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CWSS	Cauveri Water Supply Scheme
DETR	Department of Environment, Transport, and Regions
DO	Dissolved oxygen
DOS	Bureau of Water Works
DWI	Drinking Water Inspectorate
DWR	Department of Water Resources
EA	Environment Agency
EC	European Commission
EEC	European Economic Commission
EMOS	Empresa Metropolitana de Obran Sanitarian
ETOSS	Ente Tripartite de Obras de Servicios de Saneamiento
GERC	Gujarat Electricity Regulatory Commission
GIDB	Gujarat Infrastructure Development Board
GoK	Government of Karnataka
GoTN	Government of Tamil Nadu
GSDWICL	Gujarat State Drinking Water Infrastructure Company Limited
GWRDC	Gujarat Water Resources Development Corporation
GWSSB	Gujarat Water Supply and Sewerage Board
IA	Independent Auditors
IE	Independent Engineers
IL&FS	Infrastructure Leasing & Financial Services Limited
JVC	Joint Venture Company

RMC	Rajkot Municipal Corporation
ROM	rehabilitate, operate and maintain
ROT	Rehabilitate operate transfer
RUDA	Rajkot Urban Development Authority
SAMAPA	Servicio Autonomo Municipal da Agua Potable y Alcantarillado
SDA	Superintendencia de Aguas
SENDOS	National Service of Water and Sewerage Works
SPV	Special purpose vehicle
SSNN	Sardar Sarovar Narmada Nigam
SSNNL	Sardar Sarovar Narmada Nigam Limited
SSP	Sardar Sarovar Project
SSS	Superintendent of Water and Sewerage Services
TACID	Tamil Nadu Corporation of Industrial Infrastructure Development Limited
TADP	Tirupur Area Development Programme
TDS	Total dissolved solids
TEA	Tirupur Exporters Association
TLPA	Tirupur Local Planning Area
TM	Tirupur Municipality
TNPCB	Tamil Nadu Pollution Control Board
TRAI	Telecom Regulatory Authority of India
TWAD	Tamil Nadu Water Supply and Drainage Board

List of Tables

2 A review of the water sector in Gujarat

3 Private sector participation in India and other countries

4 Scope for private sector participation in Gujarat

List of Figures

2 A review of the water sector in Gujarat

6 Regulatory framework to facilitate

projected to decrease in the future as large surface water schemes are being commissioned, notably the Sardar Sarovar based Narmada Main Canal. Nevertheless, even after accounting for the groundwater and surface water availability, there would be significant shortfall in water 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 as well as strengthening of the water supply distribution network. The shortfall of drinking water supply in the six municipal corporations has been projected at 986 mld by 2010, calling for an investment of Rs. 8609 million by 2010. Additional investments are also required to rehabilitate the existing distribution network.

A study of the Ahmedabad Municipal Corporation showed that there exist significant exploitation of ground water, low availability of water supply, service standards being administered through a newly introduced citizen's charter, technical quality of water followed according to IS-10500 standards, tariff not linked to consumption of water, significant differences between cost of water supply and the existing tariff, and involvement of private parties in discrete functions such as pumping of water and operation of water treatment plants. A similar picture also emerged during the study in Rajkot Municipal Corporation when there exist considerable subsidization in water sector, significant cross subsidization within the sector, private sector involvement only through service contracts, and water charges not being linked to consumption of water.

Private sector participation in India and other countries

The options for PSP (private sector participation) can take different forms. Such options would include service contracts, BOT/BOOT/ROM, management contract, lease contract, concession contract, and divestiture. 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. Depending on the PSP options, benefits accruing in the sector would vary.

There have been very little in terms of private sector participation initiatives in the water sector in India. Even the initiatives that have taken place have been confined to discrete functions and to more primitive forms of PSP as in management and service contracts. In Tamil Nadu, the private sector participation has been allowed in sourcing of water, treatment of water, reverse osmosis plants, and transportation of water by tankers, all in Chennai, and, through BOT for the entire water cycle in Tripur project. Similarly, some

- Should the State Government/local bodies recognize the need to subsidise any segment of water cycle, then the subsidy should be explicitly accounted for in the operation of these projects and provided through the State/local bodies' Budget.
- It is recommended that GSDWICL should not rely completely on budgetary support for executing its project. The option for identifying a strategic partner and setting up a joint venture for executing the project should be examined.
- The GWSSB should only work as an agency for the execution and operation of water sector projects, as its regulatory and advisory role will rest with the independent regulator, as discussed in the next sections.
- A complete divestiture of the distribution network in urban local bodies can be explored as an option for those sections of the distribution network that could be isolated from the rest of the network.
- The water supply activities of the local bodies can be hived off as separate commercially operated companies with assistance from a strategic partner, and over time, consider complete privatisation of these companies.
- For strengthening the existing distribution network in some of the smaller municipal corporations and larger municipalities, the ROT (Renovate, operate, and transfer) mode of privatisation could be explored. Wherever the distribution network has not been laid, PSP could take the BOT form, wherein the private operator would also lay down the distribution network.
- For local bodies that are not very large, management and service contracts may be assigned to the private sector in discrete activities like operation of pumping stations and water treatment plants, billing, etc.

Legal impediments to private sector participation

There is no legal barrier to private sector participation in the water sector in Gujarat. The existing laws/acts such as the Gujarat Infrastructure Development Act 1999, the Bombay Provincial Municipal Corporations Act 1949, the Gujarat Municipalities Act 1963, the Gujarat Act No. 18 1979, and the Gujarat Panchayat Act 1993, permit such participation. All forms of PSP, can be adopted in Gujarat, and implemented within the framework of these laws.

Regulatory framework

The scope of PSP has been discussed earlier, and it has been stipulated that the proposed corporations or the new developers would be the service providers and are expected to run on commercial principles. A fall out of the privatisation

- To monitor terms and conditions of all new concession agreements between developers and local bodies in water sector.
- To aid and advise the Government for developing a Water Use Policy for Gujarat, and monitor such annual water use on the part of the local bodies as well as to co-ordinate with other regulators such as Gujarat State Pollution Control Board for framing and evolving guidelines for sustainable water use in the state.
- Perform such functions as are assigned to it by the Government of Gujarat at a later date.

Although the current study examined the functioning of the WRA in water supply, it is suggested that these areas should be extended to sewerage as well so that the WRA, for the sake of integrated water management, should have the regulatory oversight over the water and sewerage sector in the state.

The WRA should be advised by an Advisory Committee. The composition of the Advisory Committee should be determined by the WRA in consultation with the Government of Gujarat, and it should include interests of local bodies in addition to representing interests of industry, agriculture, labour, consumers, non-Governmental organisations, academic, research bodies in the water sector. The functions of the Advisory Committee shall be to advise the WRA on major questions on policy, on matters relating to tariff and quality of service, matters relating to protection of consumer interests and overall standards of performance of service providers.

Independence

If the WRA is required to effectively discharge its duties under the statute, 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. It is, therefore, recommended that the selection process of members of the regulatory body is open and transparent, removal of members of should be through a transparent process, and only on the advice from an independent authority such as the State High Court, and finally, to ensure the financial independence of the regulatory authority, the authority shall have its own fund and all receipts of the authority, including grants from the State Government, should be credited thereto and all payments by the authority shall be made therefrom.

Framework for tariff regulation

The pricing of water in Gujarat is one of the functions assigned to the municipal and local bodies. Under the existing structure, most consumers pay according to the rateable value of their property (or a flat rate) and the actual consumption of water is not measured. This has resulted in a number of distortions, including inefficient use of water, and also raises questions of equity. The pricing for the water supply has no relation with the cost of supply. Further, given the bundled accounting procedures and the information systems, it is not even possible to calculate accurately the cost of water supply.

In the context of attracting private capital in the water sector, tariff reforms has become critical. Based on the feedback from the Government of Gujarat, a phased program for tariff regulation is suggested. During the first phase (called Phase I), which will last for three years, the focus will be on development of regulatory capacity and in undertaking the basic tasks essential for full-fledged regulatory intervention in the second phase. In Phase I, the regulatory authority will prescribe the principles to be used for tariff determination. In addition, it would conduct a cost of service study to assess the extent of subsidy and cross-subsidy in the prevalent tariff structure. Finally, it would formulate a plan in consultation with the State Government to optimise the subsidy requirement and the delivery mechanisms. The latter would include rationalisation of the retail tariff, in the areas indicated by the Government of Gujarat, to meet all justified expenditure on O&M (operation and maintenance) within the Phase I. The O&M expenditure would interalia, include the cost of repair, maintenance, administrative costs and the employee costs. This would imply that from the existing level, the tariff would be increased to cover 100% of the justified O&M expenditure within three years of Phase-1. It is suggested to phase the increase as 50%, 25% and 25% in year 1, year 2 and year 3 respectively.

In Phase II, the regulatory authority should directly regulate prices for bulk water supply in all cases and, for prices for retail water supply, in the areas to be declared by the Government of Gujarat. It is suggested that during this phase, the regulator may determine the retail prices in the six municipal corporations to begin with. For other areas, the regulator should regulate the retail tariff indirectly.

For direct regulation, 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. For other local bodies, governed by indirect regulation, the power to determine the tariff shall still remain with the regulator, but it shall be executed through local

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

It is however recommended that a detailed scrutiny of the Acts/rules for carrying out such changes should be carried out whenever the legislation constituting the WRA is proposed. In addition, while amending the acts, the spirit of the 73rd and the 74th Constitutional Amendments should not be violated.

Agenda for action

Regulatory reforms, 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, apart from regulatory reforms in the sector. An appropriate study to devise a sector reform strategy should be initiated on a time bound basis.

services is limited, this segment is also characterized by a strong element of monopoly. Fourth, as most of the distribution system is buried, information on the network, necessary to facilitate investment decisions, is not easily available.

Private investment in the water sector would also imply efficiency improvements with the introduction of managerial and technical expertise. It could be achieved through different options reflecting varying degrees of private sector participation. However, any attempt to introduce such participation would have to address many complex issues to satisfy both the consumers and the investors in the liberalised environment. There is a need for a fine balancing act to secure the financial viability of the industry on the one hand and protect the interests of consumers on the other. Also, as the scope of competition in water supply services is limited, there is a need to ensure that the utilities do not exploit their monopoly power at the expense of the consumers.

The bulk consuming segments in Gujarat's water sector are all areas under Municipal Corporations, smaller urban centres, rural areas, irrigation requirements and industrial consumers. It is expected that all the segments would significantly depend on bulk supply schemes, such as the Narmada Main- Canal based schemes and the Kalpasar project.

The need to protect the interests of various consumers in a natural monopoly situation, to ensure future growth in water sector in view of increasing population, rising income, economic growth and urban pressure to provide autonomy to various entities working in water sector, focus on providing incentives for sustainable water use, including conservation of water resources and protection of environment and, finally, to promote economic efficiency were recognised in Gujarat. Thus, the Government of Gujarat decided to develop an enabling framework to meet these objectives. The GIDB (Gujarat Infrastructure Development Board), Government of Gujarat has assigned the task to TERI (Tata Energy Research Institute), New Delhi.

Scope of the study

Against the above background, the scope of the study is as follows.

- To identify and suggest changes in the provisions, if any, in the existing legislations to facilitate the privatisation of the water sector
- To develop an enabling regulatory framework to facilitate private sector involvement in the water sector
- To identify changes in the existing legislations in order to facilitate the enabling regulatory framework
- To suggest measures to promote competition in the water sector
- To develop a policy framework for tariff-regulation

Among the major Indian States, Gujarat is the second most urbanized. Over 14 million people inhabit a network of 225 urban centres. According to the 1991 Census, 34.5 percent of its population lives in urban areas, compared to 25.7 percent for the country as a whole. It is estimated that by 2011 this will become 42.8 percent out of a total population of 51.7 million (CEPT 1997).

Table2.1 Number of towns in Gujarat

	1971	1981	1991[1]
Class I	8	13	28
Class II	17	23	25
Class III	37	46	51
Class IV	66	76	75
Class V	66	52	46

Source CEPT (1997)

Geographically, Gujarat divides naturally into three regions, namely (i) the mainland, covering the central and eastern part of the state; (ii) the Saurashtra peninsular region; and (iii) the Kutchh region, covering mostly the arid land of northern Gujarat. About two thirds of the total area is covered by rocky formations, while the remaining area is covered by alluvial formation.

Overview of the water sector in Gujarat

Water resources in Gujarat are concentrated primarily in the southern and central part of the mainland. Major rivers from neighbouring states enter through the eastern fringe. However, there are only three perennial rivers flowing through Gujarat viz., Narmada, Tapi and Mahi, all of which are located in south Gujarat. A major non-perennial river, Sabarmati flows through the districts of Sabarkantha, Mehsana and Ahmedabad.

Gujarat can be divided into four independent divisions for the purposes of classifying water resource availability. While 11 rivers flow in South Gujarat, 71 rivers flow in Saurashtra, 97 rivers in Kutchh, and 6 rivers in North Gujarat. About 47 percent of the available water resources of Gujarat are available from these rivers. Through these rivers, about 80 percent of the run-off generated from rainfall during the monsoon flows into the Arabian Sea.

The distribution of the water resources in the state is not equitable. While 60 percent of the total water resources exist in the south Gujarat, only 12 percent are in Saurashtra, 7 percent in Kutchh, and 21 percent in the north Gujarat region. North Gujarat, Saurashtra, and Kutchh, thus suffer from acute water

[1] Out of these 28 Class I towns, six are Municipal Corporations

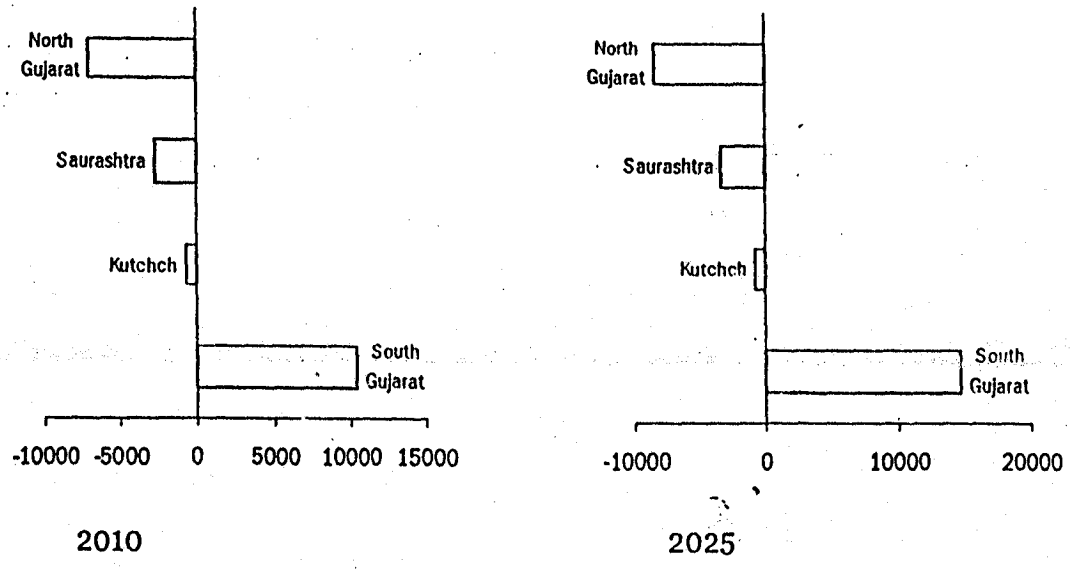

Figure 2.2 Surplus (deficit) of water resources in Gujarat (mcm per year)

Source Tahal (1997)

Apart from the inequitable distribution of water resources, the coastal regions also face problems due to the ingress of sea water due to limestone quarrying–largely restricted to the Saurashtra and Kutchh regions. The rainfall pattern in the state is also erratic, and this has made certain areas of the state extremely susceptible to drought and famine conditions. This is exacerbated by the very specific and peculiar geological and geo-hydrological situation–rocky terrain, desert region, and deteriorating ground water quality.

Water resources in Gujarat

The availability and requirements of water resources by the year 2010 and 2025 given in Table 2.3 have been estimated by Tahal (1997). With the available quantum of water resources, it is estimated that an area of 5.9 million hectares of land can be brought under irrigated agriculture and at the same time drinking water supply for a population of 51.7 million can also be provided by 2010. In 2025, an area of 6.5 million hectares can be provided with irrigation and 58.7 million people with drinking water. The requirement of water for industrial use is estimated assuming industrial demand as 12–15 percent of the requirement for domestic use.

