)(f)
Recommendation 6	-	-	-	-
Recommendation 7	-	-	-	-
Recommendation 8	-	Chapter XIII Section 189	Chapter VI, Section 90	14 (f), 15 (2) (i)
Recommendation 9	-	Chapter XIII Section 189	Chapter VI, Section 90	14 (f), 15 (2) (i), 52
Recommendation 10	-	-	-	-
Recommendation 11	-	-	-	35
Recommendation 12	-	-	-	31(3)
Recommendation 13	-	Chapter VI	Chapter VI	15(2) (e), 49
Recommendation, 14, 15, 16, 17	-	-	-	-
Recommendation 18	-	-	-	78
Recommendation 19, 20, 21	-	-	-	-

*Note.* Recommendations 4, 5, & 6 of Chapter 6 in relation to the Gujarat Panchayat Act 1993 would affect Part II (Section 200) and Schedule I. Similarly, recommendations 10 and 11 of Chapter 6 would affect Schedule I of the Gujarat Panchayat Act 1993.

<sup>48</sup> In Phase II of the regulatory process, the WRA should also regulate water tariff as discussed in Chapter 6

Regulatory reforms in the water sector in Gujarat, as discussed in the previous chapters alone would not be sufficient for bringing about a marked improvement of water services in Gujarat today. It is necessary to introduce substantial reforms in the sector. This would include developing a sector vision document, improvements in operational and maintenance practices, institutional restructuring, tariff reforms, and introducing private participation, apart from regulatory reforms in the sector.

## Sector assessment

As highlighted in Chapter 2, the water sector in Gujarat, especially in many urban areas is characterised by a 'low level equilibrium'. The resultant outcome is the poor finances in the water sector. As a result, most water service providers in Gujarat are not financially viable, and have to depend heavily on government subsidies. In addition, the institutional and regulatory framework does not encourage efficient operation by service. This is compounded by the fact that there is also no incentive amongst various players to bring about changes in the existing unsustainable water management system. There is a need to create an environment, which will give emphasis on performance improvement, rather than the current focus on physical expansion of the water services.

In Gujarat, there is also a need for an appropriate policy for management and allocation of scarce water resources. Management of water resources should give a lot of stress on the demand side of the resources rather than the supply of existing resources. An integrated approach to water development, which would call for promotion of use of surface water and ground water is a needed. Existing institutions entrusted with allocation, planning, and management of water, should be geared up to evolve such an approach.





# **Regulatory framework for water services in the state of Gujarat**

## **Volume II**

*Prepared for*

**Gujarat Infrastructure Development Board  
Gandhinagar**

**TERI Project Report No. 2000ER61**

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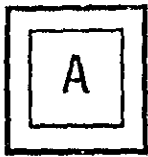
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## Case study of the Ahmedabad Municipal Corporation

Ahmedabad, the former capital of Gujarat, is the largest city in the state with a population of about 3.3 million in 1991. It is situated on the banks of the river Sabarmati, about 80 km north of the Gulf of Cambay. The city is spread over an area of 192 square kilometres. The Sabarmati flows through the city from north to south dividing the city into eastern and western parts. A leading industrial city, Ahmedabad is the commercial capital of the state. The city is situated at 23° 01' N and 70° 37' E. It lies at an average altitude of 49 m above mean sea level and has a maximum level difference of about 4 m. The temperature varies between 47 °C and 4 °C. Relative humidity during the summer varies between 64% and 73%. The average annual rainfall in the city is about 750 mm, which occurs generally from June to September. Parts of the city get inundated when flash floods occur in the river. Mostly, the geology is made up of sandy soil.

Ahmedabad Urban Agglomeration had a decadal growth rate of about 30% between 1981 and 1991 (Figure A.1). About 85% of the total population lives within the municipal corporation limits.

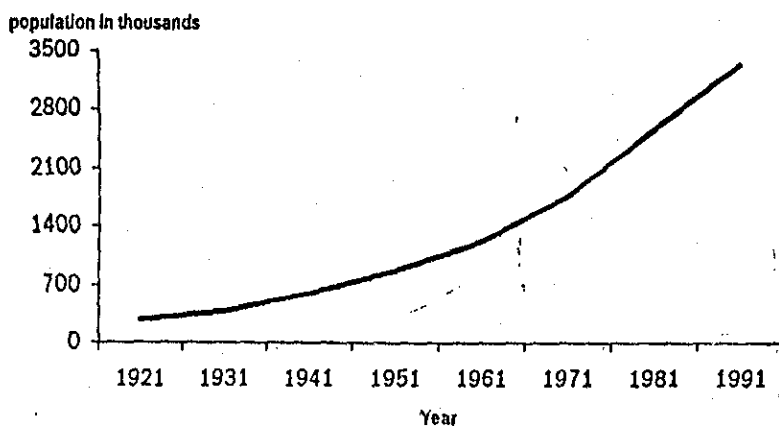


Figure A.1 Population growth in Ahmedabad Urban Agglomeration (thousands)

Source AMC (1999)

municipal corporation existed even before the enactment of the 74th Constitutional Amendment (1993).

The corporation has three statutory committees: Standing Committee of the board, the Transport Committee, and the School Board Committee (AMC 1999). Water services, like other municipal services, are under the scrutiny of the Standing Committee established under the provisions of Chapter II Section 4(1). This committee appointed by the Municipal Board, has twelve members and meets on a weekly basis.

Other (non-statutory) committees are established by the corporation under Section 30(1). The committee which deals with the water sector is called the Water Supply and Sewerage Committee. Additionally, the Health Committee monitors the water quality in the city, and the Tax Committee deals with tariff related issues. However, the authority for determining all tariff-related issues, including water tariff and water charge, rests with the Standing Committee and the Municipal Board.

The chief executive officer of the corporation is the municipal commissioner, who is assisted by eight deputy municipal commissioners, each heading either one zone or areas covering administration activities, and engineering related projects. The engineering department in the corporation is responsible for executing all water supply projects in the city. There is an engineering department at the zonal level too. The other departments at the zonal level are for taxation, health, town development and estates, and administration, of which the first three are involved with the water services in the city.

## Overview of water sector

The water supply and sourcing strategy in the AMC is to rely more on surface water so as to conserve groundwater resources. Towards this end, the AMC has constructed the Raska project on the Mahi river and has entered into negotiations with the state government for water from the Sardar Sarovar project. The objective is to minimize the reliance on groundwater resources and recharge these using the surface water from the Raska project and the Narmada river (Sardar Sarovar project).

### *Water sources*

The AMC receives water from three primary sources: French wells and infiltration wells for abstracting surface water, and tubewells for drawing groundwater. During 1997, it received about 486 MLD (million litres per day) from the sources. The break up of supply is indicated in Table A.2.



depending upon the level of water in the tubewell. Normally, 1.5 MLD water is drawn from each 260-metres-deep tubewell per day and 0.75 MLD from each 183-feet-deep tubewell. To maintain the supply of water the corporation keeps constructing new tubewells to replace tubewells (the normal life of a tubewell is about 15 years) that become defunct.

As can be seen from the Table A.2, supply of water from the French wells and infiltration wells is not sufficient to meet water demand, estimated to be about 1000 MLD in 2001 within the present corporation limits (TCE 1997). Hence, the AMC would have to depend heavily on subsoil water drawn from tubewells. On account of excessive drawing of water from tubewells, and the large number of private tubewells being constructed in and around the city, the water table in the city has been decreasing at an average rate of 3–4.5 metres every year. This makes 10–12 tubewells defunct every year. In 1999/2000 the water table presently was over 350 feet deep. The groundwater depth in Ahmedabad over the last 40 years is given in Table A.3 and if sufficient surface water is not made available further depletion of groundwater level is imminent in the coming years.

Table A.3 Groundwater depth (metres)

Year	Ground water (feet)
1960	17
1965	40
1978	67
1980	78
1990	94
1995	100
1998	108

The depletion of water level in the tubewells is a cause for concern, as the water quality may deteriorate due to the increased TDS (total dissolved solids), chlorine, and fluoride in the water. Besides, the corporation has to lower pumps in the tubewells from time to time due to the fall in the groundwater table, and incur higher expenses on energy consumption.

Interestingly, there is no provision for regulating the extraction of water from tubewells. However, Chapter XIV of the Schedule A (defining the rules, by-laws, regulations, and standing orders of the BPMC Act) Section 16 requires that the municipal commissioner's sanction be taken before any new well, pond, cistern, or fountain is dug or constructed. The *Oxford English Dictionary* (1996) defines a well as a lined shaft sunk in the earth whence a supply of water, oil, etc

### Raska project

Due to the failure of the monsoons in 1999, and the low level of supply from the Dharohi dam, the Raska project was conceived of on the river Mahi. The cost of the project was 1.1 billion rupees and the project was executed within five months. The project involved the laying of a 32 km long pipeline from the main canal on river Mahi to Ahmedabad. About 300 MLD is made available from the Raska project. The water is treated at the Kotarpur Water Works, which has a capacity 600 MLD.

### *Narmada-canal-linked water project*

To meet its demand for additional water, the AMC is exploring the possibility of drawing water from the Sardar Sarovar project based Narmada canal. In Gujarat the Sardar Sarovar project involves a terminal dam called the Sardar Sarovar dam on the Narmada river with a 460 km long main canal. This canal is called NMC (Narmada Main Canal). Numerous branches have been planned from the NMC that will cover Saurashtra and other regions towards the Arabian Sea and the Gulf of Cambay. The NMC passes about 3 km upstream of Kotarpur. About 980 mld from Narmada is required. However, it is expected that the water supply from the Narmada canal would be only about 132 MLD.

The corporation has decided to undertake water projects to tap 980 mld from the Narmada canal in stages to meet the total requirements of the city till the year 2021, without depending on from the Dharoi and tubewells. The corporation is considering the possibility of exchanging the Dharoi water to the state government for an equal quantity of water from the canal so that the former could be utilized in the critical areas of Mehsana district. Thus, the AMC could get 610 to 855 mld of water from the Narmada canal in exchange for Dharoi water. The rest of the water, can be bought from the Sardar Sarovar Narmada Nigam Limited. A decision in this regard has to be taken.

### *Water treatment system*

As mentioned earlier, Ahmedabad has two water treatment plants: one at Dudheshwar and the other at Kotarpur. The Dudheshwar Water Works which was constructed in 1891 and treats water from the infiltration wells network located in the Sabarmati river bed, supplies 82 MLD to the city distribution network.

The Kotarpur Water Works was commissioned in 1976 at an estimated cost of 540 million rupees for treating 680 MLD water that was expected from the Dharohi dam. It was envisaged that on completion of the Kotarpur project, and

major bulk consumers have their own private tubewells. Figure A.3 shows growth in the water distribution network.

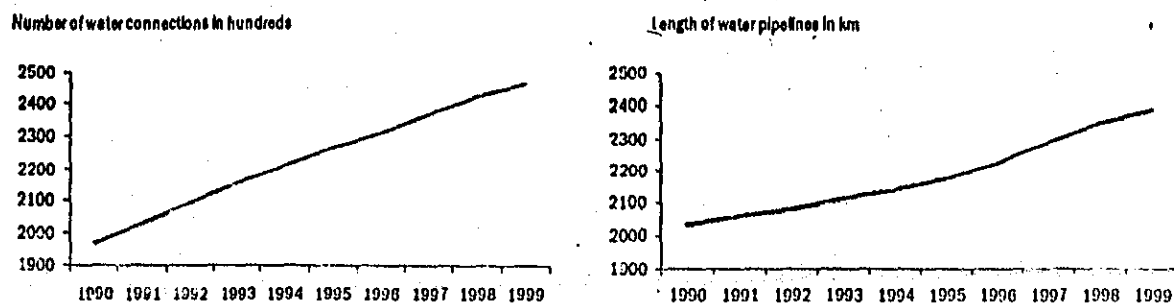


Figure A.3 Growth in water distribution network in the Ahmedabad Municipal Corporation

Source AMC (1999)

There are no estimates of the extent of losses and leakages in the water distribution system in the city. It is expected that over 20% of water is wasted on account of leakages in the water supply lines, mainly in the distribution network. The AMC has undertaken a leak detection programme for a period of three years, and plugging of the leakages has been identified as a priority area.