Groundwater

Groundwater condition in Gujarat varies in relation to the hydrological setting. At present, a substantial quantity of ground water is being extracted to support irrigation, industry and drinking water requirements. As of 1991, there were 32 560 wells in Gujarat, of which 28 411 were private tube wells and 4149 government / Gujarat Water Resources Development Corporation tubewells. During the same year, the groundwater exploitation was 10 416 mcm.

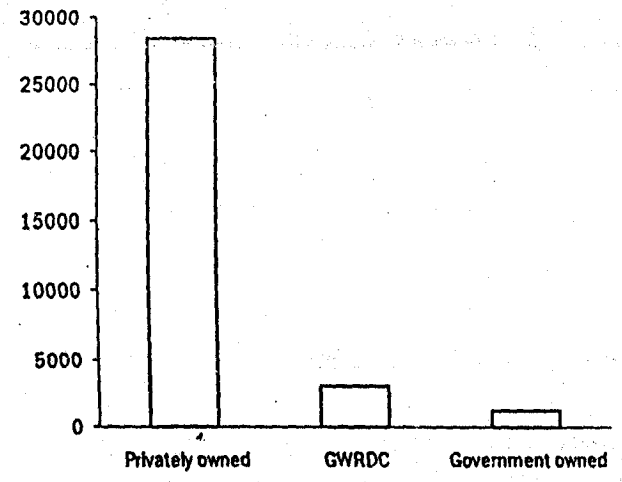

Figure 2.3 Number of tubewells in Gujarat

Source Hiraway (1999)

As per the Ground Water Resources Estimation of 1997, 31 talukas of Gujarat fall in the over exploited (OE) category, eight talukas in the dark category, and 42 talukas in grey category. As ground water exploitation is more than the recharge, depletion in water levels of three to five meters occurs every year. This has resulted in a reduction in yields from the tubewells. There is also a general deterioration the quality of ground water.

As can be seen from the above table, the share of groundwater in the total supply is projected to decrease from over 53 percent to about 41 percent. The share of surface water would also reduce marginally from the current 46 percent to 45 percent. This shift can be attributed to the growing importance of conservation activities which are estimated to account for well over 13 percent of the total water supply. Thus, the current scenario is likely to change because of rapid depletion of ground water levels and consequently higher dependence and usage of indirect sources in the future.

Projects in the pipeline till 2010

Despite initiating conservation activities to meet the growing demand, the state would continue to depend heavily on new surface water schemes (primarily the Sardar Sarovar Nigam Project). Some of these schemes, identified in GIDB 1999 are listed in Table 2.5.

Table 2.5 Major bulk water supply projects in the state (excluding projects in urban areas)

Project	Implementing Agency	Area	Investment (Rs million)
Sardar Sarovar Canal based Drinking water supply scheme	GSDWICL	8215 villages and 135 towns of Saurashtra, Kutchh and North Gujarat	47 000
Narmada based Mahi Pipeline Project	GSDWICL	Bhavnagar and Amreli districts	5500
Gulf of Khambat: Kalpasar Development Project	Proposal to float an SPV for this purpose	Saurashtra	34 9610 including power works

Source GIDB (1999)

Demand-supply scenario in urban centres

Tahal (1997) has estimated the demand for drinking water in urban centres in Gujarat assuming a demand of water of 140 lpcd in towns with a population more than 50 000, and 100 lpcd in all other towns. The urban population in the state was assumed to grow at a rate of 15 percent in 2001–2011, 12 percent in 2011–2021, and 4.8 percent in 2021–2025. The estimates are given in Figure 2.5.

distribution of water has been calculated based on a norm of Rs 200 per capita. The investment requirements presented in Table 2.7 have been calculated on the basis of an assumption that no capacity addition takes place in the previous years.

Table 2.7 Investment required in water sector in Municipal Corporations (Rs million)

Year	Ahmedabad	Vadodara	Surat	Jamnagar	Rajkot	Bhavnagar	Total
Cumulative investment to augment supply							
2001	1994.2		1373.8	114	390	180.3	3764.3
2004	2526.7		1652	175.3	495.3	245.7	4988.2
2007	3109.3	91.6	1956.5	242.4	610.4	317.2	6327.4
2010	3746.8	308.6	2289.7	315.9	736.4	395.5	7792.8
Cumulative investment to augment distribution network							
2001	77.00	26.20	40.20	8.90	15.20	9.50	177.00
2004	161.20	54.90	84.30	18.60	31.90	19.80	370.60
2007	253.40	86.30	132.40	29.20	50.10	31.10	582.50
2010	354.30	120.60	185.20	40.80	70.00	43.50	814.40

Source GIDB (1999)

Institutional structure of the water sector

As per the Constitution of India, the primary responsibility of water supply rests with the states. The Central government influences the sector through approvals of state development plans and provides assistance through a number of Central government agencies like the Central Groundwater Commission.

Within the framework set by the Central government, the State Governments determine the policies for the water sector and influence sector developments through the processes of regulation of sector agencies and resource allocations from State budgets. It is not uncommon for State governments to have established special purpose entities to provide the planning, design and construction of water supply and sanitation infrastructure. At the local level, the municipalities are the primary local bodies responsible for providing water supply in larger cities and urban areas of India.

In Gujarat, as in other states, the water sector is managed by institutions at different levels. The Department of Narmada, Water Resources, and Water Supply is the key State-level government department. Each of the three wings of this department, that is, Narmada, Water Resources and Water Supply, is headed by a Secretary to the State government. This institution is responsible for formulating the drinking water policy, preparing annual and five-year plans for development of the sector, allocating funds to the implementing agencies, and guiding sectoral development. The Gujarat Water Supply and Sewerage Board

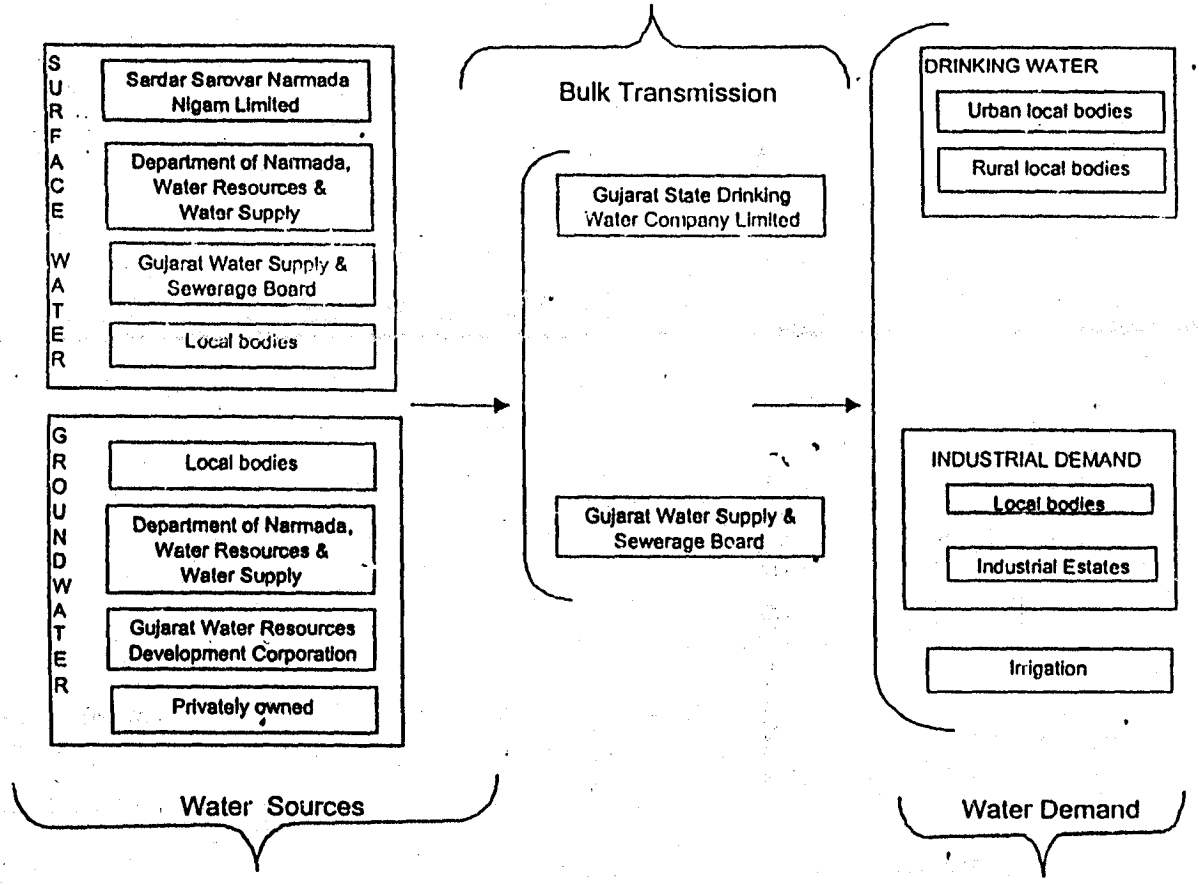

Figure 2.6 Structure of the water sector in Gujarat

A brief description of the various agencies in this sector in Gujarat is given below. Of these the three state level agencies responsible for the implementation and operational activities in the state, that is GWSSB, GSDWICL, and SSNNL are under the Department of Narmada, Water Resources and Water Supplies, Government of Gujarat.

- **Municipal Corporations:** Municipal Corporations for the cities of Ahmedabad, Vadodara, Surat, Rajkot, Jamnagar and Bhavnagar are governed by the Bombay Municipal Corporation Act 1949 (BPMC Act). Under the provisions of the BPMC Act, these corporations provide the civic services in their respective cities[4]. This includes provision of water. This was the case even before the enactment of the 74 Constitutional Amendment.

[4] Under Section 63, it is the obligatory function of the corporation *to make reasonable and adequate provision by any means or measures which it is lawfully competent for it to use* or to take *the management and maintenance of all municipal water works and the construction or acquisition of new works for a sufficient supply of water for public and private purposes.*

functions (Section 15[2][f]). Thus, there is ample scope for the board to initiate private participation in the sector.

- **Sardar Sarovar Narmada Nigam Ltd:** There are surplus water resources in the Narmada, Mahi, Damanganga and Tapi river basin areas. Therefore, diverting surplus water resources from these river basins to other water scarce areas has been recognized as a key strategy in the state. For achieving this, Sardar Sarovar Project of the Narmada Canal has been developed as a state carrier of water from water abundant to water scarce areas in the state. A SPV, the SSNNL (Sardar Sarovar Narmada Nigam Ltd.) has been set up. The salient features of Sardar Sarovar Project are given in Table 2.9.

Table 2.9 Salient features of Sardar Sarovar Dam

Main Dam	
Length of the main concrete gravity dam	1210.00 mm
Maximum height above deepest foundation level	163.00 m
Catchment area of the rive above dam site	88,000 sq. km
Gross storage capacity (7.7 MAF)	9497.07 mcm
Live storage capacity (4.75 MAF)	5859.80 mcm
Length of reservoir	214.00 km
Maximum width	16.10 km
Average width	1.77 km
Main canal	
Length up to Gujarat-Rajasthan border	458 km
Length in Rajasthan State	74 km
Design discharge capacity	
In head reach	40 000 cusecs
At Gujarat-Rajasthan border	2500 cusecs
Distribution system	
No. of branches (Gujarat)	42
Length of distribution system network	6600 km
Annual irrigation	
Gujarat	1.80 million hectares
Rajasthan	0.075 million hectares

- **Gujarat State Drinking Water Infrastructure Company Limited:** For implementation of the Sardar Sarovar Canal-based drinking water supply project, the state government has set up a SPV–SSNNL (Sardar Sarovar Narmada Nigam Ltd.) a state owned corporation. This would be the bulk supplier of Narmada water through its canal network, including the supply of drinking water. This water would then be purchased and

and utilization of water to promote overall development in the State. In addition to proper planning of water resources management, the distribution of intra-state water resources and optimum utilization of water resources are equally important.

The water sector in Gujarat, especially in many urban areas, is characterized by a *low level equilibrium*, that is, there is a vicious cycle arising out of the interrelated factors such as poor finances, poor institutions, poor infrastructure, poor service and consumer dissatisfaction. Since consumers are dissatisfied with the poor services of water service providers, there is low willingness to pay. As a result, revenue collections are poor leading to inadequate generation of capital resources. This is also compounded by inadequate information systems in the sector. Inadequate resources also lead to a fragmented institutional structure as well as ineffective management practices. Also, as the focus in the water sector is largely on the construction of new water supply schemes, adequate management skills have not developed. This has led to the inadequate provision of services in the water sector which again leads to consumer dissatisfaction. Although a need to break the vicious cycle has been recognized in Gujarat, a lot of effort is needed to tackle these complex issues.

Table 2.10 shows the status of the water sector in Ahmedabad and Rajkot. As mentioned earlier, there is a substantial gap in the demand and supply. The universal service obligation is also not being met in large parts of the State. The consumption of water that is charged for on a volumetric basis, forms a negligible proportion of the total consumption. Finally, the collection of revenue from the water sector falls considerably short of even the operating and maintenance costs of the water supply. Thus there is a large shortfall in resources available for the development of this sector.

Table 2.10 Overview of the water sector in Ahmedabad and Rajkot (1999/2000)

	Ahmedabad	Rajkot
Surplus (deficit) in water supply (mld)	–252	–50
Availability of water (lpcd)	152	110
Availability of water (no of hours daily)	2½	½[5]
Accessibility of water (% of the municipal area covered)	80.00	66.67
Extent of metering (% of the total number of connections)	4.12	0.38
Cost of water supply (Rs per 1000 litres)[6]	2.70	4.30
Collection of water tariff (Rs per 1000 litres)	1.60	1.00
Subsidy to the water sector (Rs per 1000 litres)	1.10	3.30

[5] This has fallen to ½ hour every alternate day

[6] Includes only operating and maintenance costs

Service contracts

This type of contract requires a private operator to perform certain specific tasks such as billing and collection, meter reading, monitoring loss, repairing pipes, etc. The maximum duration of the contract could be, say, five years. By using this option, it is possible to take advantage of private sector expertise for performing technical tasks or even to open such tasks to competition. The public utility manager, under this option, has the responsibility for coordinating the tasks being performed by private operators, and the responsibility for investment would lie with the public utility manager. It is not possible to bring management expertise, improve operating efficiency and bring additional investment under this option.

BOT, BOOT, ROM

In a typical BOT (built-operate-transfer) option, a private operator would be required to perform specific tasks, maintain the same for a certain period, and at the end of the period, relinquish all rights to the public utility. The private operator would get the price calculated over the life of the contract to cover its construction and operating costs along with a reasonable rate of return. The period of this kind of contracts varies between approximately 10 to 30 years. A related concept is ROM (rehabilitate, operate and maintain) wherein the private operator provides necessary investment for rehabilitating the water system, and sells its services to a public utility manager according to the terms and conditions of the contract. This option allows the bringing in of management expertise to some extent (Table 3.1). Commercial risk as well as investment risk remains the burden of the private operator.

Management contract

This option transfers the responsibility for the operation and maintenance of the existing system to a private operator. The public utility is responsible for rehabilitation and new investment. The contract lasts for a period between three to five years approximately. The private operator receives a fixed fee or fees, which could be related to various performance parameters. This option could bring technical and management expertise to the sector and to some extent improve operating efficiency, while generally there would be no investment in the bulk or investment in the distribution segment of the water system. The commercial risk as well as the investment risk remains with the public utility.

In sum, depending on the PSP options, benefits would vary. The extent of variation of such benefits has been summarized in Table 3.1. Each country has to adopt its procedure and choose options depending on varied circumstances. In addition, the extent of stakeholders' support and necessary political commitments would determine the best possible option. Such details have been summarised in Table 3.2.

Table 3.2 Stakeholder support and political commitment under various private sector participation options

Option	Stakeholder's support and political commitment
Service contract	Low
Management contract	Low to medium levels needed
Lease	Moderate to high levels needed
BOT	Moderate to high levels
Concession	High levels
Divestiture	High levels

Source Cowen (1997)

Indian experience

There has been very little in terms of private sector participation initiatives in the water sector in India. Even the initiatives that have taken place, have been confined to discrete functions and to more primitive forms of PSP as in management and service contracts. However, the Tirupur project in Tamil Nadu is being developed on a BOOT model. In Karnataka also, the BOOT option is being explored for various activities in the water sector.