## Water demand

The demand for water in the AMC limits is estimated to grow to about 1000 MLD in 2001 by TCE (1997). However, the *Gujarat Infrastructure Agenda: Vision 2010* document of the GIDB (Gujarat Infrastructure Development Board) estimates this demand at 715 MLD (Table A.4).<sup>51</sup>

Table A.4 Water demand projections for Ahmedabad

Year	Population (millions)	Demand (MLD)*	Incremental demand (MLD)	Gap (MLD)	Cumulative investment (rupees million)
2001	4.4	715.44	61.60	252.44	1994.2
2004	4.9	782.84	67.40	319.84	2526.7
2007	5.3	856.59	73.75	393.59	3109.3
2010	5.9	937.28	80.70	474.22	3746.8

Source GIDB (1999)

\* million litres per day

<sup>51</sup> This was estimated using a base year population of 3.3 million, and assuming a decadal growth rate of about 35% and water demand at 160 LPCD.

be poor in the old city and is thus more prone to water-borne diseases, one sample is taken per 1000 people. The agencies involved in testing are the central laboratory, water supply department, and the health department. Usually, about 6000 samples are tested monthly by these laboratories.

Water quality parameters in the French wells are reported to be within the desirable limits of drinking water standards. The results of the tubewell water indicate that chlorides and the TDS have exceeded their desirable limits, but are within the maximum permissible limits. In general, even though the water quality of all the tubewells is within the permissible limits, further exploitation of groundwater resources should be avoided to prevent quality deterioration and depletion of water level.

The municipal commissioner has wide powers to ensure that the water quality is not adversely affected and that the health impacts due to any contamination are minimized. For instance, under Chapter XIV (Schedule A Section 34) of the BPMC Act, the Commissioner can prohibit the use of water from any source likely to cause or spread diseases. Similarly, Section 31 authorizes the commissioner to shut down any factory that is polluting any water source.

### *Quality of service standards*

There are no statutory service quality standards that the corporation is required to follow. However, the AMC released a *Citizens Charter* in February 2000, which listed certain standards for some of the services provided by it (Table A.5). The AMC is one of the few municipal bodies in the country which have a document that provides a framework for evaluating municipal services. However, these standards only serve as guidelines. The *Citizens Charter* could be taken as a starting point for laying down standards of service in the municipal corporations.

and charge collection may not be a true indicator of the revenue from the water sector as it is based on the ratio of the rate of water tax to the property tax. Thus, if the water tax for an NRV (net rateable value) slab is 10%, and the total property tax in that slab is 30%, then one third of the property tax in this slab is apportioned to the water tax. The amount is then aggregated across all NRV slabs to arrive at the total collection of water tax and charge. Thus, the amount shown under this head is independent of the tax amount that is actually billed and collected as water tax.

It may be noted that most of the revenues in the water sector come from water taxes (Table A.7). The share of revenue being collected from metered connections is minimal.

Table A.7 Revenue collected from water services (rupees)

Component	1997/98	1998/99
Water tax	216,495,000 (88.92%)	233,725,000 (90.15%)
Water charge	21,893,000 (8.99%)	21,379,000 (8.25%)
Others	5,072,000 (2.08%)	4,159,000 (1.60%)
Total	243,460,000	259,263,000

Source AMC (1999)

The revenue expenditure during 1999/2000 under the head of water supply was over 10% of the total expenditure (about 438 million rupees). If this is compared with the tax collected under the water tax/charge head (Table A.7), the revenue collection is just over 60% of the revenue expenditure in the water sector. While the O&M (operating and maintenance) cost for providing water is Rs 2.70 per 1000 litres, the revenue collected is just Rs 1.60 per 1000 litres during 1998/99, implying that the corporation subsidizes water supply considerably. However, demand for the water taxes and charges for the year compares well with the revenue expenditure in this sector (Table A.8). Since for the accounting purposes, major repair works are included under capital expenditure the revenue expenditure relates primarily to the O&M expenditure in this sector. Thus, it would appear that the subsidy in this sector arises from a low rate of recovery in taxes, and not underpricing of the service.

standposts. In these notified areas, called the water zones, the corporation can levy a water tax irrespective of whether the property is connected to a municipal water supply or not (Section 130). The municipal commissioner annually notifies these water zones. Currently, industrial areas are not included under any water zone in the corporation. Thus, under this provision, major industries are exempt from paying the water tax. Additionally, Sections 134(1) and (3) authorize the corporation to charge for water on the basis of volume consumed or the size of the connection, in lieu of the water tax. Thus, in the present legislation, there are provisions for linking water tariff to water consumption.

The current water tax structure is given in detail in Table A.9. Apart from the water tax, a water connection charge is also levied.

As stated earlier, nearly all domestic connections in the AMC are non-metered, and are charged water tax based on the NRV. This is despite the fact that there is a provision for charging residential water demand on the basis of consumption under the provisions of Section 134 (Table A.9). There are about 6000 metered commercial connections in the city. However, it is reported that water charges collected from these metered commercial connections are also nominal as the minimum rate of tax for non-residential properties generally exceeds the water charge based on actual consumption. Thus, these establishments also pay the flat tax rate rather than the water charge.

**Table A.9 Property tax rates in Ahmedabad Municipal Corporation (1997/98-2000/2001)<sup>52</sup>**

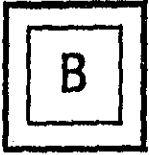
Water tax	Tax rate
<b>For residential properties</b>	
1-100 sq m area (%)	15
100-150 sq m Area (%)	17
150-200 sq m area (%)	20
Above 200 sq m area; except individual ly owned bungalow (%)	22
Above 200 sq m area; only for individual own bungalow (%)	25
<b>Minimum rate of water tax per month</b>	
For huts (Rs)	4.00
<b>For other residential properties</b>	
for 1-30 sq m area (Rs)	12.00
for 30-50 sq m area (Rs)	15.00
for more than 50 sq m area (Rs)	17.50
<b>Non-residential properties</b>	
Annex A type of usage (%)	25
Annex B type of usage (%)	30
Minimum monthly rate (Rs)	60.00

<sup>52</sup> Annex A and Annex B are commercial and industry classifications based on the water consumed. For instance, water intensive industries like ice factories are listed in Annex A.

Plant has reportedly been contracted to a private operator. However, this is a relatively recent development, and on a considerably modest scale. This is in contrast to *Gujarat Infrastructure Agenda: Vision 2010* document, which had identified the Ahmedabad and Surat municipalities as forerunners in the privatization process in the water sector in Gujarat.

## Conclusion

- Water supply functions in Ahmedabad are the responsibility of the municipal corporation. This was the case even before the enactment of the 74 Constitutional Amendment.
- Due to the overexploitation of groundwater in the state, there are concerns regarding water quality. It is important to substitute the use of groundwater with surface water. This would involve substantial investments in improving the efficiency of the current system and also developing river-based schemes. Here again, the role of the private sector is critical.
- The current water supply would fall considerably short of the water demand if supply were not augmented on an urgent basis. The GIDB estimates that this would involve investments to the tune of 3.75 billion dollars over the next decade. Even though the AMC is financially strong, the magnitude of investments would imply substantial commitment from the private sector.
- There are no service standards that the AMC is required to follow. However, standards for some of the services have been recommended in the Consumer Charter.
- The current demand for water tax and charges compares favourably with the O&M expenses. However, due to the shortfall in collection, the revenue from this sector falls short of these expenses. Thus, it appears that the subsidy for water supply arises from inefficiency in tax collection and not because of underpricing of water supply.
- The current tax regime is such that the total tax collected as water tax is independent of the consumption of water. Also, the new taxation methodology that has been proposed does not address this issue.
- Private sector participation in the water sector in the AMC is only in the discrete functions, such as pumping of water and operation of water treatment plants, even though the corporation has been identified as being favourably placed to attract such investment.



# Karnataka: case study on private sector participation in water sector

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## Introduction

In Karnataka, like in Tamil Nadu, there is a specialized agency at the metropolitan level the BWSSB (Bangalore Water Supply and Sewerage Board) responsible for provision of water supply, sewerage, and sewage disposal in Bangalore. In addition, a state-level specialist agency called the KUWSDB (Karnataka Urban Water Supply and Drainage Board) is associated with bulk water supply in some urban areas, while for the rest, the urban local bodies are responsible for provision of water supply to its consumers.

The BWSSB covers 482 square kilometres, within its jurisdiction, serving 5.2 million during 1997 (a population density of 10 809 persons per square kilometre). At present, Bangalore receives about 656 mld (million litres per day) of water through Cauveri and Arkavathy sources. Water is supplied on alternate days for about 3 hours each day in the city. About 60% of population has access to piped water supply. The per capita water supply per day during 1998/99 was about 100–110 litres, which is below the national standards recommended by CPHEEO (Central Public Health Environment Engineering Organization) i.e. 150–200 lpcd (litre per capita per day) for a city the size of Bangalore.

Distribution of water to consumers is undertaken through direct tapping from transmission line, through ground-level reservoirs and overhead tanks, and through direct pumping from trunk mains into the distribution system using booster pumps. In the city, almost all the connections (about 300 000) are metered, and most of them are of 15-mm size. The BWSSB (created under the Bangalore Water Supply and Sewerage Act, 1964) maintains 6000 borewells with handpumps and 750 borewells with electrical pumps to supplement its water supply in densely populated areas. The board also uses tankers for supplying water to areas having water scarcity.

The KUWSDB constituted in 1975 has a jurisdiction over 208 urban areas in the state excluding Bangalore city and 7 other urban areas around Bangalore city, covering a population of about 12 million. It has the responsibility of formulation and implementation of water supply and drainage schemes in these areas. The responsibilities for maintenance of these schemes are with concerned local bodies while the board maintains water supply systems up to the bulk



- Operational deficits ranging from 54% to 73% of total operating expenditure in Belgaum, Hubli-Dharwad and Mysore; and
- Mangalore is the only city having full cost recovery and higher service levels although the quality of treated water in Mangalore is the worst among the four cities.

The above study recommended the following approaches.

- Use of a public-private partnership approach through a JVC (joint venture company) with majority private ownership.
- Formation of an operating partnership between KUWSDR and M/s Anglian Water International.
- A simple management contract with a fixed or percentage fee for speedy implementation of projects duration up to 5 years.
- Parallel tariff reform, regulatory strengthening, and data gathering.
- Conversion of the management contract to a long-term lease by an agreed mechanism once the prerequisites are in place, say after 3 years.

Due to low tariff and high fix cost associated with technology transfer it was suggested that a city should have a population of at least 15 lakhs for such projects to be critically viable.

A similar study was also conducted by M/s Northumbrian Water Group in Davangere city in 1999. This study also stipulated a critical mass of around 10 lakhs population for a viable private sector participation in the water sector.

Further, private sector participation has also been attempted through various options in Bangalore city: a) BOOT (build-own-operate-transfer) contracts for provision of bulk water supply services, and b) through ROT (rehabilitate-operate-transfer) basis. These are illustrated below.

The BWSSB had already taken initiatives for private sector participation in sourcing water from Cauveri river. Under the CWSS (Cauveri Water Supply Schemes) Stage IV-Phase II, a proposal to transport 500 mld water at a distance of 98 km from the city is being considered under BOOT mode of private participation. Under the project, a private partner would lay a separate pipeline for bringing water to a treatment plant, pump and store the same at three stages, and finally, bring water to distribution points in the city. M/s Biwater Consortium has emerged as the preferred bidder in the competitive bidding process initiated by the board in 1997. The cost of supply of such water is expected to be Rs 23.75 per kilolitre. A final decision on the subject is awaited.

Filters is under consideration. The cost of recycled water supply is approximately Rs 14 per kilolitre.

The O&M (operation and maintenance) contract for secondary sewage treatment plants of 163 mld capacity at K&C valley is entrusted to M/s Seamak Hi-tech Products, Bangalore; of 180 mld capacity at Vrishabavathi valley to M/s Sri Majunitha Enterprises, Bangalore; and of 60 mld capacity at Hebbal valley to M/s Mysore Construction Company, Bangalore. Further, O&M of 36 chlorinators has also been entrusted to M/s Engineers and Erectors.

### *Water tariff*

Although the GoK had taken several policy initiatives to introducing a rational tariff structure for water services, a notable step in this direction can be seen in its comprehensive tariff order of 1996. The salient features of the order as applicable to all ULBs (urban local bodies) (except Bangalore city) are as follows.

- A minimum water rate on volumetric basis, which separately includes O&M and debt service charges, for each corporation was suggested.
- One time connection charges for domestic, non-domestic and commercial / industrial category were indicated. For instance, the corporation's domestic consumers are required to pay Rs 2000 as connection charges which is one-quarter of the charges levied for commercial / industrial consumers.
- Mandatory house connection irrespective of whether they are tenants/owners has been suggested.
- KUSWDB has been allowed to levy actual O&M cost, if the same is higher than the prescribed O&M costs whenever the board is entrusted for bulk water supply; in which case a MOU is to be signed between the ULB and board.
- ULBs have been directed to take over the O&M of schemes as completed by the board.
- It permits the board to hand over the water supply schemes that are maintained by it up to the consumer point to the ULB and to entrust the maintenance of such schemes to the ULBs.
- ULBs are required to collect water rate and remit the debt service charge components of such rate to the board.
- A meter at bulk supply point is required to be installed by ULBs for measuring the quantity of water supply by the board / local body.

To improve customers' service quality and to address consumer grievances, the BWSSB has taken certain initiatives which include

- complaints of consumers regarding excess billing or billing disputes are heard and settled through an 'Appeals Committee' constituted by the board;
- meetings are conducted regularly at service stations for redressal of public grievances;
- a public relations officer in the head office also receives complaints and corresponds with the public.

## General issues/comments

A need to promote efficiency and economy in the water supply system, and to conserve water has been recognized. At present, there exists no law prohibiting ground water extraction except the fact that no two borewells should exist within a distance of one kilometre for irrigation purposes.

The BWSSB, which is the policy maker, regulator, and service provider of water services in Bangalore city, is mandated to be guided by such directions on questions of policy as may be given by the state government in consultation with the board.

## Lessons for Gujarat

- The process of private sector participation will require credible basic information on the water systems in any ULBs. Use of consultants to gather such information before inviting bids for long-term contracts will reduce substantial risk-sharing by the private partner. However, such efforts could be expensive and time-consuming, and such information as provided by the consultants should be of a high credible level. Further, assistance to ULBs for conducting such studies need to be arranged.
- The decision-making process for selecting a bidder should be transparent otherwise, the credibility of the regulatory framework before the potential investors would be at stake.
- Selecting bidders on competitive basis would give best value for money, and will ensure competition for the monopoly water market.
- Lack of capacity in managing private participation in smaller urban areas can be avoided through use of suitable technical assistance / expert advice, at least as a short term measure.
- Use of BOOT for augmenting sources of water, or ROT for old distribution network could be alternative options for private sector participation.



# Metro Water: a case study

## Introduction

Tamil Nadu, in South India ranks seventh in population and eleventh in area amongst all states in India (1991 census). Its capital, Chennai, is the nation's fourth largest metropolitan area. The population of the CMA (Chennai Metropolitan Area) is 5.9 million (1991 census): 3.8 million from the CMC (Chennai Metropolitan Corporation) and 2.1 million from surrounding jurisdictions covering 6 municipal areas, 3 municipal townships, 27 town panchayats, 10 panchayat unions, and 1 cantonment board. Chennai, an administrative and commercial centre, has a number of industries including the port, textiles, electrical equipment, machinery, and vehicles with petrochemical and fertilizer industries in North Chennai.

## Institutional structure

The TWAD (Tamil Nadu Water Supply and Drainage Board) is the nodal agency for the water sector in Tamil Nadu. Municipalities are responsible for providing water supply in urban areas though for a few of the larger cities special purpose entities have been established, for example, the CMWSSB (Chennai Metropolitan Water Supply and Sewerage Board) or Metro Water in Chennai.

With the exception of the CMA, the statewide responsibility for planning, design, and construction of water supply and sewerage systems rests with the TWAD. The TWAD was established in 1971 for the purpose of regulating and developing drinking water and drainage investments in the state. The responsibility for irrigation systems rests with the irrigation wing of the state government's PWD (Public Works Department), reorganized in early 1995 into the WRO (Water Resources Organisation). Generally, after commissioning, the TWAD hands the projects over to local bodies for operation and maintenance.

Chennai has its own water supply company, Metro Water. Metro Water was formed as a statutory body in 1978, and assumed the responsibilities of water supply and sewerage collection, formerly held by the municipal corporation. Metro Water is responsible for water supply in the CMA, which includes Chennai city, 20 urban local bodies (referred to as adjacent urban areas and distant urban areas), and other villages. It is also responsible for the collection,

freshwater interface in the coastal belt. Metro Water is enforcing the CMAGR Act. According to Section 2(j), 'no person shall sink a well in the scheduled area (the city of Chennai and some surrounding villages) unless he has obtained a permit in this behalf from the competent authority'. Also, according to Section 4, the board is required to collect and maintain information on the number of wells in its jurisdiction and the quantity of water drawn. The drawing of groundwater for purposes other than drinking is restricted under the Act.

## Overview of the water sector

Chennai's water deficiency can be ascribed to the fact that the city lies in a rain shadow with no major river systems supplying surface water. Metro Water has started implementing a master plan to increase Chennai's capacity to draw, treat, and distribute additional water flows from Krishna river and rectify inequitable distribution; low pressure, leakages, and losses by strengthening the distribution system. This section reviews the services provided by Metro Water in Chennai. The growth of Metro Water is presented in Table C.1.

Table C.1 Metro Water: growth profile

Parameter	1978	1998	1999
Population served (million)	2.8	5 (city + AUA <sup>a</sup> )	—
Treatment capacity (mld <sup>b</sup> )	182	620	620
Water production (mld)	180	440	485
Length of water mains (km)	1250	1795	1853
Water connections (number)	116 000	209 000	228 876
Distribution stations (number)	3	7	10
Staff productivity			
Staff strength	5659	5658	5846
Staff per 1000 connections	49.00	27.58	25.09
Staff per mld of water	31.00	12.33	12.10
Staff per kilometre of water pipe	4.50	3.20	3.00
Population served per staff	618	728	742

<sup>a</sup>adjacent urban area; <sup>b</sup>million litres per day

Source Metro Water (2000)

## Water sources

Water supply for Chennai is currently obtained from 13 groundwater sources (wellfields), and three interconnected reservoirs at Poondi, Cholavaram, and Redhills. The dependable safe yield from surface storage is estimated at 227 mld (million litres per day). The wellfields yield 70 mld though their potential was estimated at 169 mld. A reassessment of this potential is to be taken up soon.

quantity (about 20 mld) of secondary treated sewage effluent is also supplied to the industries. For conserving and recharging groundwater reserves, no licences for groundwater extraction have been given after 1996.

### *Water distribution network*

For the management of water supply and sewerage, the city is divided into 10 areas and 155 depots, the jurisdiction being coterminous with that of the CMC zones and unit offices, respectively. An area is managed by an Area Engineer of the rank of an Executive Engineer. The first level unit office called a depot is managed by the Depot Engineer of the level of an Assistant Engineer.

Chennai city, faced with severe source constraints, is the only metropolitan city in India that had a supply of less than 100 lpcd (litres per capita per day). The city water distribution system, dating back to several decades, could not cope with the rapid growth both in population and geographical spread.

A Master Plan for Water Supply and Sewerage Systems was prepared for the entire CMA in 1978, which was revised in 1991 and further updated in 1997. This Master Plan envisages dividing the entire city into 16 district water supply zones. Each of these zones will have an independent water distribution station and network. Additionally, a modified transmission mains system linking the water treatment plants to the distribution zones has been proposed.

The works proposed in the Master Plan are being implemented in stages. All the major works contemplated have been taken up for implementation. A new Water Treatment Plant of 300-mld capacity, major part of the transmission mains, and five new water distribution stations have been completed. Seven stations are nearing completion. Revamping of the water distribution network in 11 zones is in progress.

Leak detection and repair works covering 35% of the area of the city in three phases have already been completed. For the remaining area, the works are now in progress. The water conservation effort under this ongoing programme envisages replacement of all the house service connection, identified as the major source of leakage due to corrosion of the galvanised iron of the pipe connecting with MDPE pipes.

All the above ongoing works relating to the water supply distribution and leak detection and repairs are expected to be completed and commissioned progressively by the year 2002.

- Ensuring adequate level of disinfection even at the tail end of the distribution network, around 100 samples are tested daily for residual chlorine from various locations in the city.

Automatic chlorinators are installed at various points in the distribution network of the city for effective dosing with chlorine so as to ensure the requisite disinfection level in the city distribution system. The functioning of these chlorinators is regularly monitored. Samples from the general public are tested against nominal charges and suggestions provided towards improvement/treatment of quality for drinking, construction, and other industrial uses. Table C.3 provides the percentage of samples tested with less than 0.2 ppm chlorine by area.

Pollution Monitoring Unit with mobile laboratory provides the expertise to depot engineers in pinpointing the source of pollution. By coordinating with the Communicable Diseases Hospital, the incidence of water-borne diseases is monitored and controlled by increasing the level of chlorine in the distribution network whenever and wherever required.

**Table C.3 Report of residual chlorine by area for April 2000**

Area	Total number of samples	Residual chlorine less than 0.2 ppm*	
		Number of samples	Percentage of total samples
1	186	35	18.82
2	85	10	11.76
3	359	12	3.34
4	116	5	4.31
5	358	16	4.47
6	140	5	3.57
7	120	3	2.50
8	117	0	0.00
9	153	6	3.92
10	225	10	4.44
Total	1859	102	5.49

\* part per million

Source Metro Water (2000)

### *Quality of service*

With the execution of the Master Plan by 2002, the physical constraints in the distribution of supply will be removed. However, apart from removing the physical bottlenecks in providing improved water supply, Metro Water recognizes the need to improve the quality of service. Several initiatives have been taken to strengthen the consumer interface. These relate to simplification

*Assisting with accounts*

Metro Water will be available to assist customers with respect to their accounts enquiries on weekdays during working hours at the head office as well as area offices.

*Responding promptly*

- Metro Water will reply to all written customer enquiries within 10 working days.
- Metro Water will endeavour to answer all telephone calls within 90 seconds and to answer the majority of these calls within 30 seconds.

**Table C.4 Service standards**

Service	Standard
<b>Water connection / sewer connection</b>	
Free supply of application forms at head office, area offices, and depot offices	Working days (10.00 a.m.-3.00 p.m.)
Registration of application forms (acceptance of application) at head office	Working days (10.00 a.m.-3.00 p.m.)
Issue of challan for depositing connection charges	On the spot at the time of registration
Intimation to applicant in case of deficiency in Application form	Within 7 days from the date of registration
Issue of work order	Within 7 days in the case of single dwelling up to 200 square metre plinth area Within 45 days for other cases
<b>Water supply</b>	
Replacement of defective water meter	7 days
Complaint regarding leakage	
Services lines (main)	3 days
Distribution main	5 days
Transmission main	7 days
Complaint regarding pollution (contaminated water / quality of water)	
Where pollution point is easily identified	7 days
Otherwise	15 days
No water supply / defective water supply	5 days
Repairs	
Hand pump	2 days
India Mark II pump	5 days

Source Metro Water (2000)



Metro Water has also implemented a complaint monitoring software, which enables them to keep track of complaints and its recurrences. Based on the information obtained from the consumers in the form of complaints, feedback, and suggestions, strategies are evolved for betterment of services.

However, it must be noted that the standards of service are not a statutory requirement. In fact, Section 44(2) states that 'the board shall not be liable to any penalty or damage for cutting off the supply of water, or for not supplying water in the case of unusual drought, or other unavoidable causes, accidents, replacements, extensions, or the necessity for relay or repairing of pipes'.

## Fiscal framework

Metro Water has been earning a financial surplus for the last seven years. This has resulted in the board being allowed to function largely in an autonomous manner without any interference from the state government. This financial strength is also in consonance with Section 5(4) of the CMWSS Act which states that 'the board shall endeavour to be financially self supporting'. This has largely been ascribed to a rationalization in the water tariff in terms of increase in the domestic water tariff. This has resulted in the ratio of revenue collected from industrial and commercial consumers to that collected from domestic consumers falling from a high of 5.60 to just over 3 between 1992/93 and 1999/2000. The rate of collection maintained by the board is also good at 92% for 1999/2000 and 89% for 1998/99. Finally, metering has been promoted in areas where adequate water supply has been assured.

The net surplus in 1998/99 was estimated to be about 222 million rupees, a drop from over 440 million rupees in 1997/98 (Table C.5).

**Table C.5 Financial summary of Metro Water (million rupees)**

Parameter	1998/99	1997/98
Income	1736	1626
Expenditure	1514	1186
Surplus	222	440

Source Metro Water (2000a)

The revenue from the sale of water supplies comes largely from metered water connections (Figure C.1). Interestingly, Section 47(2) of the CMWSS Act states that 'where so required by the board, meters shall be installed by the owners of the premises concerned'. Thus there is legislative support for universal metering in Chennai.

Amongst unmetered consumers, the bulk of the revenue is accounted for by domestic consumers (Figure C.3). Notably, recycled water accounts for a sizeable proportion of the total revenue collected.