Management contracts

In Tamil Nadu

Sourcing of water in Chennai

In Chennai, the Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB or Metro Water) has entrusted the operation and maintenance of 29 borewells in two aquifers, namely, Tamaraipakkam and Poondi, to a private contractor. The operating personnel are provided by the contractor. Also, the contractor is responsible for minor repairs. However, the power costs are met by Metro Water. It has been estimated that the cost saving for the Board from this arrangement is about 56 percent.

gradually reduced in spite of increase in inputs costs like diesel prices due to the intense competition in the sector. An average of 18.5 percent savings has been estimated through this initiative.

Build-Own-Operate-Transfer (BOOT)

Tirupur project in Tamil Nadu

Tirupur is a leading industrial township in India and has a strategic importance in the domestic cotton knitwear industry. From home-run cottage industry in the early 1960s, Tirupur has emerged as India's leading knitwear export centre. Despite its growth and unique position, the industry faces constraints in infrastructure. Water, an essential input to the bleaching and dyeing process, is in short supply. In addition, Tirupur lacks adequate roads, transhipment facilities, power, telecommunication and urban infrastructure facilities. The local knitwear industry made a representation to State government with regard to severe infrastructure bottlenecks in the region. The State government drafted out the Tirupur Area Development Program (TADP). While TADP covers a number of infrastructure areas, the first phase would essentially relate to water supply, wastewater and industrial effluent treatment. It was also recommended that a Special Purpose Vehicle (SPV) be set up to implement the project on a commercial basis. Accordingly, an SPV known as the New Tirupur Area Development Corporation Limited (NTADCL) has been formed. It has been promoted by the Central Government, the State Government, IL&FS (Infrastructure Leasing and Financial Services), and the local industrial association.

The project is being developed in a BOOT format, that is, NTADCL executes and operates the project during the concession period. The ownership of the project lies with NTADCL during the concession period. The project is an integrated water sector project and envisages the following activities.

- Establishment of bulk water supply system for abstraction and treatment of raw water from Cauveri river, and distribution to bulk industrial consumers, Tirupur Municipality (TM) and four villages enroute
- A water distribution system to store and distribute treated water to domestic and industrial consumers within the jurisdiction of TM
- A sewage collection, treatment and disposal system for the TM, including on-site sanitation facilities (for the slum areas)

Table 3.3 Extent of participation in PSP-National experience

Option	State	Operation	Management	Investment	Ownership	Duration
Management contract	Tamil Nadu	Q	Q	P	P	0.5 -3 years
Service contract	Tamil Nadu	Q	P	P	P	1-3 years
BOT	Tamil Nadu	Q	Q	Q	R	30 years

International experience

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 (The World Bank 1998), are some international examples of PSP.

Management contract

The Government of Trinidad and Tobago opted for a management contract (Table 3.4) of 3 to 5 years as a preliminary step for adopting a full fledged concessional agreement in subsequent years in the water sector. First, it found it difficult to amend the existing law in a short time frame, in addition to requiring political commitments for PSP through the latter option. Second, it did not have enough information on the asset infrastructure relating to the water and sanitation sector. Third, it did not have an efficient regulatory capacity to develop an effective tariff setting mechanism as well as monitor and implement the complex concession contract. The government, therefore, adopted, as an interim arrangement, the management services contract for operations and maintenance of the water supply and sewerage system as well as for meeting additional investment targets in the sector. As a part of the long-term plan for introducing concessional contracts, it wanted private operators to collect necessary information for developing a tariff mechanism during the interim period. The other details may be seen in Volume II (Annex I) of the Report.

Concession

In Argentina, prior to introduction of private sector participation in the water and sanitation sector, the government adopted market-oriented reform programmes and privatized the ownership of many government enterprises in sectors such as electricity, telecommunications and gas. Therefore, the government's efforts in introducing sectoral reforms in water and sanitation sector came as a natural corollary to its commitment to the privatization process in the country. However, performance of this sector managed through public

- *Management Contract / Service Contract.* Individual treatment plants or pipeline operation could be conducted through a service contract with a private operator.

However, the Gujarat Act No. 11 of 1999 (GID Act) provides for the following options for initiating private sector participation (Table 4.1).

Table 4.1 Options for private sector participation

Build own operate and maintain	Build and transfer
Build lease and transfer	Build operate and transfer
Lease management	Rehabilitate own operate and maintain
Supply operate and transfer	Joint venture

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. There has been some degree of private sector involvement in the water sector in some areas. However, this has taken place only in some discrete activities in the water cycle and has been limited to only management and service contracts.

One of the oft-quoted reasons for not initiating private sector involvement is the enormous gap in the demand and supply of water. The argument here is that private operators would not involve themselves in this sector unless they are allowed to operate on commercial principles. Also, since water is such a scare resource in the region, and given the universal service obligation issues in the water sector, it would be difficult to ensure social acceptability and political will for commercialising this sector in the region. Nevertheless, it is important to recognize that given the criticality of the demand-supply gap in the area, and the consequent investment requirements, private sector involvement would result in additional investments in this sector.

Gujarat State Drinking Water Infrastructure Company Ltd

The Gujarat State Drinking Water Infrastructure Company Ltd (GSDWICL) has identified some projects for the purpose of construction of the bulk distribution network for the Sardar Sarovar scheme. These are proposed to be executed with substantial private sector participation. The following three models have been proposed by GSDWICL for these projects.

- GSDWICL becomes the developer of the project and also executes it by sub-contracting the project. The post execution management of the contract is carried out by a private party. The advantage here is that the project

resources for irrigation purposes. The number of tubewells owned by GWRDC is less than 3000 forming under 10 percent of the total number of tubewells in the state.

Given the marginal share of GWRDC in the groundwater sector in the state, it is recommended that GWRDC be completely privatized, either by transferring the tubewells to farmers co-operatives, or by divesting it to the private sector.

Department of Narmada, Water Resources and Water Supplies-managed river based projects

Apart from the Sardar Sarovar project, all other river based water projects are owned and operated by the Department of Narmada, Water Resources and Water Supplies. Just as in the case of the Sardar Sarovar project, these projects should also be operated on commercial lines and each project should be made into a profit centre. If the State government feels the need to subsidise any segment, then this subsidy should be explicitly accounted for in the operation of these projects.

Transmission of water

Gujarat State Drinking Water Infrastructure Company Ltd

For the purpose of transmitting drinking water from the Sardar Sarovar based Narmada Main Canal, the GSDWICL was been formed. This company is responsible for laying down the pipeline network for the bulk supply of drinking water, and the subsequent operation of the same. Apart from the SSNNL, the company can purchase drinking water from any other source.

As mentioned earlier, the company is exploring various project execution options including joint ventures and build, lease, manage, transfer formats. Given the size of the project, some governmental support would be necessary. However, it is recommended that GSDWICL should not rely completely on budgetary support for executing the project. The option of identifying a strategic partner and setting up a joint venture for executing the project should be examined for obtaining private sector funds. The continued role of the government in the sector to supplement private investment in the short term, through such joint ventures would ensure that the development of the sector is not impeded by the lack of funds.

could be collected during the process of building or rehabilitating. This kind of a process would also require substantial social acceptance and political commitment, which would need to be developed over a period. Again, as in Karnataka, the consumer base would have to be adequately large. Finally, a commercial rate of return and a stable regulatory framework would have to be ensured to attract private capital.

Management and service contracts

For local bodies that are not very large, sustaining commercial operations throughout the use of private entities can still occur if management and service contracts are given to the private sector in discrete activities like operation of pumping stations and water treatment plants, billing, etc.

This option should be considered by all local bodies wherever it is not possible to introduce private sector participation in any of the other suggested modes. We especially recommend this route for the municipalities and some of the smaller municipal corporations like Rajkot, where the water supply situation is critical and it might be difficult to build support for PSP.

Caveat

Although some options for commercialising operations in the water sector have been suggested, the financial sustainability of each option will have to be assessed with a view to determine the extent of financial support that may continue to be needed from government. It is recommended that an assessment of the financial sustainability may be done before any option is operationalized.

In Gujarat, the water supply function was vested with the local bodies even before 1993. For instance, in the case of municipalities, the Gujarat Municipalities Act of 1963 says that it shall be the duty of every municipality to make reasonable and adequate provision for the following matters within the limits of the municipal borough, namely obtaining supply or an additional supply of water, proper and sufficient for preventing danger to health of the inhabitants from the insufficiency or unwholesomeness of the existing supply, when such supply or additional supply can be obtained at a reasonable cost. Similar is the case with city corporations which are responsible for ensuring water supply to consumers under the BMPC Act 1949. Thus, no need was recognized to incorporate any changes in this function of the local bodies guaranteed under the existing acts in view of the Constitutional Amendment, 1993.

PSP in the water sector — legal barriers?

We examine the existing acts in order to ascertain the legal barriers, if any, for private sector participation in water sector in Gujarat.

Gujarat Panchayat Act 1993

Schedule I to the above Act outlines the responsibilities of the village panchayat. Under Schedule I at 1(a), it is the obligation of the village panchayat to provide water for meeting household needs. Similar responsibilities have been cast on the taluka panchayat and district panchayat. Thus, there is nothing in the Act which prevents these bodies from arranging water supply in their areas through any persons' including private entrepreneurs.

Gujarat Municipalities Act 1963

Section 65 (1) says, 'A municipality shall be competent to enter into and perform all such contracts as it may consider necessary or expedient in order to carry into effect the said provisions and purposes'. Any such contract is, however, subject to the approval of the municipal authority. Thus, it is possible to provide water supply in municipal areas through any person including private entrepreneurs.

The Bombay Provincial Municipal Corporations Act 1949

Section 189 relating to water supply stipulates that for the purpose of providing the city with a supply of water proper and sufficient for public and private purposes, the commissioner may–with the approval of the corporation–enter

and Pipelines (acquisition of rights of user in land) Bill 2000 stipulates that government can issue necessary notification for acquiring the right of users, which may be necessary for transport of water in public interest. Upon such notification, a corporation[11] can take the necessary action for laying pipelines for transportation of water in its areas of operation. Thus, the Bill[12] allows a private developer (who should be qualified under the definition of a corporation as indicated in the Bill) to take necessary action in performing his duties in relation to water supply in the concession areas.

In sum, there is no legal barrier to private sector participation in the water sector in Gujarat. All forms of PSP, as described in Chapter 4, can be adopted in Gujarat, and can be implemented within the existing laws.

[11] 'Corporation' means anybody corporate established under any Gujarat Act and includes: a company formed and registered under the Companies Act, 1956; and a company formed and registered under any law relating to companies formerly in force in any part of India.

[12] The Legislative Assembly of the state of Gujarat passed the Bill on March 8 2000.

that may rise. Where tariffs and relevant factors cannot be unambiguously set out, there would be a need for mid-term reviews. This strengthens the case for an independent regulatory framework.

Water consumers constitute a large proportion of voters, and water services are perceived as essential function of the Government or local bodies, and should be given free of cost. These considerations often compel many public authorities to advance short-term political objectives rather than long-term interests of consumers. Investors are also aware of this type of pressure as well as the consequent vulnerability of their long term and immobile investment. If there is weakness in the credibility of the commitment to regulatory contract, the private entrepreneur deflects such risk by increasing the cost of capital. This is then reflected in higher tariffs, which goes against the interests of the consumer. Therefore, the need for credible commitment to the contractual obligations over the entire contract period is paramount while introducing PSP in the water and sanitation sectors. An independent watchdog can provide such commitments to regulatory contract.

As Governments or their instruments or local bodies would continue to be major stakeholders in the water sector, the authority which aims to balance the interests of various stakeholders, including the Government or local bodies, has to be independent of the Government or local bodies. Independence in the context of regulation means that the authority with the 'expertise' should have all the attributes of autonomy so that it can apply its expertise in accordance with the mandate and subject only to its charter as laid out in the instrument through which it was set up and the laws of the land.

Regulatory framework – international experience

Our study of countries such as United Kingdom, Argentina, Chile, Bolivia, and Trinidad and Tobago (For details, see Volume II) showed that these countries have created an enabling framework in the context of private sector participation. The extent of regulatory oversight has been summarised in the Table 6.1. It clearly shows that such oversight has to increase as one adopts a higher degree of PSP. For instance, the regulatory oversight should be greater as in the use of the divestiture option as in UK, where the Water Regulator (called OFWAT) has the authority to modify licenses, regulate water tariff, promote competition, ensure quality of service, review investment plans, etc. On the other hand, in the case of the management contract operational in Trinidad and Tobago, the regulator has only a tariff-setting function. In the use of the concession mode such as in Argentina, the regulator (called ETOSS) determines

Metro Water

With respect to management contracts and service contracts in Chennai, Metro Water, as a regulator and operator, performs certain functions. These are indicated in Table 6.2. It is chaired by a political person. Its regulatory oversight extends over the contracts it awards.

Table 6.2 PSP and the extent of regulatory oversight- Metro Water

Regulatory agency	Regulatory functions
Metro Water[15]	▪ Tariff determination ▪ Licensing / awarding contracts to private operators ▪ Monitoring compliance with the terms and conditions

Tirupur

As stated in Chapter 3, under the BOOT form of PSP, a regulatory framework for certain functions exists in the form of an Independent Auditor, an Independent Engineer, and a Charges Review Committee. Their functions are detailed in Table 6.3. A detailed case study of the project is presented in Volume II (Annex E) of the report.

Table 6.3 PSP and the extent of regulatory oversight - Tirupur

Entity	Function
Independent Auditor	Carry out periodic review of the financial terms of the concession agreement and certify the same. Furnish data to the Charges Review Committee
Independent Engineer	Carry out periodic review of the compliance with technical requirements, performance standards, and costs of construction, operation and maintenance of the facilities, establish the methodology of estimation of transmission losses, monitor the transfer of facilities, and review the overall progress of the project
Charges Review Committee	Regulate changes in tariff required besides those provided for in the concession agreement

Regulation of tariff – Charges Review Committee

The Concession Agreement (CA) in Tirupur provides an option to the concessionaire to charge for water supply and sewage disposal facilities. The formula for tariff determination is spelled out in detail in the CA. Additionally, a Charges Review Committee has been constituted to regulate changes in the tariff structure and revisions that may be required due to events beyond the control of the concessionaire. The committee has representatives from the concessionaire and the State Government, and is presided over by an independent judge. The

[15] Metro Water is a regulator as well as operator in its areas

Instituting a regulatory authority

In India, with the reforms and liberalisation of the economy starting around 1991/92, the power and telecom sectors were thrown open gradually to private investment and competition. In 1991, the telecom sector was opened up with private investment being permitted in the manufacture of telephone equipment. Value-added services were thrown open for private investment in 1992. Private sector participation by way of leasing port facilities, in the ports sector, was permitted in 1994 and investment in the creation of new facilities in the existing ports or establishment of new ports in 1996. However, the need to regulate the entry objectively, and to establish a regulatory framework based on which private investment could be forthcoming, was not fully understood. Therefore, regulatory reforms were not contemplated as part of the initial reform process in these sectors. Instead, regulatory reforms were brought in much later. In the port sector, a decision to set up a tariff regulatory authority was, however, announced as a part of the policy statement in 1996, although it was implemented only in 1997. Only in the case of insurance sector, did the positioning of an autonomous regulator precede the introduction of the sector restructuring process.

In the water sector in Gujarat, there are at least two reasons why the regulator should be in place even before private sector participation is initiated in the sector in a substantial way. First, there is a need to improve the operational efficiency of the water supply service providers by aligning the cost of supply with the tariff. This would make the operation of these services more sustainable and eventually more attractive to the private sector. Secondly, there is need to set standards of service, and enforce the same. The regulator should be able to take an independent view of this. Given the above experiences, it is desirable to position the WRA in Gujarat, before the water sector is opened to PSP.

Recommendation 2

Before the water sector in Gujarat is opened to PSP, the Water Regulatory Authority should be constituted.