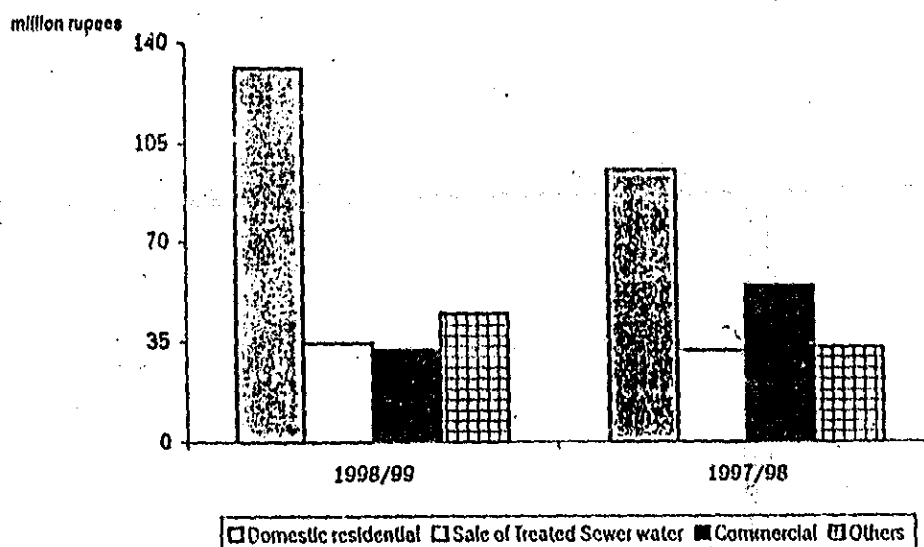


Figure C.3 Income from various types of unmetered connections (million rupees)

Source Metro Water (2000a)

Also charges are levied in Chennai for the provision of water services. This is done in two ways. First, there is a water charge that is levied on all consumers with a water connection. Second, there is a water tax that is levied as per Section 34(a) of the CMWSS Act. The historical origins of this tax are in the property tax that was collected by the municipal corporation prior to the setting up of the board. Subsequently, this was passed on to the board on its formation. This has historically been 5.5% for water and 1.5% for sewerage making a total of 7% of the Annual Rateable Value.

Till 1997, the board required the approval of Tamil Nadu government before effecting a change in the tariff rates. While it could 'determine, levy, and collect taxes, rates, fees, charges, surcharges, rents, and costs and expenses' (Section 5(6)(2)(xii) of the CMWSS Act), it required the approval of the state government before notifying the rates. With the enactment of the Act Nos 56 and 58 of 1997, the board has complete autonomy in fixing water charges. The Act Nos 56 and 58 of 1997 have amended the Chennai Metropolitan Water Supply and Sewerage Act 1978 and authorized the board to determine the manner and basis of levying and collecting tax, charges, surcharges, fees, rents, and other amounts, maintaining and regulating connections and fees for connection and re-connection of water supply and sewerage. The current water tariff for metered

- Maintenance charges for steel tanks: Rs 200 per month per tank (monthly)
- Casual water supply — Mobile water supply to customers
  - Rs 300 for every load up to 6000 litres
  - Rs 450 for every load up to 9000 litres
  - Rs 600 for every load up to 12 000 litres

## Private sector participation

Metro Water has been one of the pioneers to initiate privatization in the operation of public water utility. There was no legal barrier to PSP (private sector participation) in this sector. Section 5(6)(2)(ix) of the CMWSS Act empowers the board to enter in to contracts, agreements or arrangements with any person, firm, or organization.

The objectives for PSP, as identified by Metro Water are listed below.

- Explore the areas of involvement where it will promote economy and operational and managerial efficiency.
- Develop a suitable contractual framework for involving the private sector based on the experiences gained in the initial efforts.
- Make O&M an integral part of the contract package for construction of new facilities.
- Evolve a suitable longer time frame for the contract as against the shorter duration of one to three years involved in the initial efforts.
- Seek long-term involvement of private sector in the construction, operation and maintenance of new water and sewerage facilities on BOT (build, operate, and transfer / BOOT (build, operate, own and transfer) basis.

The privatization efforts relating to O&M functions cover all areas of activities in varying degrees. These include source, production, treatment, and distribution of water, financial accounting, etc.

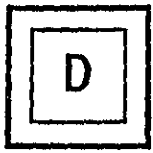
## Water source

One of the efforts in involving the private sector in water sources relate to drawing of groundwater from the borewells owned by agriculturists during the drought situation in 1987. This was a short-term proposal involving 12 wells which supplied about 3.3 mld water.

Apart from regulating private operators in the sector, there is another regulatory issue peculiar to Chennai. As the board is an autonomous and independent body directly under the control of the state government, there is no statutory involvement of the local body in the functioning of the board. This is despite the enactment of the 74th Constitutional Amendment. The board has sought to resolve this issue by forming joint council with the local body for its day-to-day functioning. The joint council formed by the board with the corporation meets once in three months to sort out coordination issues with the corporation. This is chaired by the Mayor. Also, local councillors are members of this body. In addition, there are ward-level committees which deal with local issues of coordination with the elected representatives.

## Lessons for Gujarat

- Regulation of the use of groundwater is essential for sustainable use of water resources. This is feasible once legislative support is available.
- To effectively convey the benefits of any improvements in water supply to the final consumers, issues related to the quality of service would need to be addressed in detail. Here Metro Water's efforts at providing better consumer service, as detailed in its consumer charter, are important.
- Metro Water has a competent complaint redressal mechanism, which includes an extensive review of the complaint redressal process using modern information technology. This is one area in which the local bodies in Gujarat could learn from the experience in Chennai.
- The CMWSS Act gives Metro Water functional autonomy and independence. This kind of independence would have to be ensured for the efficient functioning of any such corporate body.
- Financial viability of the water supply agency is essential to ensure functional autonomy. This also ensures that the confidence of private operators is maintained.
- The CMWSS Act provides for compulsory metering if Metro Water so desires. This kind of provision should be considered for the local bodies in Gujarat also.
- To ensure the political acceptability of any commercialization or privatization scheme, there should be a continuous stakeholder involvement in the management of the operating systems.



## Case study of the Rajkot Municipal Corporation

Rajkot is situated in the heart of the Saurashtra peninsula at  $22^{\circ}1'N$  and  $70^{\circ}45'E$ , 225 km south-west of Ahmedabad. The temperature varies between  $43.5^{\circ}C$  and  $24.2^{\circ}C$ . The average annual rainfall is 500 mm. However, out of the last 60 years, rainfall has been below normal in 22 years. In fact, the average for the last 7 years is only about 300 mm.

The population comprises nearly 5% of the total urban population of Gujarat. The total area under the RUDA (Rajkot Urban Development Authority) is 483 sq km. This includes the RMC (Rajkot Municipal Corporation) area (104.86 square kilometres) and surrounding 39 villages. The present RMC population is around 850000. The population of the rest of the RUDA area is less than 100000. It is estimated that by 2011, the population would become about 1200000.

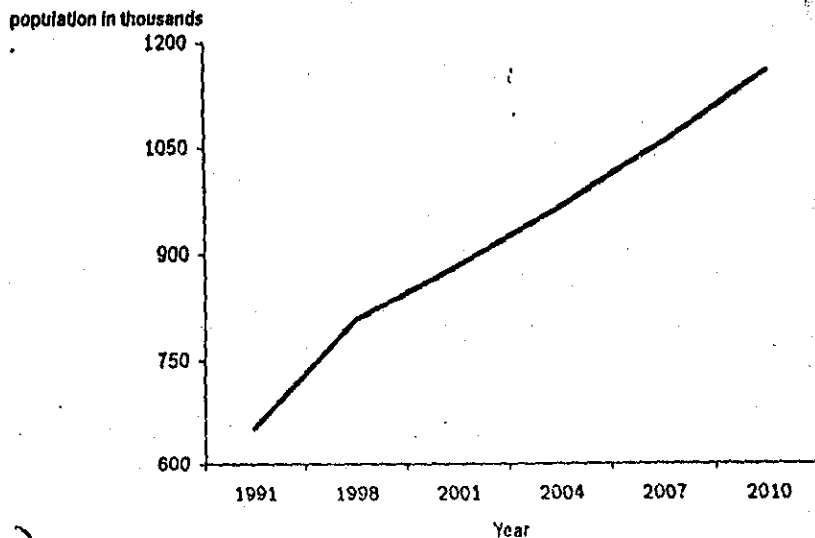


Figure D.1 Population projections for Rajkot (thousands)

Source GIDB (1999)

Table D.1 Structure of the water sector in Rajkot Municipal Corporation

Designation	Number
Municipal commissioner	1
Deputy municipal commissioner (technical)	1
City engineer / executive engineer	4
Deputy executive engineer	10
Assistant engineer / Additional assistant engineer	24
Valve operator	150
Filter Plant operators / Electrical staff etc.	150
Chief chemist / Chemist at filter plant	4
Water tax officers / tax staff / Administrative staff	20

Source RMC (2000)

## Overview of water sector

The following section describes the sources of water supply, water treatment facilities, and the water distribution system in Rajkot. Table D.2 illustrates the growth in the water sector in Rajkot since the establishment of the RMC.

Table D.2 Comparative development of waterworks since the formation of Rajkot

### Municipal Corporation

Source	1973	1999
Existing	Ajl I, Lalpari & Randarda	Ajl I, Lalpari & Randarda, Nyari I, Bhadar, Ajl III, Nyari II
Proposed	Nyari - I, Bhadar	Khokhaddadi, Machchhu II, Lapasari
Daily drawl	26.5 MLD*	95.3 MLD (gross)
Number of filter plants	Ajl	Ajl (2) Nyari (2) Ribda (2)
Number of tap connections	32 000	100 000

Source: RMC (2000)

\*million litres per day

Water is currently supplied from reservoirs through pipelines. The water supply is usually about 92 MLD (million litres per day). However, in May 2000 drought in Gujarat, this has decreased to about 77.5 MLD. Raiya, Nana-Mava, and Mavdi areas recently merged with the RMC do not have access to piped municipal water supply. Thus, about 70 square kilometre of the nearly 105 square kilometre of municipal limits are uncovered by municipal water supply. These areas are served by about 830 standposts and 250 tankers.

Usually, water is supplied for half an hour daily and the average supply is about 110 LPCD (litres per capita per day). However, during the 1999/2000 drought, the supply fell to just 90 LPCD and water was being supplied only every alternate day.

Nearly all connections are un-metered (Table D.6). Nearly 30% of the connections are commercial consumers. There are no estimates of losses in the system due to leakages.

Table D.6 Number of water connections in Rajkot Municipal Corporation (by category)

Category	3/8 Inch	1/2 Inch	3/4 Inch	Metered
Residential	100	101 336	722	60
Commercial	13	42 600	57	490
Total	113	143 936	779	550

Source RMC (2000)

### Water demand

The GIDB (1999) has estimated the demand for water in Gujarat in its Gujarat Infrastructure Agenda: Vision 2010 document. Assuming an annual population growth rate of 3.05% and the per capita water supply norm of 160 LPCD, the estimated demand was over 141 MLD. The demand estimated by the RMC is just over 110 MLD (Figure D.2).

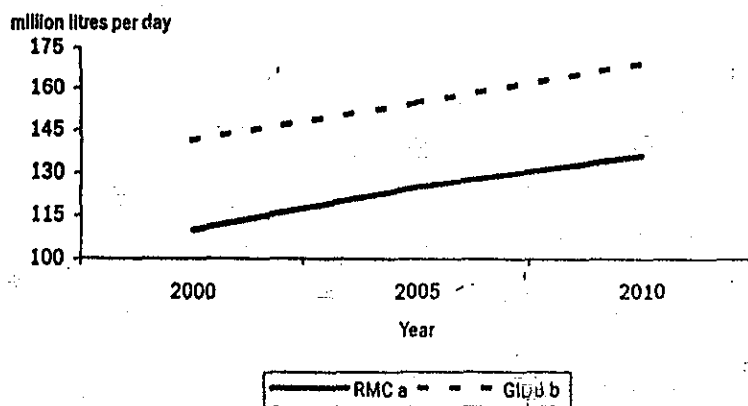


Figure D.2 Growth in water demand in Rajkot Municipal Corporation (million litres per day)

\*Rajkot Municipal Corporation; <sup>b</sup> Gujarat Infrastructure Development Board

Source. GIDB (1999) and RMC (2000)

Taking the average supply Figure D. of 92 MLD, the shortfall in demand estimated by the GIDB (1999) is nearly 50 MLD. This is projected to grow to over 93 MLD by 2010 if supply is not augmented (Figure D.3). The gap in the

supplies water to domestic consumers through piped individual tap connections in older Rajkot, through tankers and standposts in the recently merged area, and through community standposts in slum areas (Table D.9).

**Table D.8 Water distribution by consumer category**

Category	Proportion of water consumed (%)
Domestic	85 (Including standpost )
Commercial	12
Industrial	3

Source RMC (2000)

**Table D.9 Number of connections in Rajkot Municipal Corporation (by type)**

Item	Number
House connections	110 000
Standposts	2100
Hand Pumps (RMC)	1700

Source RMC (2000)

The RMC does not encourage industrial demand much due to lack of water resources. The industries generally prefer to purchase water from private tankers. The few industrial consumers have metered connections. Also, the industry is not water intensive in Rajkot. Thus the industrial water demand is low.

### *Plans for water sector development*

The shortfall of water has been estimated at about 50 MLD. To meet this shortfall, the RMC would have to depend completely on surface water, as the region's rock-hard surface does not permit groundwater exploitation.

#### **Source development**

The following options are under the consideration of the RMC to augment water supply.

➤ **Increasing storage capacity of Nyari Dam** The Nyari I dam which has a capacity of 26476 million litres is located about 10 km from the city. The municipal corporation, proposes to increase the capacity of the dam by raising the earthen dam and widening the waster weir. This would increase the capacity to 40 068 million litres. The estimated cost of this project is 116.4 million rupees.



the revenue expenditure would exceed the revenue income. This is primarily on account of a dramatic rise in debt servicing in the RMC.

Table D.10 Financial summary of the Rajkot Municipal Corporation budget (Rs million)

Account head	1994/95	1995/96	1996/97	1997/98	1998/99	1999/2000	2000/2001
Revenue income	444	578	666	737	827	961	1057
Revenue expenses	332	393	484	555	745	757	1198
Revenue surplus	112	185	182	182	83	204	1142

Source RMC (1999)

Two kinds of charges are collected from the water sector, namely water charge, piped water supply, and tanker charges for supplying water through tankers. Tankers are used in the case of deficient water supply or to supply water to areas not covered by piped water supply. There has been no discernible trend in the collection of charges from the water sector. Since 1996/97, the collection of charges has averaged about 33 million rupees annually (Figure D.4).

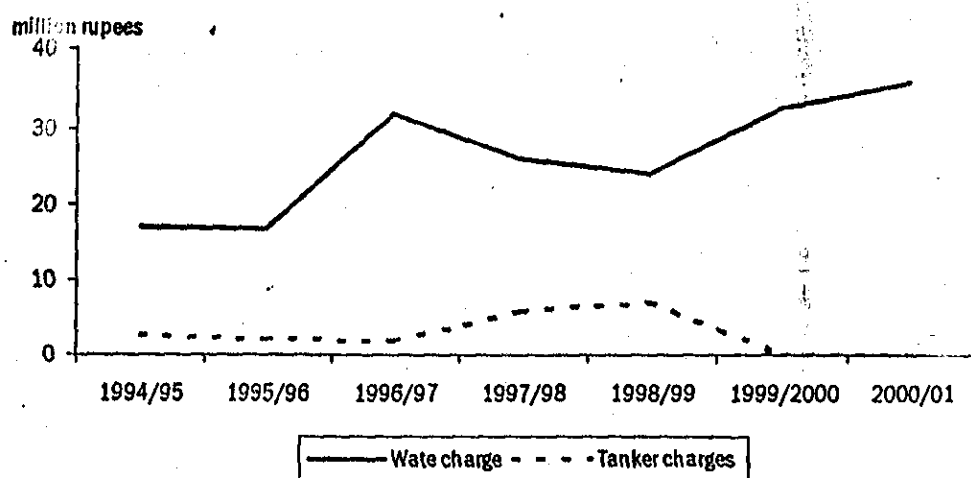


Figure D.4 Collection of charges from the water sector (Rs million)

Source RMC (2000)

### Subsidy in the water sector

Table D.11 presents an analysis of the O&M (operating and maintenance) costs and the revenue from the water sector. Given the average supply of water of 92 MLD and assuming that water is available only 350 days a year, the O&M costs of water supply are about Rs 4.30 per 1000 litres. However, about Rs 1.00

commissioner has issued a public notice stating that the corporation has arranged to supply water through house connections, tankers, or public standposts. In these notified areas, called the water zones, the corporation can levy a water tax irrespective of whether the property is connected to a municipal water supply or not (Section 130). Similarly, only properties that are connected to the municipal mains are required to pay the water charge. Apart from the water tax, a water connection charge is also levied.

The current water charge structure is given in detail in Table D.12.

Table D.12 Monthly water charge in the Rajkot Municipal Corporation (rupees)

Size of connection (Inch)	Residential	Commercial /Industrial
3/8	16	32
1/2	20	40
3/4	48	96
1	120	960
2	480	3840
3	1200	9600
4	1800	14400
6	2700	21600
8	3600	28800
12	4800	38400

Source RMC (2000)

As can be seen the water charge for commercial and industrial consumers is twice that of domestic consumers for connections less than an inch and eight times more for connections that are an inch or more. This implies there is significant cross-subsidization of domestic consumers by commercial and industrial consumers.

Under the new amendment of Gujarat Act No 3 of 1999, the calculation of property tax has been redefined under Section 141-B and the corporation has an option to calculate the property tax under Section 129 or under Section 141-B. Under the new formula, the rate of tax is determined taking into account the following parameters.

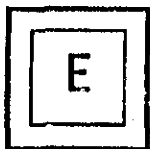
- The market value of the land in the area where the building is located
- The age of the building
- Type of usage of the building
- Whether the building has been tenanted or not

The property tax is calculated as follows using the new formula.

$$\text{Property tax} = \text{Rate} \times \text{Area} \times (F1 \times F2 \times F3 \times F4)$$

where

- Private sector involvement in the water sector in Rajkot has been only in very discrete functions by way of service contracts.
- As is the case with Ahmedabad, the water charges are not linked to the total consumption.



## Case study of Tirupur

### Introduction

Tirupur is located about 55 km east of Coimbatore in Tamil Nadu. Tirupur or the TM (Tirupur Municipality) area is the second largest town in Coimbatore district. The TM had a population of 235 661 as per the 1991 census and covers an area of 27 square kilometre. The TLPA (Tirupur local planning area) surrounding the town comprises TM, two town panchayats, and 14 village panchayats. The geographical area measures 217 square kilometre. The municipal administration is governed by the rules laid under the Tamil Nadu District Municipalities Act, 1920. The municipal council with its chairperson is elected by the people and is responsible for implementation of the various services within the TM such as piped water supply, sanitation, solid waste management, roads, etc.

The economy of the TLPA revolves around the cotton knitwear industry which started as a cottage industry in the early 1960s and is now India's leading knitwear export centre. It accounts for nearly 90% of India's knitwear exports, equivalent to approximately 1 billion dollars at current prices. This growth has been achieved through a dense and complex network of knitting and manufacturing units. Despite its unique position, the industry faces constraints in infrastructure. Water, an essential input to the bleaching and dyeing process, is in short supply.

### *Genesis of the Tirupur Area Development Programme*

As mentioned earlier, the extraordinary export volume attained by the Tirupur cotton knitwear industry has been achieved despite severe infrastructure bottlenecks. Singular amongst these is the absence of water and related infrastructure for collection, treatment, and disposal of waste water. In addition, Tirupur lacks adequate roads, transshipment facilities, power, telecommunication, and urban infrastructure facilities.

Investments in infrastructure in the region have been significantly lagging demand. The continuing inability of the GoTN (Government of Tamil Nadu) and TM to make the necessary investments had prompted local industry represented by the TEA (Tirupur Exporters Association) to peruse alternate

domestic establishments in the municipality have septic tanks with overflows being discharged directly on the street. Until recently, industries have also been discharging effluent without treatment. The resultant environmental degradation in the TLPA has been severe.

With the growth of the local knitwear industry, the abstraction of groundwater has progressively expanded to cover a radius of between 20 and 30 km. As a result, local landowners have shifted from farming to servicing the water requirements of the industry. The unregulated abstraction of groundwater has led to dangerous depletion in groundwater reserves. It has been estimated that existing reserves would reach saturation levels over the next three years. Thereafter, this source of water would be unavailable to sustain industrial activity.

The discharge of untreated effluents has resulted in the severe contamination of the groundwater aquifers. Public health concerns have become significant as most households also resort to groundwater tapping to meet their daily water requirements. The poor quality of water has prompted the industry to make increasing levels of investment to treat pre-production water.

In the light of specific interventions requested by local people affected by the pollution caused by industry, the Green Bench of the Madras High Court directed the TNPCB (Tamil Nadu Pollution Control Board) to take closure action against all those units which did not comply with the TNPCB's environmental standards. Approximately 150 units have been closed for non-compliance, while the balance units have initiated steps to meet the TNPCB standards. The physical progress is being closely monitored by the TNPCB with periodic reports being tabled for the record of the Green Bench.

The implementation of effluent treatment schemes would progressively address some of the issues relating to the degradation of the environment. However, the poor quality of water and severe depletion of groundwater resources remains a big concern. Thus the sustainable long-term solution is the provision of treated water supply scheme to industries which substitutes groundwater abstraction for this purpose.

## **Demand for services**

A consortium of independent consultants comprising Kirloskar Consultants, Operations Research Group, and Mahindra Acres Consulting Engineers have carried out a detailed analysis of the demand for the services from the project. The consultants have analysed the demand based on interactions with all the industrial units and on usage patterns. The household demand has been

Table E.1 Industrial demand for water (million litres per day) in Tirupur

Year	Low growth rate (8%)		Moderate growth rate (10%)		High growth rate (15%)	
	Normal	Technology shift	Normal	Technology shift	Normal	Technology shift
Current	93.20	93.20	93.20	93.20	93.20	93.20
1999	100.66	97.64	102.52	99.45	107.16	103.97
2000	108.71	103.28	112.78	107.14	123.26	117.10
2001	117.41	109.19	124.06	115.37	141.75	131.83
2001	126.80	115.39	136.46	124.18	163.02	148.34
2015	186.22	167.59	200.40	180.36	239.39	215.45

Source IL&amp;FS (1999)

Thus, even in the most conservative scenario, the industrial demand is expected to be 115 mld (million litres per day) by 2002.

## Project description

The project is an integrated water sector programme and envisages the following activities.

- Establishment of bulk water supply system, including laying down of the pipeline network for transmission, for abstraction and treatment of 185 mld of raw water from river Cauveri, and distribution to bulk industrial consumers (approximately 550 in number), TM, and four villages enroute.
- A water distribution system to store and distribute treated water to domestic and industrial consumers within TM's jurisdiction.
- A sewage collection, treatment, and disposal system for the TM, including on-site sanitation facilities (for the slum areas).

The project envisages a two-phase construction with a three year first phase aggregate cost of 12.07 billion rupees to service industrial, commercial, and domestic consumers located in the TLPA. In addition water supply is proposed to be provided for four wayside unions and a model township, which lie enroute on the water transmission corridor.

The GoTN has approved and allocated the right to abstract 185 mld of raw water from the river Cauveri, approximately 1 percent of the total Cauvery water available to Tamil Nadu for allocation. The abstraction point is located approximately 55 km from Tirupur and about 1 km downstream of the confluence of river Bhavani (a tributary of Cauveri) and the river Cauveri. The Water Allocation Board of the GoTN has stipulated the sharing of the 185 mld between industries and households in a 100 mld: 85 mld ratio. The project design reflects the allocation scheme of the board.

The design of water treatment processes has been based on the existing raw water quality data of river Cauveri. Water is to be supplied to all consumers after

### *Rate of return*

The NTADCL would be allowed to levy a composite water charge to supply to industrial units and on a bulk basis to TM and Tamil Nadu Water Supply and Drainage Board for wayside villages. The charge is set to recover a fixed rate of return on total investment over the concession period, initially set at 30 years. The concession assures a post tax rate of return of 20% on investment and would be terminated whenever the target rate of return is achieved. Project lenders are offered prudent allocation of risks and a security package including but not limited to project receivables, pledge of project assets and contracts, debt service reserve fund, commitment of contracted sponsor equity to the project.

Potential to earn additional investment through development of value-added franchisees to develop ancillary infrastructure like fibre optic network, power cable network, gas pipelines, bottled water, waste water recycling, etc. through affiliates / subsidiaries is also a possibility. Also, there is a provision in the CA to generate additional revenues through real estate development.

### *Socio-economic impacts*

The project has been designed to provide competitive service tariffs for the consumer, and more importantly, allowing access to water and sewage treatment to the residential customers and preserving the competitive position of Tirupur's industry. It would also significantly improve the environment in the region by reducing the pollution and improving the groundwater resources.

### *Strategy for execution*

The IL&FS has also been asked to undertake the role of merchant banker to the project and would be responsible for raising the requisite resources. IL&FS has obtained the sanction of USAID to this programme, thus enabling the raising of bonds aggregating to 25 million dollars from the US capital markets. The bonds have a 30 year tenure and are guaranteed by the US Government. NTADCL would also access ADB (Asian Development Bank) and the World Bank for debt mobilization.