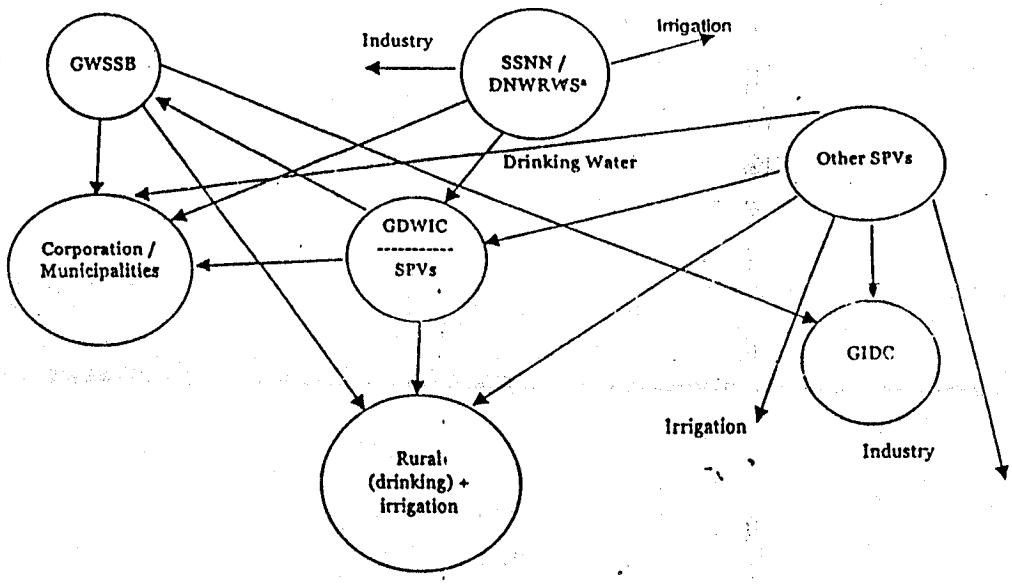

Figure 6.1 Structure of water services in Gujarat

*Department of Narmada, Water Resources and Water Supply

The owners and suppliers of surface water are a) SSNN (Sardar Sarovar Narmada Nigam) and b) DWR (Department of Water Resources) whose area of operation extends over the entire state of Gujarat. Ground water is extracted by many local bodies[16], private individuals, and the Department of Water Resources (through Gujarat Water Resources Development Corporation Ltd.). There are SPVs or other agencies who own transmission (or conveyance) networks for the bulk supply of water in Gujarat (Figure 6.1). For instance, GSDWICL (Gujarat State Drinking Water Infrastructure Company) will be sourcing water from sources such as SSP (Sardar Sarovar Project) or Mahi river, and conveying the same through its network to bulk consumers over the entire state. These companies have monopoly characteristics in the water market. Further, the distribution segments of the water delivery system in the local bodies are monopolies. Similar is the case with SSNNL (Sardar Sarovar Narmada Nigam Ltd.), which is capturing the water, conveying the same and selling water in bulk for irrigation as well as non-irrigation purposes. The Department of Water Resources also is a service provider with monopoly characteristics in the water market in the state of Gujarat.

[16] Local bodies include city corporations, municipalities, village panchayats

Regulation of water tariff (or charges) as applicable to these monopoly service providers should be one of the primary functions of the WRA. In effect, the WRA would need to regulate the

1) Tariff for bulk water
2) Tariff for retail water

However, it has been suggested by the Government of Gujarat officials that tariff regulation by an independent authority at the initial stages may not find favour with most stakeholders. There is concern that tariff regulation, based on the principle of full cost recovery would meet with stiff opposition from the public and thus might be politically unviable. Thus, a more gradual approach in introducing tariff regulation is suggested. Therefore, in **Phase I** of the regulatory process, the regulator should concentrate upon laying down the tariff principles, and their enforcement should be the prerogative of the State Government. The duration of Phase I should be decided by the Government, but should not ideally exceed three years.

In the **Phase II** of the regulatory process, the regulator should regulate the tariff; bulk as well as retail. However, while it would be desirable for the WRA to regulate the charges for retail water, it may not be feasible, or practicable, even during Phase II of the regulatory process, upon considering that the numbers of local bodies responsible for water supply are too many[17]. In these cases, it is, however, possible for the WRA to suggest principles for determination of water tariff. Such principles should be taken into consideration by these local bodies at the time of fixation of water charges in their areas.

Recommendation 4

The WRA should frame principles for determination of tariff for water services in Phase I. In Phase II, the WRA should regulate bulk and retail tariff.

Private sector participation

Under the existing acts[18], the various bodies such as corporations, municipalities, GWSSB, or Panchayats are authorised to contract, if required, water supply functions to any person including private operators (Chapter 5). The GID Act also authorises the GIDB to recommend the terms and conditions

[17] There are more than 220 urban centres including 6 city corporations

[18] Such as GID Act, 1999; BPMC Act, 1949; Gujarat Municipalities Act (GMA) Act, 1963; Gujarat Act (GA) No. 18 1979, Gujarat Panchayat Act (GPA), 1993

Corporation) in respect of 'poor self-employed women' (Box 6.1) suggests that there is a need to improve quality of services in such areas.

Box 6.1. Reports Cards

A number of efforts using "report cards" have been undertaken in India to establish and monitor public opinion with respect to the delivery of public services. Report cards are a method of measuring public opinion in a structured way using household sample surveys, focus group discussions, case studies, and documentation of information from service providers and interviews with a sample of the lower-level staff of the agencies. The cards attempt to assess, rank and benchmark the following parameters: overall satisfaction with service delivery; the extent and coverage of services; patterns of emerging problems; the response of agencies to reported problems and grievances; and the effectiveness of bribes ('speed money') in rectifying reported problems.

These studies have generally found that

- Administration of public services is uniformly low across most cities
- Supply shortages are often man-made and information is manipulated for personal gain
- The popular belief that public services are cheap is a myth, when full account is taken of the real financial and economic cost of service provision.

The findings also suggest that

- Improvements in service delivery and consumer satisfactions can be improved at reasonable costs
- Consumers are willing to pay more for improved and reliable services
- Consumers' active role in the planning and monitoring of public services is essential, and
- Non-responsiveness of urban water supply and sewerage services (and other public services) is directly linked to their monopolies status

Source The World Bank (1998)

Quality of service comprises of water quality as well as standards of service to customers. With respect to quality, GWSSB and urban local bodies in Gujarat follow water quality standards as laid down by WHO and BIS. There is no specific provision in the existing legislation which mandates the service providers to lay down and enforce water quality standards. There is, thus, a need to ensure that minimum standards of water quality are statutorily laid down and adhered to by different service providers.

Water quality has health and environmental implications and therefore, regulatory interventions would remain with the Government or its agencies even after private sector participation in the water sector. Since water is essential to life, and has to be provided to consumers with adequate quality, many countries such as UK have kept water quality control under the Government, so as to set and ensure proper water quality standards. In UK, because of pressure from the

framework for improving QOS to consumers has been recognised in many countries in the water sector. It is possible that WRA may take the existing QOS parameters as the base QOS to begin with, and then gradually revise the same for better services to consumers. Since the conditions in local bodies vary widely, the QOS parameters need not be uniform: the WRA may frame the minimum standards of services for all water utilities. Over time, these QOS parameters could be revised, if required.

Box 6.2. Private participation and the poor: International experience on service quality

Poor water quality leads to sickness. Unreliable supply increases the coping costs experienced by disadvantaged groups. Private management and finance can reduce these problems. In Puerto Rico, the private operator is required to comply with tough US environmental and drinking water quality standards, and is liable for large fines in case of default. In Trinidad and Tobago, the operator is paid a bonus for increasing the number of households with at least a 12-hour daily supply. Since private participation, Buenos Aires no longer suffers from water shortages in the summer months. In Manila, the concessionaires are required to comply with drinking water standards from the Corporation/Municipalities (and provide) uninterrupted 24-hour service throughout the city.

Source The World Bank (1998)

Recommendation 9

The WRA should lay down and enforce minimum standards of service to consumers. It should also monitor such standards through surveys.

Promoting economy and efficiency

Public service providers in Gujarat's water and sanitation services are not operating efficiently (Chapter 2). They suffer from many weaknesses: inadequate planning, inability to become financially solvent through proper user charges, lack of management autonomy and accountability, lack of consumer orientation, lack of better accounting and financial management, etc. In Chile, National Water Regulator takes steps for making the public service providers efficient and viable through better accounting and management practices and other measures. In UK, the regulator promotes economy and efficiency of the water companies. If the water sector runs inefficiently it would go against the consumer's interest. It is, therefore, necessary that measures are taken to improve the sector by improving its efficiency and economy of operation.

Advisory role

The requirements of water in Gujarat are met from ground water as well as surface water. Substantial quantity of ground water is extracted to support irrigation, industry, and drinking water requirements. This study noted the over-exploitation of ground water: ground water exploitation is more than recharge. There is a reduction in yields from tubewells, and general deterioration of the quality of ground water.

Schedule VII, List II (Entry 17) of the Indian Constitution says 'Water, that is to say, water supplies, irrigation and canals, drainage and embankments, water storages, and water power subject to provision of Entry 56 of List I'[23]. Unlike surface water, which is a public property, ownership of groundwater goes to the owner of the land above, and its use and disposition are governed by tenancy laws. Thus, the legal and absolute right of the ground water rests with the owner of the overlying land. This kind of right has implications for accessing water as well as distribution of benefits from the use of such water. By virtue of this right, many farmers lay a disproportionate claim over the resources, than others, with the use of higher pumping capacity and deeper tubewells in the field. With regulatory restrictions practically non-existent in Gujarat, excessive withdrawals of water from many areas has reduced the sustainability of ground water stocks and supplies. The existing rules (for example, rules used by the State Electricity Boards for electric connections for pumpsets for farmers) are unable to control resource depletion and ecological degradation in the State. We understand that the Government is yet to consider and adopt the 'model groundwater Bill' in this regard.

Comprehensive management on a river-basin basis, conjunctively for both groundwater and surface water and incorporating both quality and quantity aspects of water, are often ignored. There is no single authority in Gujarat which looks into the use of surface water and ground water as a whole. There is no water use policy in Gujarat[24]. The Government of Gujarat should call for a report of annual water use from the WRA. Further, the WRA should also monitor such use by local bodies.

Sustainable development[25] through integrated management of water services available in various forms have to be recognised. The role of the WRA

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[23] List I (Union List), Entry 56 says "regulation and development of inter-state rivers and river valleys to the extent to which such regulation and development under the control of the Union is declared by the Parliament by Law to be expedient in the Public Interest".

[24] Which should include the use of surface water as well groundwater

[25] Sustainable development is such development that meets the needs of the present without compromising the ability of future generations to meet their needs

sectors were to be separated, there would be considerable overlap of the regulatory activities between the regulatory agencies in the two sectors. Hence, it is recommended that the scope of the WRA should be expanded to include the sewerage sector also. The timing of assigning such functions may be determined by the Government.

Recommendation 15

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

Summary of functions to be performed by the Water Regulatory Authority

In sum, the Water Regulatory Authority (WRA) should have the following functions:

a) The regulator should frame principles for determination of tariff for water services[27].

b) There should be a minimum standard for water quality and service to be provided by various service providers to their consumers. The WRA[28] should lay down and enforce minimum standards. It should also monitor the above standards through surveys.

c) Promote economy and efficiency in the water supply services in Gujarat.

d) Facilitate competition in water sector in Gujarat.

e) Adjudicate disputes and differences amongst various service provides or / and between a service provider and a group of consumers.

f) Recommend generic terms and conditions of the new concession agreements in water sector.

g) Recommend terms and conditions of a specific concession agreement if required by the Government.

h) Should monitor terms and conditions of all new concession agreements between developers[29] and local bodies in water sector.

i) Aid and advise the Government for developing a Water Use Policy for Gujarat, and monitor such annual water use.

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[27] In Phase II of the regulatory process, the WRA should also regulate water tariff as discussed in the earlier sections

[28] If the Government intends to assigns this function to the WRA. For details see recommendation 10

[29] Developer is defined under GID Act 1999

expenditure without the Government's prior approvals and, finally, criteria for removal.

There are different approaches being adopted across the world on the issue of an effective selection process. The executive and the legislature jointly decide the appointment of regulators in countries like USA. In Argentina, ETOSS members are nominated (Table 6.4). In the UK, the executive selects the water regulator. In India, in the power sector like in Gujarat, a committee[30] prepares a panel of names of regulators at the first instance for consideration by the executive. In the India's telecom sector, it is left to the executive to appoint the regulator. Ideally speaking, a regulator should be chosen through a transparent process for attracting the best available expertise in the field. A committee may prepare a panel of names and, the appointment of members of the regulatory authority is made by the Government.

On the question of constitution of a regulatory authority, many countries entrust the decision-making authority to a commission of three to five members while others prefer a single individual. Each system has its own advantages and disadvantages. In India, there is a general consensus for a multi member regulatory authority. For example, in the power sector in Gujarat, the GERC (Gujarat Electricity Regulatory Commission) has three members, while the CERC (Central Electricity Regulatory Commission) at the national level has five members.

Common qualifications for selecting members of a regulatory authority include sufficient experience in economics, finance, law, administration, or industry. In a multi-member authority, not more than one member should be drawn from any one category. Similarly, criteria for disqualification should include an interest in the regulated firms, as this could lead to a conflict of interests between the regulator and the stakeholders. Further, commercial employment in the relevant industry should be prohibited once a regulator completes his or her tenure in the regulatory authority. In Chile (Table 6.4), there are no restrictions on regulators being employed in the regulated utility. But, the regulated entities in Chile are mostly State-owned companies with low salary structure that can offer low incentives. However, with more private operators in the water sector, the regulatory 'capture' in Chile cannot be ruled out.

In most countries, members of a regulatory authority enjoy fixed but staggered tenures. However, the issue whether the regulator should be eligible

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[30] Under the Electricity Regulatory Commissions Act 1998 (Section 18 (1)) enacted by the Government of India

funding a regulator through a 'charged' budget has not eliminated the interference of the executive, a case lies in setting up a 'Regulatory Fund' for the regulatory authority. The fund can source grants from the Government in the initial stage and fees thereafter. There should be a cap on the levy fees, which may be fixed by the Government.

Table 6.4 Regulatory autonomy - International experiences

PSP option	Country	Regulatory agency	Features for regulatory independence
Management contract	Trinidad & Tobago	PUC [a] (Govt.)	• Regulator placed within the Government
Concession	Buenos Aires	ETOSS [b] (Independent)	• Members nominated from Presidency, Provinces and Municipalities of Buenos Aires • Funding depends on the revenue of the regulated entity
Concession	Chile	SSS [c] (Independent)	• Law does not place any restriction on who could hold top executive position • Law does not place any restriction on re-employment, even to regulated entities • Professional staff enjoy salaries more than civil service staff salaries
Concession	Bolivia	SDA [d] (Independent)	• NA
Divestiture	England & Wales	OFWAT [e] (Independent)	• Appointed by the Government for a fixed term. Eligible for reappointment. An independent single-member body

[a] - Public Utilities Commission; [b] - Ente Tripartite de Obras de Servicios de Saneamiento;
[c] - Superintendent of Water and Sewerage Services; [d] - superintendencia de Aguas; [e] - Office of Water Services

Recommendation 16

1. The WRA should consist of three members. The Chairman and Members of WRA should be selected through a Search Committee. The Search Committee should be chaired by the following members.

- Chairman of the Gujarat Public Service Commission, who should be the Chairman of the Selection Committee
- Secretary in-charge of Urban Development
- Senior most Secretary in the Department of Narmada, Water Supply, and Water Resources, as the Convenor of the Committee

5. The authority shall have its own fund and all receipts of the authority, including grants from the State Government, should be credited 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 control.

7. The WRA should be advised by an Advisory Committee. The composition of the Advisory Committee should be determined by the WRA in consultation with the Government of Gujarat, and it should include interests of local bodies in addition to representing interests of industry, agriculture, labour, consumers, non-Governmental organisations, academic, research bodies in the water sector. The functions of the Advisory Committee shall be to advise the WRA on major questions on policy, on matters relating to tariff and quality of service, matters relating to protection of consumer interests and overall standards of performance of service providers.

Regulatory accountability

If a regulator is made autonomous, it must be accountable for its actions. It should not be seen to protect the interests of only certain groups. It should balance the interests of stakeholders in a fair manner. Clear rules, an open regulatory process, and decisions with reasons can alone ensure this. The stakeholders must be given the opportunity to present their views; the regulatory decisions must be published, and the reasons for such decisions clearly stated; and it should be possible to appeal against the regulator's decisions.

This would imply that the regulatory process should be such that all potential stakeholders are aware of the regulatory process and have an opportunity to present their views freely and frankly. Regulatory legislations in India's electricity sector (including Gujarat) have mandated that the regulators shall ensure transparency while exercising their powers and discharging their functions. If there is no transparency in the decision-making process, the credibility of the regulator is lost. Argentina's water regulator faced these problems as it did not have a transparent regulatory process.