The framework for implementation revolves around the contractual arrangement between NTADCL and each stakeholder and beneficiary. In all cases, the objective is to sub-contract the responsibility of NTADCL to appropriate experts with pass through penalties and benefits to the GoTN and TM and the contracted party. The project development and implementation has

business of NTADCL will be further expanded by development of various value-added franchises that may be developed through affiliates or joint ventures. Given direct access to the households and industrial units, the additional infrastructure that may be developed with relative ease would include fibre optic network to provide a platform for telecom services, underground power cable network, gas supply network, as well as use the surplus water for establishing a bottled water supply. Additionally, it is expected that the industrial demand would outgrow supply in the initial years. Hence, investment in a waste water recycling facility is proposed, which would enable NTADCL to supply additional water to the industry and thereby generate additional revenues.

### *Involvement of stakeholders*

The project has been developed through the framework of NTADCL with the board of directors as the oversight authority. In addition, wherever appropriate, approval of individual sponsor agencies was taken prior to implementation. As a result, the project has been developed on a transparent basis, with decisions reflective of stakeholder interest and concerns. Some of the key stakeholders are discussed below.

#### **Private sector consortium**

The project, as developed and approved by the NTADCL, TEA, GoTN, and TM, was bid on an internationally competitive bidding basis to induct an experienced and suitably qualified consortium to build, operate, and maintain the facility for the period of the concession. On this basis, the private sector consortium, comprising Mahindra and Mahindra, Bechtel and United Utilities was selected. In addition, Mahindra and Mahindra and Bechtel inducted Larsen and Toubro and Hindustan Construction Company as their partners for the purposes of implementing the respective construction contracts.

#### **Atlantis Water Fund**

An MoU was signed with Atlantis Water Fund of the USA to participate in the project as an initial sponsor and invest 26% of project equity. Atlantis is presently carrying out the due-diligence on the project.

#### **NTADCL**

As the concessionaire, NTADCL's responsibility extends from ensuring project design to financing, constructing, operating and maintaining the project, including billing and collecting from TM and industry and panchayats outside



## *Regulation of service standards*

In order to ensure compliance of the CA, GoTN, TM, and NTADCL are required to appoint reputed agencies with relevant track record as the IA (independent auditors) and IE (independent engineer) to undertake a process of periodic technical and financial reviews and certification and to regulate the terms of the CA. The functions of each of these are discussed in detail below.

### **Independent Engineer**

An IE will be appointed for exercising the following regulatory powers.

- Determine and ensure compliance with the technical requirements, the performance standards, and costs of construction.
- Inspect the sites, sludge disposal sites, and the site for the system in order to determine the progress of construction, and operation and maintenance of the facilities and the extent of compliance with the technical requirements and the performance standards stipulated.
- Monitor on behalf of GoTN and TM the design, construction, operation and maintenance of the facilities and the extent of compliance with the technical requirements and the performance standards stipulated for the facilities and the extent of compliance by NTADCL of its obligations.
- Issue and sign the construction completion certificate for each part of the works upon achievement of the tests on completion as set out in the construction contracts and the final construction completion certificate upon completion of the project.
- Monitor the operation and maintenance of the facilities to ensure that the performance standards are adhered to.
- Establish the methodology of computation of transmission losses after due consultation with the parties to this agreement.
- Monitor the transfer of the facilities including but not limited to the testing and inspections following the transfer, and ensure that the facilities are transferred to the GoTN in line with the performance standards.
- Certify completion of interconnection facilities.
- Verify the cost of construction of the project as determined and submitted by NTADCL which shall be presented to GoTN, TM, and lenders.

### **Independent Auditor**

An IA will be appointed for exercising the following regulatory powers.

- Verify and issue a certificate at the end of each financial year, confirming the accuracy of all calculations made during the relevant financial year.



# Argentina: case study on private sector participation and regulatory framework

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## Introduction

Till recently, water industry in Argentina was managed by public companies. The first two, potable water and sewerage concessions in Argentina are being implemented in the provinces of Corrientes and the Greater Buenos Aires region in 1992. Buenos Aires is situated on the west bank of the Río de Plata, which meets more than 90% of the city demand. Before this, the water supply and sewerage coverage in these two urban areas was only 59% and 36% respectively (World Bank 2000).

Till the early 1990s, water services were provided by the public utility called OSN (Obras Sanitarias de La Nación). The performance of the OSN was not satisfactory (Table F.1). Most of its water and sanitation system was very old and in need of immediate repair and replacement. The deterioration of the system often caused water shortages, frequent breaks and interruptions in supply, low pressure, poor water quality, and sewer flooding during rain storms. More than 40% of the water was unaccounted for. The public utility was not financially sound because of low level of water tariff, which declined over the years falling by almost 70% from 1960 to 1976. Consumers had little incentive to conserve water because of the low price for the water consumed, consumption was not metered, and billing was based on factors not relating to consumption. In addition, the law did not permit the OSN to disconnect service to defaulter households. In 1992, over 80% of those not connected to the sewerage system in Buenos Aires used septic tanks /cess pools, and the remaining resorted to direct disposal. Since many people not connected to the piped water supply system were depended on shallow tubewells, waterborne diseases were prevalent.

Table F.2 Performance targets in the Buenos Aires concession contract (percentages)

Year of concession	Population coverage		Sewerage treatment		Network renovation (cumulative)		UFW <sup>a</sup>
	Water	Sewerage	Primary	Secondary	Water	Sewerage	
0	70	58	4	4	0	0	45
5	81	64	64	7	9	2	37
10	90	73	73	14	12	3	34
20	97	82	88	88	28	4	28
30	100	90	93	93	45	5	25

<sup>a</sup>unaccounted for water

Source World Bank (2000b)

In addition, the contract provided certain goals for meeting service quality and metering connection to city population. The company is required to invest around 4 billion dollars for the first 15 years of the concession period. There are penalties for non-performance and incentives for expansion of services, and reduction of the unaccounted for water and wasteful consumption of water.

Under the concession agreement, the company (Aguas Argentinas) maintained a monopoly over its service area because all the customers would require a connection, and therefore, any alternative source would have to be blocked (or made unusable). The government has also the power to charge taxes.

The agreement also required that all non-residential customers have meters while it is optional for residential customers. About one percent of the residential connections were metered at the time of concession.

The concession agreement mandates that residential customers, who are without meters at the time of concession, should get meters at the discretion of the concessionaire or at the user request.<sup>55</sup> The customer can exercise his choice only once. Since the users did not know the implication of their switchover to the metering system, very few customers opted for the metering system. Secondly, there is a provision that the residential users may only change their minds once if, as a result of metering, the cost of the service changes by 20%. The company in this eventuality should compensate users if it wants to meter the water service. The compensation includes the cost of replacing and installation of meter. Cross-subsidies between various consumers are allowed under the concession agreement.

<sup>55</sup> In this case, the user should pay for the meter and its installation cost.

existing flat rate for different types of consumers (e.g. residential) and services (water only or water and sewerage), and multiplying the same by a factor  $K$ . Immediately after concession, the  $K$  factor was pegged at 0.731.

The rate-setting system for potable water in Buenos Aires is based on property's area, its location, and its age. Charges are completely unrelated to the volume of water consumed.

Water rates are broadly divided into two categories – residential and commercial or industrial. Each can be either unmetered (the main category in terms of both physical volume and revenue) or metered service. The basic formula (Sayedoff et al. 1999) for the unmetered service rate ( $P$ ) is

$$P = T \times K \times Z (Sc \times E + S/10)$$

where,  $T$  is basic or general rate,  $K$  the adjustment coefficient,  $Z$  is a zone coefficient that discriminates by district,  $Sc$  the surface covered by the property,  $E$  coefficient of the dwelling quality which depends on the age and type or category of building, and  $S$  is a total property surface (whether covered or not). The  $P$  rate can differ according to class of users, zone classification, variations in the  $E$  coefficient or changes in the declaration of cubic metres of a particular property that are covered and not covered.

In contrast, Aguas Argentinas has a metered rate ( $PM$ ) that is defined as one-half of the unmetered rate plus a variable rate that depends on the amount used above a pre-established consumption level:

$$PM = P/2 + K_{pm} \times (X - X_b)$$

where  $PM$  is the price per cubic meter applied when consumption  $X$  exceeds basic consumption,  $X_b$ . The average rate then turns out to be a three-part rate: a fixed charge,  $P/2$ ; a block of free consumption up to  $X_b$ , where the marginal price equals zero ( $X_b = 15$  cubic metres per month) and the average price is declining; and a block where the marginal price equals  $PM$  and the average price is rising or falling depending on the system design. The price,  $PM$ , the fixed charge, and the unmetered rate are doubled if the users get sewerage as well as water supply services.

During the first revision of tariff (1994), the  $K$  factor was increased by 13.5%. Connection charges increased by 84%, and water infrastructure fee (applicable to new customers) by 38%. Later on, there was some downward revision of water tariff and connection charges. Notwithstanding such reduction, infrastructure fee (Table F.3) coupled with the connection fee created problems to many poor consumers; it led to protest resulting in renegotiation of concession contract in 1997.

**Table F.4 Comparison of average bimonthly charges (Before and after contract renegotiation\*)**

Average charges for already connected residential customers	Before	After
Water and sewerage services	30.00	30.00
Regulatory fee (2.67%)	0.80	0.80
SUMA (Universal Service and Environmental Implement fee) charge	-	6.00
VAT (value added tax) (21%)	5.46	7.72
Total	36.26	44.52
Average charge for a new customer (water only)		
Water services	6.00	6.00
Regulatory fee (2.67%)	0.16	0.16
SUMA charge	-	3.00
CIS (connection charge)	-	4.00
Infrastructure charge	44.00 <sup>b</sup>	-
VAT (21%)	10.53	2.76
Total	60.69	15.92

\*In Argentina Pesos (equivalent to US\$)

<sup>b</sup>Average monthly payment for the first two years

Source World Bank (2000b)

## Quality standards

The concession contract defines a set of water quality parameters. Effluent quality parameters are set for waste water undergoing primary and secondary treatment. Standards were also specified for improved coverage. Service quality improved remarkably after the concession (Table F.5). Water pressure improved and response time to complaints reduced, although the number of complaints registered increased due to improvement of the communication channel.

**Table F.5 Service indicators**

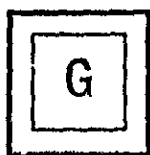
	Before concession (1992)	After concession (1995)
Water complaints (no.)	43800	143739
Response time (hr.)	144	48
Sewerage complaints (no.)	99400	164922
Response time (hr.)	240	30
Customers with pressure >8wcm* (%)	17% <sup>b</sup>	54% <sup>c</sup>
Greater Buenos Aires <sup>b</sup>		

\*wcm = water column metres where 10 wcm = 1 atmosphere; <sup>b</sup> May 1993; <sup>c</sup> April 1996

Source World Bank (2000b)

## Performance indicator trends

During the contract period, performance indicators are moving in a positive direction (Table F.6).



# Bolivia: case study on private sector participation and regulatory framework

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## Introduction

In Bolivia, the municipalities and their public utilities were till recently responsible for the provision of water and sewerage services in various urban areas such as La Paz and El Alto. Prior to 1997, the coverage of piped water supply was about 83% in El Alto and 93% in La Paz. The sewerage connections were extended to 32%–45% of the population in El Alto, while it is 66% in La Paz.

A municipality-owned public utility called SAMAPA (Servicio Autonomo Municipal da Agua Potable y Alcantarillado) used to provide water and sanitation services in El Alto and La Paz. The board of SAMAPA, chaired by the mayor of La Paz, was responsible for these services under the supervision of the national government.

## Regulatory framework

Since 1990, the Government of Bolivia has enacted several regulations for increasing the coverage of water and sewerage services in urban areas. The basic principles of these regulations were to universalize access to various water and sanitation services, promote efficiency in the use of water resources, and protect the environment (Law number 1600 of October 1994). The law divided urban areas into two categories: concessionable zones and non-concessionable zones. In the concessional zone, responsibility for such services is with the EPSA (defined as legal, public, or private person that provides water and sanitation services, and could take any form such as private business, other than municipal governments), while in the non-concessional zones, the municipality as well as EPSA could provide such services. Thus, the law assures that the private companies could participate in the provision of various services in urban areas. This has to be undertaken through concession according to regulation set by the regulator. Article 35 of the National Regulation of 1994 outlines the features of concession contract which include

- objectives and time limit for concession

## Private sector participation

In July 1997, the regulator approved a concession contract with Aguas del Illimani under which the latter undertook the responsibility of providing water and sanitation services in the La-Paz-El Alto metropolitan area. SAMAPA, continues to exist as a legal entity whose activity is limited to administering the assets-leasing contract with the company. The concession contract was subject to strict performance standards such as (a) output standards (e.g. type of service, service quality, source reliability, and customer service), b) input standards (e.g. materials and design standards) which are subject to approval by the regulator, and (c) expansion mandates.

The expansion mandates (Table G.1) included connection requirements, target coverage (percentage), and the requirements to connect households meeting certain criteria. The percentage coverage expansion mandates are dependant on the regulatory decisions, as the contract calls for the regulator to use population projection for translating the coverage targets for each five year period into specific connection requirements. Further, the expansion mandate, which should be based on certain criteria, became a source of dispute, as the contract did not set any deadlines for completing the expansions.

Table G.1 Water and sewer coverage targets in the El Alto subsystem fixed in request for approval and bid by Aguas del Illimani

Year	Private water connections (% bid)	Sewer connections (% fixed)
2001	100	41
2006	100	43
2011	100	47
2016	100	71
2021	100	90
2026	100	90

Source The World Bank (1998b)

## Water tariff

Article 49 of the Regulation 1994 incorporates the principle for determining water tariff. The tariff has to be guided by various principles such as

- efficiency,
- neutrality,
- affordability,
- equity,
- sufficiency,

The prices and tariff of the potable water and sanitation services served by municipalities would have to be approved by the regulator according to regulation subject to intimation to the municipal government. The tariff so determined would be maximum tariff, and there should be a formula for indexation of prices. The indexation formula will include a component that reflects the adjustments due to variation in prices and a component for change of rates and taxes as framed by the government during the period of concession. The revision of tariff should be subject to the base studies initiated by the holder of the concession according to the terms of reference determined by the regulator. The regulator may agree with, modify, or reject the findings of the tariff studies. The tariffs and the formulae of indexation of tariffs would be valid for a period of five years.

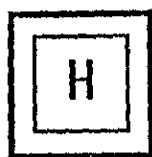
Prior to 1994, SAMAPA did not charge water tariff to achieve full cost recovery in its service areas. Tariff was low, and water utility depended on government's resources. Following the principles set out in the 1994 regulation, the concession contract of 1997 provided for automatic renegotiation of tariff once every five years. The tariff is required to be calculated based on the company's projected costs and the cost of expansion for the next five years. In the eventuality of company's costs going beyond seven per cent (due to change in tax laws, etc.), a provision for extraordinary tariff revision after first two years of the contract was incorporated in the concession agreement. The contract also sets maximum connection fees per building at \$155 for water and \$4180 for sewer. The company charges a uniform tariff for water and sewer services. The contract outlines type of cross-subsidies: industrial, commercial and government users would subsidize service for domestic connections. Tariff is also differentiated between low volume and high volume users.

## Rights of users

Article 71 of the Regulation of 1994 outlines the rights of users who are legally connected to the services of potable water and sanitation service. This would include the right to

- receive potable water in quantity and adequate quality in continuous form according to the norms enforced
- request for verification of their consumption
- request for verification of their needs
- claim for compensation for negligence on the part of the service provider before the regulator.





# Chile: case study on water sector reforms

## Introduction

Water sector in Chile till recently was largely managed by public-owned companies. The water industry in urban areas has been on a growing path since 1970 as regards its coverage of potable water and connection for sewerage (Table H.1).

Table H.1 Urban water services: indicators

	1970	1975	1980	1985	1990	1995
<b>Coverage</b>						
Potable water (%)	66.5	77.4	91.4	95.2	97.4	98.6
Sewerage (%)	31.1	43.5	67.4	75.1	81.8	89.2
Sewerage treatment (%)					8.0	14.0
<b>Average connections (1000/year)</b>						
Potable water	45	80	64	53	107	78
Sewerage	20	65	83	58	111	85
<b>Average investment amount (US\$ million/ year)</b>	54	40	64	64	136	
Investment per connection (US\$/connection)	869	404	234	547	364	703
Operating costs (US\$ million)					115	199
Operating costs (US\$/new connection)				75	95	
<b>Staffing</b>	13,500	7,000	3,000			
	(1973)		(1979)			

Source IADB (1999)

The coverage of potable water services has always been more than that of sewerage services. The sewerage treatment facilities were not developed and covered less than 10% of population in 1990. The cost for connection for water service in 1990 was \$132 (Table H.2). Many companies felt the need for additional resources to expand and maintain various urban services. For instance, the EMOS (Empresa Metropolitana de Obras Sanitarias) which was the metropolitan (Santiago) sanitary works enterprise till the late 1980s, lacked funds to maintain and expand its water and sanitary works although it was efficiently managed and did not face any water shortage or have large unmet demand. Its low cash flow was compounded by the government's restriction on its borrowing from the market. In particular, there was shortage of funds for

Table H.3 Evolution of water industry

	Water Industry
Baseline 1973	Various state offices and agencies, overlapping in zones and responsibilities, Low rates and high costs
Operational adjustment 1974-78	Rate increase; operating costs cut
Reorganization	Unification of the industry (1977) into one autonomous state body; separation along geographical lines and establishment of companies under private law (1990)
Regulatory framework	Gradual application of long-term self-financing rates (1990-94)
Privatization	Creation of a regulatory framework; 8 concessions for new real estate developments

Source IADB (1999)

In 1977, SENDOS (National Service of Water and Sewerage Works) (Table H.3) was created by law as an autonomous institution, and it combined all government activities in the potable water supply and sewerage industry operating directly in 11 regions in Chile. Its regulatory jurisdiction also extended over two autonomous companies operating in the other regions: EMOS, or the Water and Sewerage Works Company in Santiago, and ESVAL, or the Water and Sewerage Company in Valparaiso, which were free to manage their own revenues. SENDOS operated independently, enforced water tariff that was set periodically by the government, and established standards and development plans for water supply and sewerage services. Further, private companies in urban areas were also supervised by SENDOS, and their rates continued to be set by the government.

In the early 1990s, the government set up 13 state-owned corporations covering the jurisdiction of the urban services administered by EMOS, ESVAL, and the erstwhile 11 regional SENDOS offices. These corporations were entrusted with the assets management and operation of services including the responsibility for making investment decisions. As a part of the water sector reforms, the government enacted a series of water laws between 1988 and 1990 that set the framework for

- creating a regulatory body (Superintendency of Water and Sewerage Services and defining its powers and responsibilities) (1990)
- subsidy demand for low income users (1989)
- detailing the grant of water and sewerage concession (1989)
- setting water tariff principle (1988).

The water companies<sup>56</sup> are required to submit regular information on costs and service to the Superintendent of Water and Sewerage Services, failing which the company would be fined.

## Tariff policy

Till 1976, water rates in Chile used to be very low and could not sustain the water supply services efficiently. However, this changed when it was felt that users charges should be gradually hiked for reaching the goal of self-financing in water sector (Table H.4).

Table H.4 Water charges (US \$/cubic metre, constant currency)

Company	1989	1990	1991	1992	1993	1994	1995
<b>Northern zone</b>							
ESSAN (desert)	0.45	0.50	0.74	0.78	0.80	1.29	1.29
<b>Central north (semi desert)</b>							
ESVAL	0.33	0.39	0.41	0.44	0.49	0.57	0.72
<b>Central zone</b>							
EMOS	0.22	0.27	0.28	0.30	0.34	0.34	0.39
<b>Central south</b>							
ESSBIO	0.21	0.29	0.32	0.37	0.38	0.41	0.46
<b>Southern zone</b>							
ESMAG	0.33	0.36	0.45	0.52	0.53	0.63	0.68

Note Figures are for December of each year.

Source IADB (1999)

The new legislation (DFL 70, 1990) in the water sector laid down the principles for tariff determination, thus giving a little scope for regulatory manipulation. All formulae and definition of variables being used for tariff setting are spelled out in details in the law. The regulator is required to determine the tariff on the basis of the above principles. The philosophy behind the tariff policy was to give a signal to potential investors that the government was committed to not expropriating their return on capital through underpricing, and would contain the chance of their monopoly rents. The tariff setting process (Figure H.1) was, however, complex: for each company, a benchmark efficient firm is to be estimated by the regulator keeping in mind the company's geographic, demographic, and technological conditions. Parameters such as water collection rates are set for performing at efficient levels. The 'model enterprise' is required to consider development plans for meeting

<sup>56</sup> All water companies were required under the new law to enter into a new concession contract with the government.

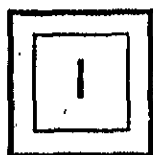
An estimate in 1995 showed that the subsidy benefited 17.6% of residual customers. However, it cost the government about 423 million dollars or 5.2% of the total billing of water companies. The application of the subsidy principle enabled the sector to become self-financing in the long run by gradually eliminating cross-subsidies. Although water rates almost doubled between 1989 and 1995, there was not much protest from consumers, as the rates paid by the low income user did not rise due to subsidy.

## Private sector participation

Although the water sector was doing satisfactorily under the state management, the government felt the need to improve regulation in water industry with an explicit framework for privatizing state-owned companies for involving private financing and technology and improving management. The conditions in the water sector became favourable for private sector participation because of the reform measures. The legislation in 1990 in water sector authorized the government to sell its shares in the two largest companies, EMOS and ESVAL. Privatization of other companies was limited to a 49% ceiling. The main private sector participation options used by the government included (a) granting concession for new services, (b) BOT (build-own-transfer) contracts, (c) transfer of concessions, and (d) sale of companies. In the case of wastewater treatment, BOT contract was opted for the city of Antofagasta (through a contract between Biwater and ESSAN in the north zone of Chile). The management contract for the entire water distribution system, including production and distribution of potable water and collection and disposal of waste water, is being considered for the southern coastal area of region five (through a contract between ESVAL and Aguas Quinta). In the city of Valdivia, the state-owned ESSAL company awarded a concession to a private company (Savedoff et al. 1999).

## Lessons for Gujarat

- Law should clarify the tariff policy, whereby regulatory discretion could be substantially reduced.
- Decision-making should be transparent.
- Strong political commitment is necessary to carry out successful reforms in the water sector.
- Yardstick competition being used in the tariff setting process can improve efficiency of the water companies.



# Trinidad and Tobago: case study in private sector participation

## Introduction

Till 1996, the water and sewerage services were solely administered by the Water and Sewerage Authority or WASA, in Trinidad and Tobago. However, performance was not satisfactory (Table I.1). The quantity of water unaccounted for was very high and there were restrictions on the availability of water during the day. Labour cost (60%) was a large component of its total operating costs. Water tariff was low, and for nearly 50 years till 1980, tariff rates remained the same. The WASA was not able to generate sufficient revenue to even cover the operating expenses. By 1994, its financial position was such that the government had to bear 800 million dollars as accumulated government transfer to the WASA.

**Table I.1 Performance of the Water and Sewerage Authority prior to 1996**

Parameters	Performance
Staff for 1000 connections	12.8*
Unaccounted for water (%)	45
Sewerage connection (%)	30
Meters connection to 240 000 customers (%)	1
Population that receives water less than 12 hours a day (%)	40

\*against 1.5-2 for efficiently run utilities in developed countries

Source World Bank (1998)

Thus the government decided to introduce PSP (private sector participation) in the management of water services. It did not opt for the concession route for the PSP during the initial period because increasing the price would require an amendment of the existing law, which would be time-consuming and require political support. Secondly, there was very little information on the water and sanitation infrastructure needed for preparing a proper long-term concession agreement document. Further, the regulatory capacity was not adequate and the government needed time to establish an effective rate-setting mechanism ensuring competitive bidding for the concessional agreement.

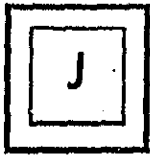
The government opted for a two-phase strategy while introducing private participation in the water sector. Under an interim management (1996), a

## Regulatory framework

The PUC (Public Utility Commission) sets tariff through a quasi-judicial process. The government reconstituted the Water Resources Agency of the WASA into an independent government agency, which would be responsible for monitoring water quality. Under the new arrangement the PUC should monitor activities of the private operator, and set a process to allow cost recovery in water sector. In 1995, water tariff was increased by 35% for customers receiving water more than 12 hours a day.

## Lessons for Gujarat

In the initial stages, the management contract option for PSP may enable the public service provider and the private operator to develop terms and conditions for a complex long-term concession agreement.



# UK: case study on regulatory framework

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## Introduction

Prior to the privatization of the British Water Industry, responsibility for providing water and sanitation services rested on various municipalities and private water companies. The water industry was rationalized from time to time with the reorganization of local governments, and there were about 160 undertakings and 1300 sewerage operators in England and Wales in 1973. A year later, these undertakings were substituted by 10 regional water authorities whose boundaries were based on the catchment areas of major rivers. The regional water authorities were responsible for managing the river basin, including quality and quantity of water supply and sewage disposal. The government gave loans to the authorities for capital investment. Water prices were set at a low level, and level of service was largely determined by these authorities. Further, 29 private water companies, not responsible for sewage treatment, continued to provide water services in England and Wales. The water companies were guided by their board of directors, representing local and business interest. Prices were set as low as possible. These companies raised funds for capital investment in their areas by issuing fixed dividend stock. By 1989, 10 regional water authorities were privatized and steps were taken to rationalize these companies. The reasons behind such a move was that as a public sector activity, the government fell short of funds in maintaining and improving the infrastructure required for water services. Along with these financial pressures, there was increasing pressure for meeting higher standards for drinking water and waste water treatment. This came from the public and also from the European Legislation. About 50 billion pound sterling was estimated to be required between 1989 and 2005 to meet the standards required by the EEC (European Economic Commission).