These are two distinct approaches being followed in the regulations. A quasi-judicial approach is followed in all the proceedings of the electricity regulations in India, while the process is consultative (in cases other than dispute

Table 6.5 Accountability parameters - international experiences

PSP option	Country	Regulatory agency	Accountability parameters
Management contract	Trinidad & Tobago	PUC [a]	• Decision making process quasi-judicial
Concession	Buenos Aires	ETOSS [b]	• Lack of transparency in decision making process • Judiciary can hear an appeal for any conflict between a regulator and the regulated entity. But Judiciary is vulnerable to political influence • Ad hoc nature of intervention by executive branch of the Government
Concession	Chile	SSS [c]	• Regulatory process transparent and decision making rule-based • Appeal to regulator on dispute regarding tariff within 30 days. If it fails, a panel of three arbitrators decides within 37 days. Decisions can be appellable to court
Concession	Bolivia	SDA [d]	• Decisions of SDA is appellable to General Superintendency, a supervisory body for all sectoral regulators
Divestiture	England & Wales	OFWAT [e]	• The decision of the regulator is appellable to competition commission • Report of the regulatory activities be laid down annually before the Parliament • Decision making process consultative

[a] Public Utilities Commission; [b] Ente Tripartite de Obras de Servicios de Saneamiento;
[c] Superintendent of Water and Sewerage Services; [d] superintendencia de Aguas; [e] Office of Water Services

Recommendation17

- The authority should ensure transparency during the regulatory process.
- The WRA should undertake judicial proceeding only 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 a High Court or a Tribunal in Gujarat with quasi-judicial powers.
- The authority[31] 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.

[31] Authority and WRA have been interchangeably used.

Table 6.6 Powers of regulators - international experiences

PSP option	Country	Regulatory agency	Powers of Regulators
Management contract	Trinidad & Tobago	PUC [a]	• NA
Concession	Buenos Aires (Argentina)	ETOSS [b]	• Fines up to $100,000 on failure to provide requested information and reports • Fines of $500,000 on failure to supply services or meet quality standards and violation of tariff rules • Fines ranging from $100,000 to $1 million for delay in fulfilment of agreed five-year investment plan
Concession	Chile	SSS [c]	• Fines can be imposed for failure of submission of regular information to the regulator • Fines up to $80,000 for providing false information • Fines up to $50,000 for providing poor quality of water
Concession	Bolivia	SDA [d]	• Can impose fines for non compliance

[a] Public Utilities Commission; [b] Ente Tripartite de Obras de Servicios de Saneamiento;
[c] Superintendent of Water and Sewerage Services; [d] superintendencia de Aguas; [e] Office of Water Services
NA - Not available

Recommendation 18

1. The WRA should have adequate power to ensure compliance of its order and 'directions'. If these are violated, there should be adequate punishment.
2. If an offence is committed by a company, then the person in charge for the conduct of the company would be liable.
3. The Authority shall, for the purposes of any inquiry, have the powers of a Civil Court while trying a suit, in respect of the following matters, namely a) summoning and enforcing the attendance of any witness and examining him on oath, b) requiring the discovery and production of any document or other material object producible as evidence, c) receiving of evidence on affidavits, d) requisitioning of any public record or a copy thereof from any court or office, e) issuing commissions for examination of witnesses or documents, f) reviewing of its decisions, directions and orders.
5. The provisions of the Code of Criminal Procedure, 1973 relating to searches shall apply so far as may be to the search made. The authority may call upon the specified Government Company or any person to furnish to the authority

Recommendation 21

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 are determined.
- Any other matter which is to be specified for carrying out its activities.

(Gujarat State Water Infrastructure Development Company Limited), it will be necessary to establish a scheme for bulk pricing.

The following role for the WRA has been (details are available in Chapter 6) suggested for the purpose of tariff determination.

Regulator's role

It is suggested to phase-in the role of regulatory body into two distinct phases which will be sequential. During the first phase, the focus will be on development of regulatory capacity and in undertaking the basic tasks essential for full-fledged regulatory intervention in the second phase. This phasing process is provided to ensure smooth transition while simultaneously maximizing the economic gains. The Phase I will last three years and the role of regulator under this phase is defined as follows.

Phase I: Development phase

This phase will start from the date of creation of the regulatory authority and vesting of power in it to determine the tariff. During this Phase-1, the regulatory authority will

1. Prescribe the principles to be used for tariff determination. This will be done through a transparent and participatory process.
2. Conduct cost of service study to assess the extent of subsidy and cross-subsidy in the prevalent tariff structure.
3. Formulate a plan in consultation with the State Government to optimize the subsidy requirement and the delivery mechanisms.
4. Rationalize the retail tariff, in the areas indicated by the Government of Gujarat, to meet all justified expenditure on operation and maintenance within the Phase I. The operation and maintenance (O&M) expenditure would include the cost of repair, maintenance, administrative costs and the employee costs. This would imply that from the existing level, the tariff would be increased to cover 100% of the justified O&M expenditure within three years of Phase I. It is suggested to phase the increase as 50 percent, 25 percent and 25 percent in year 1, year 2 and year 3 respectively. This rationalization would be done on the basis of information provided by the utilities.
5. Develop skills and expertise to undertake detailed regulatory reviews and issue orders in a transparent and efficient manner.

In the context of Gujarat, the design of the pricing regime will involve political, social and economic challenges. Among these, the most important would be political willingness and commitment towards reform. Further, it would require legislative changes to ensure smooth transition and functioning under the new environment.

The proposed regulatory framework (as discussed in Chapter 6) would involve devolution of tariff-setting to an independent regulator to meet the objectives of improving efficiencies and to bring about transparency and objectivity in the process of tariff determination. This is necessary to provide comfort to the potential investors about commitment to reform. The scope and role of the regulator vis-à-vis the government and the municipal bodies would need to be determined.

Review of the existing price regime

The pricing of water in Gujarat is currently under the purview of the government and the municipal bodies. These include Municipal Corporations in the six urban areas of Ahmedabad, Vadodara, Rajkot, Jamnagar, Surat and Bhavnagar, the municipalities (serving some of the other urban areas) and the Gujarat Water Supply and Sewerage Board and other local bodies. Specific powers have been provided to these bodies through the existing legislation to determine the price at which water will be supplied.

There are primarily three ways in which the pricing of water is currently done. These are:

- through a tax assessed on the basis of rateable value (determined on the basis of market value of land, age of the building, type of building, etc.) of a building or property.
- on volumetric basis by measurement of actual consumption (using meters) or based on the assessed consumption calculated from the size of connection.
- a flat rate levied as a minimum charge.

It is understood that most consumers in the State pay for water in the form of a tax or a minimum charge and less than 10 percent (an estimate[33]) pay based on the actual or assessed consumption. Such a system of pricing results in a number of distortions, which are discussed below.

[33] In Ahmedabad 4.0%, and in Rajkot 0.4%

higher than the actual cost of supply). More often than not, this results in exploitation of those with limited resources and capability to pay, thereby defeating the purpose of keeping the prices very low while at the same time generating undue profits for those with resources to exploit the situation.

Further, it has also resulted in over exploitation of the ground water resources for irrigation and commercial purposes. The over exploitation of ground water has on the one hand caused depletion of the water table and on the other resulted in increasing amounts of electricity being used for irrigation purposes (and resulting distortions in the electricity industry).

Price regulation in Gujarat

As stated earlier, investments in the water sector are characterized by large sunk costs and economies of scale. Further, access to water is often considered as a social goal and service. Since water is consumed by the population at large, water charges have been used as a tool for political mobilization by keeping prices artificially below the cost of supply.

Traditionally, investments in the sector have been financed by the governments. However, since the charges were not sufficient to cover the costs, it has been increasingly difficult for the government to fund new investment. This has resulted in low coverage and poor quality of service. Since the consumers are dissatisfied with such service, there is a strong opposition to increasing prices. They are however, generally, willing to pay for assured and good quality of supply[35].

Introducing private capital into the sector is a definite way to fund new investments and to improve the efficiencies. However, given the huge sunk costs and the opportunistic pricing policies, private firms need a firm assurance that they will be able to recover the investment and also able to cover reasonable operating costs.

The primary rationale for introducing an independent regulatory framework is to develop a mechanism to provide comfort to potential investors by limiting the government discretion in price setting. Creation of an independent regulator with power to set the tariff[36] is considered as the best possible means to assure the private sector of the Government's commitment to the introduction of a rationale pricing regime.

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[35] As evident from the purchases effected from the open market, generally at a high premium.

[36] Often in consultation with the Government

- That the tariff will be designed in a manner to promote an optimum level of consumption and avoid wastage of scarce water resources.

2. To secure the financial viability of the entities in the sector – meaning:
- The utility will be entitled to recover all reasonable costs incurred in operating and maintaining the water supply.
- The investors will be assured of recovering the capital costs including a reasonable rate of return on the investment.

3. To provide incentives for optimum investment – meaning:
- That the tariff structure and design will be such that it attracts the necessary investment to the sector.

4. The tariff should reflect the cost of supply of providing water – meaning
- That the consumers, to the extent possible, will pay according to the cost incurred in providing supply and service. Wherever the government wants a certain group of consumers to be subsidized, it will make a corresponding allocation from the State budget.

5. The tariff should be fair, just and non-discriminatory – meaning
- That the tariff would not discriminate against any consumer(s) so as to burden them with unjustified costs.

6. The tariff structure will be unbundled to reflect the cost of providing different services – meaning:
- To the extent possible, the tariff structure would be unbundled i.e., cost of providing different services will be shown separately.

7. That the tariff, to the extent possible, should be simple and easy to understand and implement.

Tariff design

As discussed above, the regulator will have the responsibility of determining the tariff for bulk and retail supply. This section discusses the recommended tariff design philosophy and the associated regulatory process.

The tariff structure should normally consist of two parts:

c. The bulk supply tariff should be designed as a two-part tariff consisting of a fixed charge and a variable charge. The fixed charge can be designed to recover a part of the fixed costs while the balance fixed costs can be recovered through the variable charge.
d. The variable charge should be linked to the actual metered consumption of water.
e. Tariff design should protect the financial viability of the utilities in case of reduced availability of water due to reasons beyond control and also allow for adjustments due to inflation.

Retail supply tariff

The regulator would determine the retail tariff in the areas prescribed by the Government of Gujarat and would prescribe the principles to be followed in case of other areas. It is suggested that the consumers may be categorized in three broad segments as below.

i. Domestic - comprising of households
ii. Public institutions - comprising of public services like educational institutions, hospitals, places of worship etc.
iii. Commercial - comprising of industries, office complexes, shops etc.

Following recommendations are made for the design of the retail 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. The relevant performance parameters could be the amount of water losses, number of employees per thousand consumers, water pressure, percentage of billing and collection etc.
c. All consumers should be charged on the basis of actual metered consumption. Wherever meters are currently not available, the consumers would be charged on the basis of assessed consumption estimated from the size of the connection. It would be ensured that sufficient incentives are provided through tariffs for consumers to opt for meters.
d. The tariff should comprise of two parts i.e., a demand charge and a variable charge[39].

[39] It may be noted that water as a commodity is not be charged. This is because of two reasons. One, estimating the economic cost of water supply would be difficult at present. Second, even other components in the cost of water supply, which are direct costs of supply as opposed to the economic cost of water, are currently not being recovered as part of the water tariff.

Step-2: Review of the tariff proposal by the Commission

The regulator would examine and analyze in detail the proposals submitted by the entities. The regulator would have the authority to ask for further information and also to require the utility to produce such documentary or other evidence, as it may consider necessary.

After being satisfied that all relevant information, as required, has been provided, the Commission shall require the entity to issue an advertisement in the newspaper calling for responses and comments from the public on the tariff proposal. Normally, the Commission will give approximately four to six weeks for inviting public responses.

The respondents to the tariff proposal are required to submit a copy of their comments to the regulator as well as to the concerned entities. Before the Regulator can take up the public hearings, the entities are required to prepare answers to the comments provided by the respondents.

Step-3: Public hearings

The regulator will conduct public hearings on the tariff filing made by the entities after receiving the responses from the public and subsequent replies from the concerned entity. The hearings provide a different sections of consumers an opportunity and a forum to express their views and concerns on the subject.

The regulator would have the authority to determine the stages, the manner, the place, the date and the time of the hearing, as it may consider appropriate. The public hearings can last for three to eight days depending on the number of respondents and the process adopted by the regulator.

The regulator would consult the Advisory Committee on the tariff proposal and would have the flexibility to consult the Government as a part of the public hearings or otherwise, before the award of the tariff order.

The tariff determination process should be consultative, rather than quasi judicial.

Step-4: Award of the tariff order

The regulator will, after taking into consideration the facts presented by the entities and the submissions made by the respondents and submissions during the public hearings, provide its ruling on the matter.

The regulator would have the authority to pronounce judgement at once after the hearing, or on some future date as may be practical. The judgement will have to be pronounced in an open court and shall contain counter statements of

not possible to determine the cost of providing water as also that of any other service.

A move towards cost-based tariff setting would necessarily entail information on the cost of supply. Hence, it is necessary that accounting procedures be geared so that the calculation of cost of supply is possible. This would obviously involve separation of the expenditure incurred as also the revenue earned from providing the supply of water.

The process of tariff determination by a regulator is a data intensive process requiring information of various aspects of utilities' operations. While the data requirements may differ on the basis of approach to be adopted by the regulator, efficient tariff setting without good data is not possible. It is also important to note that the availability of data would also influence the choice of approach for tariff determination. It is important that as part of the reform exercise, appropriate systems be put in place to ensure that the process of tariff setting is not distorted by lack of information and data. It is, hence, recommended that the utilities should be geared to meet the information requirements of the regulator. In this context, it would be appropriate to define a transition strategy and a long-term strategy charting out the steps required to achieve the required level of information systems.

Metering

As mentioned above, most of the consumers in the State are not metered and are charged on the basis of rateable value of property or a flat rate. Such tariff structure which does not take into account the actual consumption provides no incentive to the consumer to use the scarce resource in an optimum manner. Hence, such tariff is inherently inefficient and leads to distortions at two levels. One, it does not recover the cost of supply from a substantial number of consumers and two, it leads to waste and hence deprives other consumers of even the minimum needs.

It is recommended that the regulator is empowered to ask the utilities, under direct as well as indirect regulation, to prepare a detailed metering plan and update the regulator on the same on a regular basis metering of all consumers. Given the existing legal provisions, any move towards metering would require amending these provisions. These changes are discussed along with the discussion on other legislative changes required in Chapter 9.

IV. More than 60 percent of consumers are willing to pay additional monthly charges for additional water supply for four hours a day.

V. About 30 percent of the households desired to have a metered supply to their household.

While there are some indications from the above study that consumers would be willing to pay higher amounts, especially when supplied for longer hours and better quality of supply, it is difficult to arrive at conclusions from the same. This is so because of the following reasons.

a. The WTP would vary in different regions of the State depending on the economic parameters as well as the quantity and quality of water available.

b. The scope of the current study was limited to households only.

It is, hence, suggested that a detailed study covering different regions of the State may be initiated in order to assess the WTP among different consumer categories.

Conclusion

The pricing of water in Gujarat has been a function assigned to the municipal and local bodies. Under the existing structure, most consumers pay according to the rateable value of their property (or a flat rate) and the actual consumption is not measured. Such structure has resulted in a number of distortions, including promoting inefficient use and also raises questions of equity. The pricing has been a function of the social policy with little relation to the cost of supply. Further, given the accounting procedures and the information systems it is not even possible to calculate the cost of supply.

It has been increasingly difficult for the municipal and the local bodies to fund new investments. The Government of Gujarat has, hence, envisaged a role for the private capital in the water sector. Such a trend is visible in a number of countries as also in some parts in India, notably in Chennai, Tirupur and Bangalore.

Attracting private capital would, however, require legal as well as institutional changes. The primary requirement would be to set up an independent regulatory body with authority to determine tariffs. It is recommended that the regulator should be established through the enactment of a new legislation so as to demonstrate firm commitment to price reform. The two-tier regulatory structure is suggested with direct regulation in case of bulk supply, and for retail supply areas determined by the government. For other

Annexure 7.1: Review and analysis of price reform in different parts of world

This section, in brief, describes the international trend in regulatory reform in the water sector. The discussion is, however, limited to pricing of water and related issues.

The responsibility for providing water services has traditionally been vested with public sector organizations because of the characteristics[41] of the sector, which make functioning of competitive markets difficult. There has, however been a distinct trend towards regulatory reform in many countries including Chile, United Kingdom, Argentina etc. The reform has been driven by several factors including water shortages, unmet demand, inefficient operations and financial problems. Further, the reform has progressed at a different pace in different countries and has also been characterized by varying approaches[42].

Chile

In Chile, low tariff and resulting financial problems for the State-owned Santiago Metropolitan Sanitary Works Enterprise (EMOS)[43] was one of the key factors leading to reform. The tariff was substantially below the marginal cost leading to under investment in maintenance and expansion. Reforms were initiated in 1988 and though the initial intent was to privatize EMOS, as the first step its status was changed from an autonomous entity under the public law to a State owned corporation under private commercial law. The key features of reform, in context of tariff determination, are listed below.

1. The regulatory functions were transferred from an autonomous public entity to a regulatory body attached to the Ministry of Public Works. The regulatory body was assigned the functions of tariff determination, enforcing technical standards and granting concessions for water supply.
2. The enabling legislation describes in detail the formulae and variables to be used for the purpose of tariff determination, thereby reducing the regulatory risk.
3. The tariff is calculated once in every five years to cover the long run marginal cost and then readjusted to cover the long run average cost and allow at least 7 percent return on the capital.

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[41] large sunk costs and economies of scale

[42] due to different circumstances and also political commitment

[43] EMOS was otherwise one of the better managed utilities with almost all connections being metered and bill collection rate of over 80 percent.

Honduras

The strategy for reform in Honduras was agreed upon in 1994, with the assistance of the World Bank etc. Due to lack of political will the reform was not carried out and the sector continues to be characterized by a number of problems including welfare loss arising from non-availability of water to poorest households. The main features of the reform envisaged in 1994 are as follows.

1. Creation of an independent regulatory body.
2. Regulator to establish norms for calculating rates on a cost plus basis using a model firm and cost of inefficiency not to be passed though.
3. Municipal bodies to be allowed to cross-subsidize within the water rates but not with other services.
4. Regulator would be free to declare self-regulatory system for smaller systems.
5. Access to public resources was made conditional on compliance with recommended practice on rate setting.

Table8.1 Primary water quality criteria for various uses of fresh waters, as laid down by the Central Pollution Control Board

S.No.	Characteristics	A	B	C	D	E
1.	Dissolved oxygen (DO), mg/l, Min.	6	5	4	4	-
2.	Biochemical oxygen demand (BOD) mg/l, Max.	2	3	3	-	-
3.	Total coliform organism** MPN/100 ml, Max.	50	500	5000	-	-
4.	pH value	6.5-8.5	6.5-8.5	6-9	6.5-8.5	6.5-8.5
5.	Free ammonia (as N), mg/l, Max.	-	-	-	1.2	-
6.	Electrical conductivity, micromhos/cm, Max.	-	-	-	-	2 250
7.	Sodium absorption ratio, Max.	-	-	-	-	26
8.	Boron, mg/l, Max.	-	-	-	-	2

Use class: (A) Drinking water source without conventional treatment but after disinfection, (B) Outdoor bathing organized, (C) Drinking water source with conventional treatment followed by disinfection, (D) Propagation of wildlife, fisheries, (E) Irrigation, industrial cooling controlled waste disposal.

**If the coliforms are found to be more than the prescribed tolerance limits, the criteria for coliforms shall be satisfied if not more than 20 per cent of samples show more than the tolerance limits specified, and not more than five percent of samples show values more than four times the tolerance limits. There should be no visible discharge of domestic and industrial wastes into Class A waters. In case of Class B and C the discharge shall be so regulated/treated as to ensure maintenance of the stream standards.

Source CPCB Publication ADSORBS/3/1978-79

Criteria development

To protect given beneficial uses, water quality criteria are developed to define contaminant concentrations, which should not be exceeded. Until they are translated into standards through rule making or adjudication, criteria remain in the form of recommendations or suggestions and do not have the force of regulation behind them. Criteria are developed solely on the basis of data and scientific judgement without consideration of technical or economic feasibility. Criteria are developed for different beneficial uses.

Standard promulgation

Once water bodies have been designed for specific beneficial uses and water quality criteria have been developed for those beneficial uses, the regulatory agency promulgates standards taking into account other factors such as economics and technical feasibility. Standards may take the form of (1) process

Table 8.2 Physical and Chemical drinking water quality standards laid down by MUD

Sno.	Characteristics	Acceptable*	Cause for Rejection**
1.	Turbidity (Units on J.T.U. Scale)	2.5	10
2.	Colour (Units on Platinum Cobalt scale)	5.0	25
3.	Taste and Odour	Unobjectionable	Unobjectionable
4.	pH	7.0 to 8.5	<6.5 or > 9.2
5.	Total dissolved solids (mg/l)	500	1500
6.	Total hardness (mg/l) as ($CaCO_3$)	200	600
7.	Chlorides (as Cl) (mg/l)	200	1000
8.	Sulphates (as SO_4)	200	400
9.	Fluorides (as F) (mg/l)	1.0	1.5
10.	Nitrates (as NO_3) (mg/l)	45	45
11.	Calcium (as Ca) (mg/l)	75	200
12.	Magnesium (as Mg) (mg/l)	30	150
13.	If there are 250 mg/l of sulphates, Mg content can be increased to a maximum of 125 mg/l with the reduction of sulphates at the rate of 1 unit per every 2.5 units of sulphates		
13.	Iron (as Fe) (mg/l)	0.1	1.0
14.	Manganese (as Mn) (mg/l)	0.05	0.5
15.	Copper (as Cu) (mg/l)	0.05	1.5
16.	Zinc (as An) (mg/l)	5.0	15.0
17.	Phenolic compounds (as Phenol) (mg/l)	0.001	0.002
18.	Anionic detergents (mg/l) as (MBAS)	0.2	1.0
19.	Mineral Oil (mg/l)	0.01	0.3
	TOXIC MATERIALS		
20.	*Arsenic (as As) (mg/l)*	0.05	0.05
21.	*Cadmium (as Cd) (mg/l)*	0.01	0.01
22.	*Chromium (as hexavalent Cr) (mg/l)*	0.05	0.05
23.	*Cyanides (as CN) (mg/l)*	0.05	0.05
24.	*Lead (as Pb) (mg/l)*	0.1	0.1
25.	*Selenium (as Se) (mg/l)*	0.01	0.01
26.	*Mercury (total as Hg) (mg/l)*	0.001	0.001
27.	*Polynuclear aromatic hydrocarbons (PAH) (µg/l)*	0.2	0.2
28.	*Gross Alpha activity*	3_p Ci/l	3_p Ci/l
29.	*Gross Beta activity PCI ≈pico curie*	30_p Ci/l	30_p Ci/l

Notes.

*The figures indicated under column 'Acceptable' are the limits up to which water is generally acceptable to the consumers.

**Figures in excess of those mentioned under 'Acceptable render the water not acceptable, but still may be tolerated in the absence of alternative and better source but up to the limits indicated under column "Cause for Rejection" above which the supply will have to be rejected.

†It is possible that some mine and spring waters may exceed these radio activity limits and in such cases it is necessary to analyse the individual radionuclides in order to assess the acceptability or otherwise for public consumption.

Table 8.4 Drinking water quality standards as recommended by the WHO and BIS

Parameter	WHO standards		Indian Standards: 10 500(1991)*
	Class A: Maximum permissible limit	Class B: Maximum allowable limit	
Physical parameters			
Colour (hazen)	5.0	25.0	5.0
Turbidity (NTU)	5.0	25.0	5.0
PH	7.0-8.5	6.5-9.2	6.5-8.5
Temperature (°C)	-	-	-
Conductivity (mho/cm)	-	-	-
Total dissolved solids	-	-	-
Total suspended solids	-	-	-
Total solids	500.0	1500.0	500.0
Chemical parameters			
Total hardness	-	-	300.0
Calcium as calcium carbonate	-	500.0	75.0
Magnesium as calcium carbonate	-	650.0	30.0
Acidity	-	-	-
Alkalinity as calcium carbonate	-	-	-
Bicarbonate as calcium carbonate	-	-	-
Hydroxide as calcium carbonate	-	-	-
Chlorides as chlorine	-	-	250.0
Total residual chlorine	-	-	-
Sulphates	200.0	400.0	200.0
Fluorides	0.5	1.0-1.5	1.0
Phenol	0.0	0.0	0.0
Manganese	0.1	0.5	0.1
Silica	-	-	-
Sodium	-	-	-
Potassium	-	-	-
Organic and nutrient parameters			
Dissolved oxygen	-	-	-
Biological oxygen demand	-	-	-
Chemical oxygen demand	-	-	-
Phosphates	-	-	-
Mercury	-	-	-
Oil and grease	-	-	-
Nitrates	-	50-100	45.0
Nitrites	-	-	-
Heavy metals	-		
Iron	0.3	1.0	0.3
Chromium	-	0.1	0.1
Boron	-	-	1.0
Zinc	-	-	5.0
Copper	1.0	1.5	1.5
Lead	-	0.1	0.1

*AMC is complying with these standards

Source

1. WHO. 1986. WHO Handbook. Geneva: World Health Organization.
2. ISI. 1991. Indian Standards (IS: 10 500). New Delhi: Indian Standards Institute.

Presently the AMC (Ahmedabad Municipal Corporation) is complying with IS-10 500 standards. In general, the Government of Gujarat or WRA (Water

conditions. Modifications could be introduced at a later stage once trends and confidence levels are established with reference to:

- The operational efficiency of the treatment process,
- Health of the distribution system
- Interfaces of different service networks like water and sewage etc. and
- Correlation drawn between water quality and incidences of related diseases.

The quality of water undergoes changes during its travel from the source to the end user and this aspect needs to be carefully considered while deciding the sampling locations so as to get a sample fairly representative of the system efficiency. The possible locations for water quality monitoring could include:

- The source of raw water
- Different stages of the water treatment process to determine efficiency of different stages of treatment and identify areas requiring technical improvements / modifications
- Final treated quality
- Intermediate storage / pumping stations
- Locations where blending with ground water is being done
- Interfaces with other service networks like water and sewage etc.
- At other critical locations having chances / incidents of water contamination
- At the tail end nodes of the distribution network (since pressure, residual chlorine levels etc. are minimum at this location)

The number of water samples and location would also vary from season to season, being critical especially during rainy season.

The infrastructure facilities (in terms of manpower and laboratory requirements) and corresponding budgetary allocations for surveillance should be commensurate with the scope and parameters defined for sampling and frequency of analysis. As a guideline the MUD has stipulated minimum staff requirements for the water works laboratories (Table 8.5).

Table 8.5 Minimum staff requirement for water works laboratories

Staff	> 7.5 mld	Up to 7.5 mld
Water analyst (chemist)	1	-
Water analyst (bacteriologist)	1	-
Water analyst	-	1
Laboratory technician	3	-
Typist-cum clerk	1	-
Sampler Takers	3	1
Laboratory Cleaners	3	2

Source MUD (1991)

Table 8.6 Minimum frequency of sampling and analysis as per European Commission Directive

Volume of water distributed/ produced each day within a supply zone(m^3)	Check monitoring* (Number of samples per year)	Audit monitoring** (Number of samples per year)
≤ 100	Frequency to be decided by the member State concerned	Frequency to be decided by the member State concerned
> 100 to ≤ 1000	4	1
>1000 to ≤ 10 000		1 + 1 for each 3300 m^3/day and part thereof of the total volume
>10 000 to ≤ 1 00 000	4 + 3 for each 1000 m^3/day and part thereof of the total volume	3 + 1 for each 10 000 m^3/day and part thereof of the total volume
>1 00 000		10 + 1 for each 25 000 m^3/day and part thereof of the total volume

Source EC Council Directive 98/83/EC of November 3, 1998

* Check monitoring - The purpose is to provide regular information on the organoleptic and microbiological quality of water supplied.

** Audit monitoring - The purpose is to provide the information necessary to determine whether or not all of the Directive's parametric values are being complied with.

The Directive also states that the minimum frequency for sampling could also be decided on the basis of the number of inhabitants in the supply zone assuming a water consumption of 200 lpcd. Further, the number of samples can be reduced if the results of the analysis over a period of at least two successive years remain compatibly unchanged, and are significantly better than the standards laid.

The WHO guidelines for drinking water quality recommend the following minimum sampling frequencies for drinking water in the distribution system.

Table 8.7 WHO guidelines for minimum sampling frequencies for drinking water

Population served	Samples to be taken monthly
Less than 5000	1 sample
5000-100000	1 sample per 5000 population
More than 100000	1 sample per 10000 population, plus 10 additional samples

Source Guidelines for drinking water quality Vol .1, World Health Organisation, 1995

The AMC is following the WHO sampling methodology as given above and in certain critical areas the number of samples are taken as one per 1000 population as against one per 10 000. Thus, overall, AMC is adequately following the national guidelines for water quality standards and WHO sampling methodology.

Annexure 8.1

Minimum equipment requirements for physical, chemical and bacteriological tests

- Comparator test set for residual chlorine or chloroscope
- pH kit with different discs for pH measurement
- Mains operated pH meter complete with one calomel electrode and one glass electrode
- Turbidimeter
- Dionic water tester or conductivity metre
- Photoelectric colorimeter
- Water bath with six to eight concentric holes and discs, electrically heated
- Soxhelt extraction unit
- Kjeldahl digestion unit
- Hot plates
- Distilled water plant
- Demineraliser
- Refrigerator
- B O D incubator
- Muffle furnace
- Electric oven
- ½ H P Motor
- Magnetic stirrer
- Analytical balance with weight box
- Jar-test apparatus
- Centrifuge
- Gas cylinder if gas supply is not available
- Fume cupboard

In addition to consumables like common glassware and accessories like a beaker, a conical flask, a burette, a pipette, a volumetric flask etc., following equipment is also needed for bacteriological examination:

- Hot air oven up to 200°C
- Autoclave or pressure cooker
- Incubator 37° C or 44° (water / air-jacketted)
- pH meter
- Pipette box (stainless steel)
- Wooden racks / aluminium racks

Recommendation 3

The WRA should have jurisdiction over the state of Gujarat, and should regulate the following segments of water supply system:

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

The subsequent paras will take into account this recommendation while suggesting changes in the existing legislation.

Recommendation 4

It has been recommended that at present, the regulator should only frame guidelines for tariff determination. However, in the long run, it is recommended that the regulator should regulate the tariff for bulk water. The regulator should regulate the tariff for retail water in areas to be specified by the government from time to time. In areas not specified by the government, the regulator should frame principles for determination of tariff for retail water, and monitor the same. In other words, the regulatory process can be divided into two distinct phases.

In **Phase I**, the regulator would only set guidelines for tariff determination. The principles would be taken into account by the State Government while framing the tariff policy in the sector. During this period of regulatory reform, the existing practice of the government for giving effect to any tariff principles would be applied in this case.

In **Phase II**, the following amendments are suggested to facilitate the regulation of tariff by the WRA.

Gujarat Act No.18 of 1979

Section 14 (d) enjoins upon the GWSSB to review and provide advice on the tariff, taxes, fees and charges of water supply and sewerage systems in its areas of operation and also in the local bodies, which have entered into agreement with the Board. Following this mandate, the Board has been given the power to approve tariffs for water supply and sewerage services in these areas, and also to lay down the schedule of fees and other charges for all kinds of services rendered by the Board to the government, local bodies, institutions or individuals in these areas (Section 15 [2] [e] and [f]).

the WRA's tariff regulation. Accordingly, these sections should be amended. Such regulation can be of two forms: direct regulation or regulation through setting tariff principles and monitoring the same. Accordingly, Chapter VIII should be amended.

Bombay Provincial Municipal Corporations Act 1949

Chapter XI deals with municipal taxation. The relevant sections relating to water charges are Sections 129, 130, 134, 135, 136, 138, 141b, and 141e.
Sections 134, 135, and 136 would require amendment so as to incorporate the stipulation that tariff for retail supply of water should be subject to the tariff regulation by the Water Regulatory Authority. The power of the corporations to determine water tax under Sections 129, 130, 138 should be subject to tariff regulation of the WRA. Other sections such as 134, 135, 136, 141b, and 141e have to be amended accordingly.

Gujarat Panchayat Act 1993

Part II of the Act under Section 200(1)(13) deals with charges relating to water supplies through pipes. Panchayats can levy charges in any form to cover the cost of supply of water. The charges for water could also include the cost of supply of water. 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. These sections should be amended so that this process is subject to the WRA's indirect regulation.

Metering issues

In Chapter 7, we have seen that most of the retail consumers in Gujarat's water sector are not metered and are charged on the basis of rateable value of property or a flat rate. Such tariff structure is inherently inefficient and leads to distortions at two levels. One, it does not recover the cost of supply from a substantial number of consumers and two, it leads to waste and hence deprives other consumers of even their minimum needs.

It has also been suggested that development of a metering plan should be taken up as a priority measure. The regulator would also require the utilities, under direct as well as indirect regulation, to prepare a detailed metering plan and update the regulator on the same at regular basis.