In England and Wales, privatization was seen as the only answer to achieving the government's aims of increased efficiency and access to private funds for investment. So in 1989, the water industry in England and Wales was privatized. The operational and regulatory functions of the ten Water Authorities were separated. Companies were created with responsibility for the authorities' operations, and the authorities' assets were transferred to them. These

- publishes information to encourage poor performers to reach up to the standard of the best companies
- advises on mergers involving water and sewerage companies
- deals with complaints against water companies and settles disputes between customers and water companies and sometimes between developers or landowners and water companies.

The other organization regulating the water sector in UK is the Competition Commission (formerly Monopolies and Mergers Commission) hears appeals on OFWAT's decisions on price limits, and disputes on its licence modification.

## Quality of service

The OFWAT sets standards of service to consumers and monitors their compliance by water companies on the following parameters.

- Inadequate water pressure
- Supply interruptions
- Restrictions on use of water
- Flooding from sewers
- Billing contacts
- Written complaints
- Ease of telephone contact
- Adequacy of water resources.

Under 'inadequate pressure' indicators, the OFWAT monitors the number of domestic properties which received or are likely to receive pressure below a certain reference level when water demand is normal. The reference level is defined as 10 metres head of pressure at the boundary stop tap with a flow of 9 litres per minute. The alternate reference level often used is 15 metres head of pressure in the distribution main that supplies the property, as it is very difficult to measure pressure and flow at the boundary of every customer's property. Companies are expected to maintain a register which identifies the properties that are likely to receive low pressure. The 'supply interruption' indicator shows the number of properties experiencing unplanned and continuous interruptions for more than 6 hours, 12 hours, and 24 hours. The indicator on 'restrictions on use of water' shows the percentage of company's population that has had restrictions imposed on them regarding use of hose pipes or sprinkler / unattended hose pipe, non-essential use of water during drought, drought orders imposing stand pipes, etc. Under 'flooding from sewers' one indicator



million tests on their drinking water supplies each year, and to report the results to the Inspectorate.

The parameters for water quality are (a) microbiological quality of water leaving treatment works and (b) microbiological quality of water in service reservoirs and (c) water quality in water supply zones. The microbiological quality of water is measured in terms of coliforms and faecal coliforms factors, in addition to these two. The water quality in the water supply zones is measured in terms of coliform, faecal coliform, colour, turbidity, odour, taste, hydrogen ion, nitrate, nitrite, aluminium, iron, manganese, lead, PAH, trihalomethanes, total pesticides, individual pesticides, etc. Of late, the Drinking Water Inspectorate has been implementing the EC Drinking Water Directives 98/83/EC, which contain mandatory directives to be implemented by specified dates and the non-mandatory directives to be used for monitoring purposes (Annexes J.1 and J.2).

The quality of water and sewage effluents is subject to strict control. In the event of neglect, criminal sanctions may be imposed on the directors of the company. Performance is audited every year by the Drinking Water Inspectorate. The report is placed before the government and each company is required to maintain registers of analytical results for public scrutiny. The quality of sewage effluent is also monitored for BOD (biochemical oxygen demand), suspended solids, etc., and other parameters such as metals and colour.

In 1992 there were some 50 000 test failures. By 1998 this number came down to just over 6000, representing a pass rate of 99.8%.

## Environmental agency

Originally, the National Rivers Authority took on the regulatory functions of the public water authorities before their privatization. In 1996, the authority was brought together with Her Majesty's Inspectorate of Pollution (responsible for air quality, the regulation of major industries etc.) and local waste regulation authorities, to form the EA. Like the old water authorities and the National Rivers Authority, the EA functions on the basis of integrated river basin management.

The agency has five significant water related functions

- water resource management
- control of discharges
- monitoring of river and coastal water quality
- land drainage and flood defence

quality decreasing from 16% to 10%. The EA has now proposed that the government should aim to eliminate all impurities from rivers by 2005.

The impact of water quality improvements is probably best judged by looking at the quality of the individual major rivers in England. The Thames is now the cleanest metropolitan river in Europe, if not the world. Over 100 species of fish have been caught in it in recent years, including salmon. The river Trent, which receives effluent from major cities such as Birmingham and Nottingham, is now clean enough to use as a drinking water source. There have also been major improvements in the quality of water in the river Tyne, which flows through Newcastle, and the Mersey, which receives effluent from the Manchester and Liverpool areas.

## Water tariff

In contrast to the US 'rate of return' model for tariff fixation, the UK government adopted the so-called Austrian Model of Price Regulation. The latter relies on the price cap approach rather than the annually fixed rate of return. Each private company is required to prepare detailed asset management<sup>57</sup> plans for establishing the need for investment as regards maintenance and enhancement of water supply and sewerage disposal systems. These plans are examined by independent consultants and certified in terms of viability, costs, and necessity. Parameters such as capital expenditure needs and operating cost forecasts were considered for setting tariffs. A formula is established for price rises every year, under which the price rise is  $RPI - X + K$  where  $X$  is an efficiency factor and  $K$  is a factor dependent on capital expenditure needs. The formula was revised in 1999 and the change in price is  $RPI - X + Q + V + S$ , where  $Q$  is the cost of meeting new environment needs,  $V$  is the cost of meeting supply and demand balance, and  $S$  is the cost of enhancing a particular element of a process.

The latest review of price limits, which sets limits for the period 2000–2005, has just been completed. The limits that have been set allow for capital investment of 15 billion pound sterling over this period, equivalent to 3 billion pound sterling annually. The price limits would require price cuts averaging over 12% in real terms in 2000, with average prices remaining around 11 percent below current levels in real terms by 2005.

<sup>57</sup> These plans normally include capital costs, asset stock, operating costs and financial information. Asset stock includes information, condition, and serviceability of stock.

- Levels of service
- Cost of water delivered
- Financial performance and capital investment
- Leakage and water efficiency.

The UK regulator uses sophisticated benchmarking using statistical techniques to compare the company's efficiencies.

## Benefits of private sector involvement

A clear regulatory system is vital not only for the delivery of the standards that governments set, but also for successful private sector involvement in the water sector. The clearer the system, the lower the risk that companies has to face. Lowering risks reduces the cost of their involvement, as banks will be willing to lend them the money they need at lower interest rates. Clear regulation also reduces the administrative and legal costs of private sector involvement by reducing the extent to which common issues have to be dealt with each time a contract is negotiated. These cost reductions will result in lower charges.

The principal benefit of privatization in England and Wales has been that the water industry was freed from the constraints of government spending and from government interference in its operations. This freedom has enabled the companies to invest some 3 billion pound sterling annually in recent years, and this level of investment is expected to continue until at least 2005. By then they will have invested some 2 billion pound sterling of public funds on investment each year. In contrast in 1998/99 the water companies paid some 440 million pound sterling in tax.

This investment, coupled with the tough regulatory framework, has delivered significant improvements in drinking water quality and major reductions in the environmental impacts of the water industry's activities. Price increases were needed in the first 10 years to fund the investment and maintenance backlog that existed at the time of privatization. However, the companies have generated efficiency improvements far in excess of those that the government envisaged, whereby prices have risen less than that would have been necessary had they remained in the public sector. The benefits of those efficiency improvements are now being passed to consumers in the price cuts that have taken place this year.

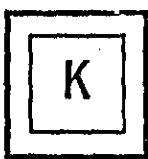
The creation of three independent regulators has delivered a transparent, publicly accountable regulatory system with a great deal of information about the performance of the industry available to customers and other interested parties.

# Annex J.1 Mandatory standards under EC Drinking Water Directives 98/83/EC

Parameter	Current regulatory standard	New directive mandatory standard	Comment
Faecal coliforms (no./100 ml)	0		Parameter name change
E coli (no./100 ml)		0	
Faecal streptococci (no./100 ml)	0		Parameter name change
Enterococci (no./100 ml)		0	
Acrylamide (µg/litre)		0.10	Control by product specification
Antimony (µg/litre)	10	5.0	
Arsenic (µg/litre)	50	10	
Benzene (µg/litre)		1	
Benzo 3,4 pyrene (µg/litre)	0.01 <sup>a</sup>	0.01	
Boron (mg/litre)	2.0 <sup>a</sup>	1.0	
Bromate (µg/litre)		25	By end 2003
		10	By end 2008
Copper (mg/litre)	3.0	2.0	
1,2 dichloroethane (µg/litre)		3.0	
Epichlorohydrin (µg/litre)		0.10	Control by product specification
Lead (µg/litre)	50	2.5 <sup>b</sup>	By end 2003 monitoring
		10 <sup>b</sup>	To be decided by end 2013
Nickel (µg/litre)	50	20	
Nitrite (mg/litre)	0.1	0.1	Ex works
		0.5	Consumers taps
Nitrate/nitrite		Formula <sup>c</sup>	
PAH (µg/litre)	0.2		6 substances including fluoreanthene
		0.1	4 substances excluding fluoreanthene
Tetrachloroethene (µg/litre)	10	10	Sum of 2 substances
Trichloroethane (µg/litre)	30	10	
Trihalomethanes (µg/litre)	100 <sup>d</sup>	150	By end 2003 Sum of 4 THMs
		v	By end 2008
Vinyl chloride (µg/litre)		0.5	Control by product specification

<sup>a</sup>annual average, <sup>b</sup>weekly average, <sup>c</sup>the formula is  $[\text{nitrate}]/50 + [\text{nitrite}]/3 \leq 1$ ; <sup>d</sup>three monthly average

Source DWI (1998)



## List of persons met

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### Gujarat

#### *Ahmedabad Municipal Corporation*

- Mr Kailashnathan, Municipal Commissioner
- Mr MK Das, Deputy Municipal Commissioner
- Mr MK Darji, Senior Legal Assistant
- Mr HN Desai, Additional City Engineer, Water Supply
- Mr HV Hindocha, Assistant Manager (MBA)
- Mr UC Padia, Assistant Municipal Commissioner
- Mr Rama Prasad, Advisor (Pollution)
- Mr ZA Sancha, Assessor and Tax Collector
- Mr BR Sethi, Additional City Engineer, Drainage Project and Slum Networking Project
- Mr VA Vaghela, Officer on Special Duty

#### *Department of Narmada, Water Resources, & Water Supply, Government of Gujarat*

- Mr M S Patel, Secretary (Water Resources)
- Mr M I Mehta, Secretary (Narmada & Major Irrigation Schemes)
- Mr R K Tripathy, Secretary (Water Supply)

#### *Gujarat Infrastructure Development Board*

- Mr R Saxena, Chief Executive Officer
- Mr A Chakraborty, Former Chief Executive Officer
- Mr D C Jha, Deputy Manager, Water Resources

#### *Gujarat Water Supply and Sewerage Board*

- Mr R K Tripathy, Chairman
- Mr K B Patel, Member Secretary

#### *Gujarat State Drinking Water Infrastructure Company Limited*

- Mr P K Taneja, Managing Director
- Mr B J Vasavada, Chief General Manager

### *Government of Tamil Nadu*

- Ms S Malathi, Secretary, Municipal Administration & Water Supply

### *New Tirupur Area Development Corporation Ltd.*

- Mr M Raman, Managing Director
- Mr M C Srikanth, Chief Financial Officer
- Mr S Srinivasan, Technical Consultant

### *Tamil Nadu Water Supply & Drainage Board*

- Mr Kashivishwanathan, Managing Director

### **International agencies**

#### *Department of Environment, Transport and Regions, Government of United Kingdom*

- Mr A Davis, Director, Water and Land

### **Sector Experts**

#### *Consumer Organizations*

- Prof M Shah, Managing Trustee, Consumer Education and Research Centre

### **HUDCO**

- Mr K Subramaniam, Chief Projects (Infrastructure)

### *Indo-US, FIRE Project*

- Mr Lee Baker, Chief of Party
- Mr Y Satyanarayana, Senior Infrastructure Finance Advisor
- Mr Chetan Vaidya, Senior Urban Management Advisor
- Ms K Devi, Project Development Specialist

### *National Institute of Urban Affairs*

- Dr U P Raghupati, Associate Professor

### *Tata Energy Research Institute*

- Dr R K Pachauri, Director
- Mr Rakesh Kacker, IAS, Senior Fellow

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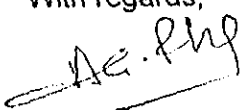
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