In view of the above, Chapter VIII of the Gujarat Municipalities Act 1963, Chapter XI of the Bombay Municipal Corporations Act 1949, Part II (Section 200) and Schedule I of the Gujarat Panchayat Act 1993, and Chapter VIII of the

recommendation of the GIDB or WRA before it enters into an arrangement (for example under the concession agreement) for supply of water in the city.

It is suggested that Section 189(2) (c) of the BPMC Act 1949 should add that 'such arrangement by which the corporation enters into concessional agreement (beyond a prescribed value as determined by the Government) with any developer[47] should be subject to Rules prescribed by the Government'.

Even for concession contract below Rs 500 million, the city corporations should consider the recommendations of the WRA on the terms and conditions of the concession agreement. Accordingly, the above section should incorporate a provision in this regard.

Gujarat Municipalities Act 1963

A similar provision should be incorporated under Section 65 of the Gujarat Municipalities Act 1963.

Section 15(2) (f) of the Gujarat Act No. 18 of 1979 should be amended to incorporate the above provisions, as suggested in the case of city corporations.

Recommendation 6

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

Since it would not be compulsory on the part of the government as well as local authorities to seek recommendation from the WRA, on the terms and conditions of the concession agreement (worth beyond a prescribed limit), there is no need to amend the existing legislation to enable the WRA for carrying out the above activities.

Recommendation 7

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

Gujarat Infrastructure Development Act 1999

Section 38 (f) of the GID Act 1999 extends the functions of the GIDB to coordinate and monitor the projects undertaken under the concession agreement in the state. Thus, a concession contract between a local body and a developer would be subject to monitoring by the Board as stipulated under the Act.

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[47] A developer, as defined under the GID Act, 1999 means a person with whom concession agreement is entered into by the State Government, a Government agency or a specified Government Agency.

incorporate the provision that the village panchayat should follow standards set by the WRA or Government of Gujarat. Similar provisions would be made applicable taluka and district panchayats as well.

Recommendation 9

The WRA should lay down and enforce minimum standards of service to consumers. It should also monitor such 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 recommendation. Section 15 (2) (i) may also be amended to incorporate the fact that the Board should follow standards of services set by the WRA. Section 52 which mandates the Board to cut off the water supply should be subject to regulation of WRA, and should be amended accordingly.

Gujarat Municipalities Act 1963

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

Bombay Provincial Municipal Corporations Act 1949

Chapter XIII (Section 189) relating to water supply should incorporate a provision that the corporation should follow standards set by the WRA.

Gujarat Panchayat Act 1993

Schedule I to the Act relating to water supply should incorporate a provision that the corporation should follow standards set by the WRA or Government of Gujarat.

Recommendation 10

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

Section 35 of the Gujarat Act 18 of 1979 says 'the Board shall not, as far as practicable, and after taking credit for any grant or subvention from the State Government under section 36 carry on its operations under this Act at a loss'. For being efficient in its working, the GWSSB should be financially viable, and it

Recommendation 16

1. The WRA should consist of three members. The Chairman and Members of WRA should be selected through a Search Committee. The Search Committee should be consist of the following members.

- Chairman of the Gujarat Public Service Commission, should be the Chairman of the Selection Committee.
- Secretary incharge of the Urban Development.
- Senior most Secretary in the Department of Narmada, Water Supply, and Water Resources, the Convenor of the Committee.

The qualifications of the Chairman / 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 specialization 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 the maximum age limit being 65 years. The reappointment of members should be allowed. Disqualification criteria should include prohibition of interests in regulated entities in addition to the following:

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

3. The members of the authority cannot 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

- The authority should maintain proper accounts, prepare an annual statement of accounts in such form as may be prescribed in consultation with the Comptroller and Auditor-General of India.
- It accounts should be audited by the Comptroller and Auditor General of India.
- Its accounts certified by the Comptroller and Auditor-General, shall be forwarded annually to the State government by the Authority and the State government shall cause the audit report to be laid, 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 laid before the State Legislature.

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 18

The WRA should have adequate power to ensure compliance of its order and 'directions'. If these are violated, there should be adequate punishment.

If an offence is committed by a company, then the person in charge for the conduct of the company would be liable.

The authority shall for the purposes of any inquiry have the powers of a Civil Court while trying a suit, in respect of the following matters: a) summoning and enforcing the attendance of any witness and examining him on oath, b) requiring the discovery and production of any document or other material object producible as evidence, c) receiving of evidence on affidavits, d) requisitioning of any public record or a copy thereof from any court or office, e) issuing commissions for examination of witnesses or documents, f) reviewing of its decisions, directions and orders.

The provisions of the Code of Criminal Procedure, 1973 relating to search shall apply. 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 / her activities related to water supply. The WRA should have full powers under Section 195 of the Criminal Procedure Code

Conclusion

It is recommended that a detailed scrutiny of the Acts/rules for carrying out such changes should be carried out whenever the legislation constituting the WRA is proposed. In addition, with the 73rd and the 74th Constitutional Amendments, the water supply function vests with the local bodies. Thus any legislative changes that are proposed should not violate the spirit of the 73rd and the 74th Constitutional Amendments.

A short note

The above analysis does not deal specially with the Gujarat Panchayat Act 1993 (except in the case of recommendations 3, 4, 5, 9 and 10), since similar modification, as applicable to municipalities would be applicable *mutatis-mutandis* in the case of Panchayat bodies as well. This type of modification would enable the extension of WRA to these bodies.

It is further noted that the changes of the existing Acts, (Annex 9.1) as suggested above, are indicative in nature. A detailed scrutiny of the Acts is required, whenever the proposed legislation constituting the WRA, is considered by the government.

The regulation function of the GWSSB in water supply activities has to be withdrawn once the WRA is constituted in Gujarat. These would also require additional changes, in Chapter X (penalties and procedures), Chapter XIII (Rules, Regulation and Bye-laws), Chapter VII and Chapter V, in addition to those stated earlier. It is suggested that chapter X should be amended to divest of the GWSSB's power to impose penalties as regards its regulating of activities in water supply.

Principles for reform

Given the above background, significant restructuring at the institutional level in Gujarat's water sector is called for. The main guiding principles of these reforms are the following[49].

- Separation of regulatory functions from direct operations
- Service operations to be run on commercial principles with customer orientation
- State government to focus on facilitating reforms and not direct operations
- Role of local governments to focus on specifying and ensuring local service standards through appropriate service providers and ensuring access for the poor
- Enhanced role of customers and civil society associations in providing effective feedback to regulators
- Insulating sector from micro-management and competitive populism

Based on the above guidelines, a detailed sector reforms program would have to be developed. As mentioned earlier, this would include developing a sector vision document, improvements in operational and maintenance practices, institutional restructuring, tariff reforms, and introducing competition and private participation in the sector, apart from regulatory reforms. An appropriate study to devise a sector reforms strategy for water supply and sanitation services for the state of Gujarat based on a review of the current modes of delivery of the services in the state, the international experience in privatisation of water supply services, and the specific constraints faced by the state in this sector should be initiated on a time bound basis. The study should also provide a reform package for the evolution of the water supply and sanitation sectors in a market oriented economy.

[49] Adapted from the draft report of the Sukhatankar Committee, Government of Maharashtra (September 2000)

A suggested format for citing this report is as follows.

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List of Figures

Institutional framework

The civic services in Ahmedabad city are provided by the AMC (Ahmedabad Municipal Corporation) which was established in July 1950 and is governed by the provisions under the BPMC Act (Bombay Provincial Municipal Corporations Act, 1949). The AMC is divided into 43 wards. In conformity with the BPMC Act, each ward elects three Corporators. Thus, there are 129 Municipal Corporators in the municipal board.

The municipal limits were revised in February 1986, and the total service area under the AMC increased from 98 square kilometres to 192 square kilometres. The western peripheral area of the Ahmedabad Urban Agglomeration (AUA) is developing at a rapid rate. This includes about 78 square kilometres of the Ahmedabad Urban Development Authority (AUDA). These areas are expected to be included in the AMC limits in the near future. The service area of AMC would then increase to about 269 square kilometres.

The city is divided into five administrative zones, namely north, south, east, west, and central zone. Table A.1 gives the population distribution of each zone. The central zone, which comprises most of the old city limit, is the most densely populated. The southern zone with the largest area and the lowest population, has a population density just 16% that of the central zone.

Table A.1 Population (thousands) and area (square kilometres) by zone

Zone	Area (km^2)	Population (thousands)
Central	16.50	595
West	42.32	575
North	32.19	624
East	27.51	608
South	72.32	475

Source AMC (1999)

Under Section 63(20) of the BPMC Act the AMC is responsible for providing water supply and sewerage services as part of its obligatory duty. Chapter VI of the amended BPMC Act outlines the obligatory and discretionary functions of the corporation. Under Section 63, it is the obligatory function of the corporation to make reasonable and adequate provision by any means or measures which it is lawfully competent for it to use or to take the management and maintenance of all municipal water works and the construction or acquisition of new works for a sufficient supply of water for public and private purposes. This provision of water supply under the obligatory function of the

Table A.2 Sources of water supply in the Ahmedabad Municipal Corporation

Source	Number	Supply (million)	Percentage of total supply
Surface water			
French wells	5	145	30
Infiltration wells	16	82	17
Groundwater			
Tubewells	327	259	53
Total		486	

Source TCE (1997)

The average water supply during 1990–2000 was about 424 MLD (Figure A.2), with the supply varying between 448 MLD in 1999 and 406 in 1998. The supply has been estimated at 416 MLD in 1999/2000.

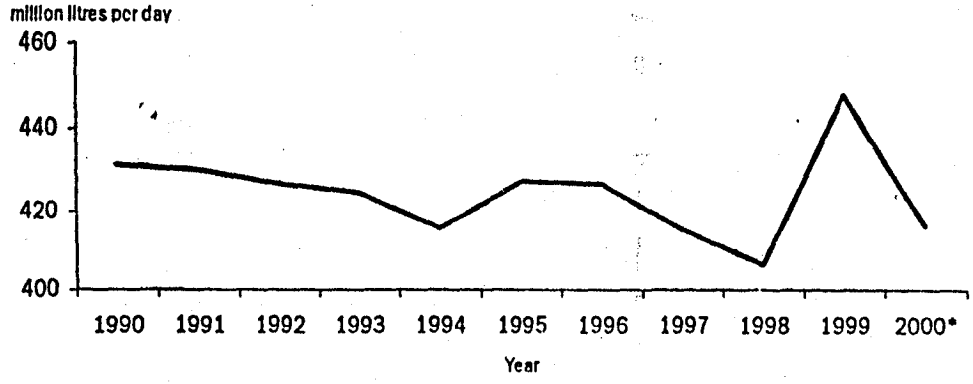


Figure A.2 Water supply in the Ahmedabad Municipal Corporation (million litres per day)
Source AMC (1999)
*estimated

Groundwater

About 53% of the water supply in 1997 was drawn from groundwater sources (Table A.3). Due to the drought conditions in Gujarat and the consequent unavailability of surface water from the rivers in 1999, it rose to 62%. Additionally, Most of the industries meet their water demand through their privately owned tubewells.

Of the 327 tubewells owned by the AMC, about 200 situated in the old municipal limits (that is, limits prior to February 1986) are about 260 metres deep whereas the rest of the tubewells situated in the newly merged area (that is, East Ahmedabad) are about 183 metres deep. Water is drawn from these tubewells through submersible pumps that are fitted at depths of 90–122 metres

is obtained. Thus the definition of well would include tubewells, and groundwater extraction can be regulated in the city under this provision of the BPMC Act.

Surface water

Surface water accounted for nearly 47% of the total water supply in 1997. During 1999, the supply reportedly fell below 32% of the total water supply. Until recently, the city depended entirely on the Dharoi dam constructed 153 km upstream of Ahmedabad for sourcing water. The municipal corporation's share in the cost of construction of the dam is 52.1%, with the rest of the investment coming in from the state government.

The water discharged into river travels through open channels and, on reaching Ahmedabad, is ponded around the French wells and infiltration wells. The ponded water is then filtered through the natural process of sand-bed filtration, and is drawn through these wells.[50] These wells are interconnected to supply water to the Dudheshwar Water Works, one of the two water treatment plants in the city.

The city has five French wells located in the Sabarmati river bed at Kotarpur, Bhadreshwar, Camp Acher, railway bridge, and Sabarmati. Except for the Camp Archer French well, which is 23 years old, the remaining 4 French wells were constructed during 1986 and 1987 as an interim arrangement till the AMC found a dependable water supply source for the city.

The 16 functional infiltration wells in the riverbed of Sabarmati are more than 50 years old. In all, there are 25 infiltration wells in the river. Frequently, these wells go out of order and need repairs. During the monsoons, these wells are often non-functional due to floods.

As per the understanding of the AMC with the state government, the corporation was to get 680 MLD water from the Dahrohi dam reservoir by discharge of adequate raw water from the dam into open channel of the river. It was assumed that the transmission loss would hardly be 10%–15%, ensuring the AMC got about 600 MLD. However, by the time the water from the dam reaches Ahmedabad, about 66% of the water is lost in transit on account of evaporation, infiltration, and tapping by the farmers, Gandhinagar city, Gujarat Electricity Board, and Ahmedabad Electricity Company.

[50] Infiltration wells are shallow wells in the riverbed, about 6 deep.

on the availability of 680 MLD of raw water from the Dharoi dam, the AMC would be in a position to supply water round the clock. This would also enable it to stop drawing water from borewells, and hence conserve underground sources of water and save on energy costs. The treatment capacity of this plant is 600 MLD. The work was to have been completed by 1978. Due to unsatisfactory water supply from the Dharoi dam, the work on the project was delayed, and it was decided to continue using the French wells. As stated earlier, the availability of water at Kotarpur falls short of the capacity of this plant. Moreover, water from the Dharohi dam is presently flowing into the river toward Dudheswar Water Works and being drawn and utilized through the French wells and infiltration wells by the natural process of the sand-bed filtration. Therefore, this water is not available for diversion to the Kotarpur water project. Thus, the execution of the project was delayed and it was completed only in 1997/98.

The commissioning of the Kotarpur Water Treatment Plant requires a minimum of 600 MLD of water at Kotarpur to run all the three streams of the plant with a minimum of 200 MLD of water for running each stream of the plant. After the execution of the Raska Water Project, 300 MLD of water has been made available to the Kotarpur Water Works. Thus one stream at the plant is fully operational while another stream is currently being utilized 50% of the time.

Distribution system

The distribution system consists of a network of cast iron pipelines having a total length of about 2175 km. The treated water from Kotarpur Water Works is fed to the distribution system in the central, west, and north zones of the AMC. While the central zone is almost completely dependent on surface water, the other zones rely primarily on groundwater. Water supply in the city for two and a half to three hours during a day, from 6 a.m. to 8 a.m., and an hours or so in the afternoon. When there is a shortage of water on account of failure of rains or depletion of flow of water in the Sabarmati, the water supply in the afternoon is curtailed. The average supply in the city is about 152 LPCD (litres per capita per day).

There are about 246 239 service connections (1999) but the water supply in the city is largely unmetered, except for the bulk consumers. The total number of connections is expected to grow to 281 000 by 2001. However, only four percent of these are anticipated to be metered. The supply is largely for domestic use, and the water supply for commercial purposes is marginal. The industries and

Currently, the AMC supplies water largely for domestic purposes (about 85% of the total water supply). Major industrial demand is not met by the AMC. Only about 5800 commercial, light industrial and service users are given municipal supplies and these are all metered. There is no metering policy in the AMC for residential connections. Only 1385 domestic connections are metered (Figure A.4). Additionally, the AMC has given about 1700 temporary metered connections to construction sites.

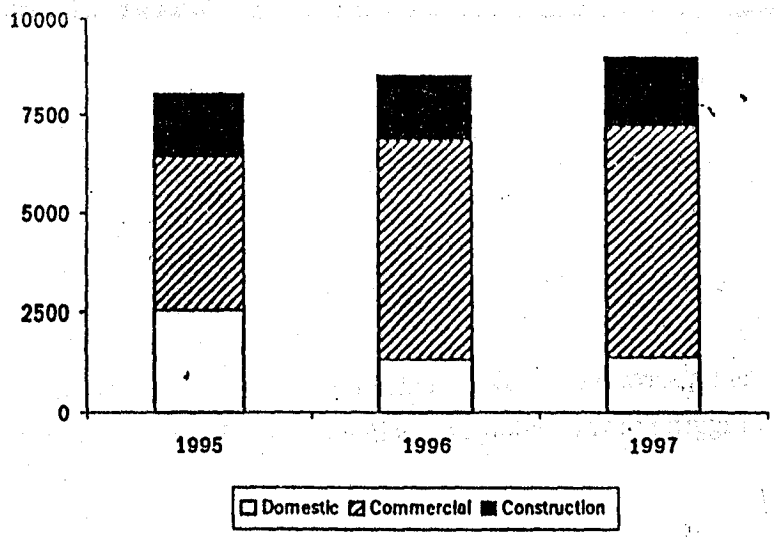


Figure A.4 Distribution of metered water supply connections in the Ahmedabad Municipal Corporation

Source AMC (1999)

Consumers not supplied by the AMC include textile mills, railways, power plant, etc. These consumers draw their requirements from their own tubewells. There are no plans for supplying water to large industrial consumers in the near future.

Water quality in Ahmedabad Muncipal Corporation

The AMC is committed to providing wholesome water to its residents. The corporation follows WHO (World Health Organization) guidelines or the BIS (Bureau of Indian Standards) which stipulate that for a city with a population of 3 million water should be sampled at the rate of one sample per 10 000 people per month which comes to 300 samples per month for Ahmedabad. The samples of the AMC are being drawn from source directly, within the distribution system, and at consumer end points. Two kinds of tests are performed, namely chemical and bacteriological tests. Given the fact that the quality of water is more likely to

Table A.5 Water supply service standards in the Ahmedabad Municipal Corporation

Activity	Time limit
Repair leakage in main line	2 days
Remedy contaminated water	1 day
Repair water stoppage	2 days
Repair of public standposts	3-5 days
Water connection	
Supply of application form	All working days (8 a.m. to 11 a.m. and 3 p.m. to 5 p.m.)
Acceptance of application	All working days (11 a.m. to 4 p.m.)
Acknowledgement of application	Immediate
Intimation to applicant in case of deficiency in application form	7 days
Depositing fees	7 days of receipt of application form
Giving connection	7 days of depositing fees

Source AMC(2000).

Fiscal framework

The corporation's activities are guided by its budget. Under Section 95 (Chapter IX) of the BPMC Act, the municipal commissioner is required to prepare an estimate of the expenses in the next financial year, balances available, receipt of revenue, and proposals for taxation. This is presented to the Standing Committee, which reviews it and sends it to the corporation for approval and adoption.

The accounts in the AMC are currently maintained on a single entry cash basis system. Since 1994/95, the corporation has been earning a revenue surplus, and is financially strong (Table A.6). The revised estimate of the cash surplus as on March 2000 is about 400 million rupees, this is expected to grow to 1832 million rupees by March 2001.

Table A.6 Financial summery of Ahmedabad Muncipal Corporation budget (rupees million)

Account head	1993/94 (actual)	1994/95 (actual)	1995/96 (actual)	1996/97 (actual)	1997/98 (actual)	1998/99 (actual)	1999/2000 (revised)	2000/2001 (proposed)
Revenue income	2198	2855	3542	3872	4207	4750	6900	8173
Proportion of revenue income from taxes (%)	79.07	79.27	79.90	81.87	81.94	80.96		
Revenue expenses	2249	2477	2948	3219	3614	4189	5977	6817
Revenue surplus	-359	19	612	679	599	570	928	1357

Source AMC 1999a

At present, the AMC does not maintain separate accounts for activities undertaken in the water sector. The amount indicated under the head water tax

Table A.8 Summary of revenue expenditure and income in the water sector in the Ahmedabad Municipal Corporation

	1997/98	1998/99
O&M expenditure (Rs)	394,715,000	438,405,000
Debt servicing (Rs)	81,832,000	79,876,000
Total expenditure (Rs)	476,547,000	518,281,000
Revenue (Rs)	243,460,000	259,263,000
Water tax demand (Rs)	406,400,000	409,900,000
Water charge demand (Rs)	20,300,000	21,500,000
Total demand (Rs)	426,700,000	431,400,000
Ratio of revenue to O&M expenditure (%)	61.68	59.14
Ratio of revenue to total expenditure (%)	51.09	50.02
Ratio of revenue demand to expenditure (%)	108.10	98.40
Total water supplied (litres)	148,226,500,000	163,447,000,000
O&M expenditure per litre supplied (Rs per 1000 litres)	2.7	2.7
Total expenditure per litre supplied (Rs per 1000 litres)	3.2	3.2
Revenue per litre supplied (Rs per 1000 litres)	1.6	1.6

Source AMC (1999)

Municipal taxation

Under the BPMC Act, the municipal commissioner is to propose taxes and prepare an estimate of the revenue from the receipts of taxation. The Standing Committee, is thereafter required to propose, with reference to the provisions of Chapter XI (Municipal Taxation), such rates and extent of municipal taxes, as it thinks fit. Thereafter, the budget estimates are considered by the corporation every year that determine rates at which municipal taxes would be imposed during the next financial year. Among other taxes is the property tax, which includes water tax as one of the components.

The corporation imposes property tax under Chapter XI (Municipal Taxation) of the BPMC Act. Section 127(1)(a) enjoins upon the corporation to impose property tax. Under Section 129, the property tax consists of a water tax (Section 129[a]), a conservancy tax (Section 129[b]), and a general tax (Section 129[c]). Thus, water tax is collected as a part of the property tax. The property is tax based on the NRV of the property. The corporation is required to fix the minimum rates of tax for different slabs of NRV with the approval of the state government (Section 129[a]). Keeping this minimum in consideration, the corporation is free to fix the tax rates. Thus, the corporation is more or less independent in the setting of water tax rates under the present legal framework.

The corporation can levy water tax only on properties that draw water provided by it. However, there are certain areas in the city where the municipal commissioner has issued a public notice stating that the corporation has arranged to supply water through house connections, tankers, or public

As Table A.9 shows, in the present scheme of water charges in Ahmedabad, water charges are not linked to the consumption levels.

With 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. The Ahmedabad Municipal Corporation is considering adopting the latter methodology in the next financial year. The corporation is yet to approve the revised rate of property tax as specified under the recent amendment of the BPMC 1949.

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,
F1 is the market value of the land in the area where the building is located
F2 is the age of the building
F3 is the type of usage
F4 relates to whether self occupied or not.

It would thus appear that the new property tax formula would not give any indication of the water consumption at all. As mentioned earlier, even with the earlier procedure wherein the corporation used to determine the water tax on the basis of NRV, this anomaly existed. Also, commercial consumers currently pay water charges on the basis of water consumption, would have to pay a new rate with the introduction of the proposed property tax formula. In sum, the existing as well as the proposed property tax formula would not indicate level of water consumption in any manner.

Private sector participation

There has been no major initiative for attracting private sector participation in the water sector. The O&M of the newly constructed Kotarpur Water Treatment

supply point, in a few major cities, and in other cases, the distribution is required to be undertaken by the local bodies.

Private sector participation

In 1997, the GoK (Government of Karnataka) issued its Policy on Infrastructure which had outlined circumstances under which it could seek private sector participation in infrastructure projects. Private sector participation in such projects is also possible through execution of an MoU (memorandum of understanding) between the GoK and an investor under the following circumstances.

- Where the investor, on his own initiative, proposes a project which is visionary in nature or totally new in conception;
- Where the government has not contemplated offering any project to private sector because it did not appear to be commercially viable;
- All related subcontracts would be let out through competitive bidding; and
- The proposal would be developed by the investor at his own cost and resources.

The MoU is also expected to be valid for a limited period during which private investors would be able to achieve the project objectives; for example, preparation of a techno-feasibility report. The GoK is also committed to finalize such proposals within a time frame of 90 days. With the installation of the new government in December 1999, it once again reaffirmed its commitment to allow private sector participation in water sector in the state.

Following such initiatives, the GoK had invited proposals for indepth studies in a few major cities for upgradation of the existing water supply and sewerage systems. A study was undertaken by M/s Anglian Water International covering four cities namely Mysore, Mangalore, Hubli-Dharwad, and Belgaum. The study revealed the following factors.

- Low per capita supply at tap in these four cities compared to Indian standards;
- Leakage ranging from 37% to 42% (highest in Hubli-Dharwad partly due to significant losses in the transmission main). Non-revenue water ranging from 51% to as high as 60% (in Hubli-Dharwad);
- 9% to 17% of annual expenditure accounted as repairs and maintenance, but a significant part goes to other uses;
- Revenue collection efficiency as low as 64% (in Hubli-Dharwad);

A need for remodeling and rehabilitation of water supply and sewerage system in Bangalore city is also being considered at a cost of about 800 crore rupees through public–private participation. It was felt that the present water supply and sewerage system in Bangalore city was outdated, and some of the facilities were also considered to be overloaded. Since the facilities were provided about 8 to 10 decades back, their conditions had deteriorated about 30% of water supply distribution pipes have been encrusted with scales. These are often broken down, and therefore, equitable distribution of water resulting from low residual pressures to each of the service areas does not occur. Similar is the case with sewer pipes which are already blocked by silt, sludge, and garbage. In addition, some of the secondary and trunk sewer pipes are overloaded due to high population density. All these problems compelled the BWSSB to initiate a study to review and update the previous improvement plans of water supply, sewerage systems, and to prepare a phased programme for identifying priority projects. Thereafter, feasibility studies for these priority projects would be conducted including preparation of detailed project report and financial viabilities of such projects. It has been stated that the French government has agreed to grant a sum of 8 million French Francs to the GoK for conducting this study. Two firms have been identified, M/s Vivendi and M/s Lyonnaise dex Eaux, and each is likely to conduct the study covering 50 000 connections on the following issues.

- Determination of 'C' (coefficient of pipeline) value for all aged feeder mains and trunk mains over 50 years old.
- Proposal for rehabilitation or replacement of pipes depending on their conditioning.
- Inspection and test of all ground-level reservoirs that are over 30 years old, and suggestions for their rehabilitation or reconstruction.
- Identification of snags in water treatment plants and taking up their rehabilitation.

It is expected that once the above study is over, the GoK would enter into 'management contract' for 5 years with these two firms. The study is yet to commence.

The BWSSB has also initiated a proposal under BOOT mechanism for utilization of its treated water and use of recycled water for other purposes. A tertiary water treatment plant of 50 mld capacity has been proposed for implementation in Bangalore at K&C (Koramangala and Challabhata) valley. The Board had received bids from about 23 bidders, and the selection of M/s US

- It intends to introduce meter system in all ULBs on 100% basis. Pending installation of meters, ULBs should fix a minimum monthly rate of Rs 45 per domestic connection. The ULBs are required to fix higher minimum charges depending on the debt service charge as applicable to them. Such rates for non-domestic or industrial/commercial consumers are also specified.

Under the Bangalore Water Supply and Sewerage Act, 1964, the BWSSB is empowered to collect water charges from its consumers at such rates, at such time, and under such conditions as may be specified by regulations. Water charges in the city collected every month are related to the level of consumption of water and no subsidy is received from the state government. The water tariff is linked to increments in electricity charges, and also covers O&M and debt service charges for water supply. Tariff is revised regularly — during the last 15 years tariff revision had taken place 12 times. The basic philosophy behind tariff setting is that it should be self sustaining in domestic category of consumers. For the non-domestic and industry category, the water tariff subsidizes the losses, and also covers maintenance cost of public fountains. The revised water tariff order of July 1998 shows the following slab rates.

- Minimum tariff per kilolitre in domestic category is Rs 65 whereas it is Rs 275 in the non-domestic category;
- Rate for lowest slab (upto 25 000 kilolitre) in domestic category is Rs 3.50 kilolitre, as against Rs 33 for non-domestic category;
- Rate for highest slab (above 100 000 kilolitre) is Rs 33 while it is Rs 60 for the domestic category; and
- Further, the following are the rates/kilolitre for other categories – for industries (Rs 60), swimming pools (Rs 60), and public fountains (Rs 2680).

The recovery against demand for water consumption is satisfactory: against a demand of 69.55 crore rupees under the domestic and non-domestic consumers during 1998/99, the Board was able to collect about 90% of its dues.

Quality of service

The quality assurance wing of the BWSSD is responsible for checking water samples for potable use, and is also required to inspect the chlorinator systems. Water samples are tested in a central testing laboratory – of 14 833 water samples, only 977 samples were found unsatisfactory. The board follows the quality standards as set by CPHEEO. In contrast, water supplied by private tankers in Bangalore city have no assured quality.

- Political interference in tariff setting could be minimized if an independent body sets the tariff, or tariff-setting procedures are clearly spelt out in contracts. However, in the latter case, the contract may fail to subsume unpredictable developments in the sector.
- Tariff revision procedures should be transparent and tariff should be inflation indexed. In Karnataka, the government has authorized the BWSSB to revise proportionately without any further reference to government as and when the Karnataka Electricity Board increases its power tariff. Further, an understanding of consumers' affordability to pay is required for determining the tariff rates.
- Need for clear assessment of service costs through proper accounting is required, to help monitor costs as well as to determine the tariff levels for water services.
- Service taxes (often linked to annual ratable values) does not ensure demand management for water services, and hence, should be coupled with user charges.
- Water quality standards must be specified and enforced.
- Improvement of water services at consumer end can be brought in through enforcement of a 'Citizen's Charter' for better services on the part of the urban bodies. Regulator may help in setting such standards and their enforcement.
- Financial viability of ULBs can only be achieved if tariff for water services reflects the cost of such services.

treatment, and disposal of sewage in the CMA. The total geographical extent of the CMA is 1172 square kilometres and that of Chennai city is 170 square kilometres. At present, Metro Water's operational area is restricted to Chennai city and parts of few adjacent local bodies, a population of about 5 million.

The state government appoints the Chairman and Managing Director of the Metro Water. The Secretary to Department of Municipal Administration and Water Supply and other senior secretaries are its directors.

Legislative framework

The water sector in Chennai is regulated under the provisions of Act No. 28 of 1978, also known as the Chennai (earlier Madras) Metropolitan Water Supply and Sewerage Act 1978 (or the CMWSS Act). Section 5 of the CMWSS Act lays down the functions of the board. These include the following.

- Promote or secure planned development of the water supply system
- Prepare long-term plans to meet future requirements
- Undertake developmental activities to meet future requirements
- Operate and maintain the water supply services
- Any other function relating to water supply as the (state) government may entrust.

With the enactment of the CMWSS Act, Metro Water was given all existing responsibilities, powers, controls, facilities, services, and administration relating to water supply and sewerage in or for the CMA. It was also given the responsibility to enlarge, improve, or develop existing facilities and to construct and operate new facilities.

Interestingly, Section 5(6)(2)(v) gives Metro Water the power to control extraction, conservation, and use of underground water in the CMA. Similarly, according to Section 51(1), 'the board may in public interest and with the previous sanction of the government, regulate, control and charge for existing or future extraction, conservation, and use of underground water in any form of purposes'. There are a number of other such provisions in the CMWSS Act that permit the board to regulate the extraction and utilization of groundwater resources.

Apart from the provisions in the CMWSS Act, the state government has also enacted groundwater legislation, Act No. 27 of 1987 or the Chennai (formerly Madras) Metropolitan Area Groundwater (Regulation) Act (or the CMAGR Act). Tamil Nadu is one of the few states to enact such a legislation. The primary objective is to conserve groundwater and to maintain the fragile sea water–

under the ongoing World Bank aided Second Chennai Project. When fully operational, the Krishna water source will add about 930 mld. The water sources are described in detail below.

Surface water

Chennai city depends mainly on surface water for its water supply. The three surface storage lakes are located outside the city. Water from Krishna river from Andhra Pradesh is a recent addition (1998). The surface water sources, that is, the three storage lakes (interlinked by open channels) at Poondi, Cholavaram, and Redhills, and the canal (inside Tamil Nadu) from Krishna river which terminates in the Poondi reservoir, are maintained by the WRI. A fourth lake at Chembarambakkam, which has hitherto been used for agricultural purpose, is also proposed to be used to supply drinking water to the city in view of the current drought. These surface storages are dependent on monsoons. Table C.2 gives the maximum capacity of storage reservoirs.

Table C.2 Maximum capacity of the storage reservoirs (million cubic feet)

Lake	Maximum storage capacity
Poondi	3231
Cholavaram	881
Redhills	3300
Total	7412
Chembarambakkam	3645

Source Metro Water (2000)

Groundwater

Groundwater is mainly used by Metro Water from six areas (wellfields) in the Araniar–Kortaliyar river basin, located at about 50 km north of the city, for supply to the water-intensive major industries in the north of the city.

A recent survey of consumers carried out by Metro Water has found that many have their own supplies of groundwater obtained from shallow wells which, for the domestic sector, are used for washing and cleaning leaving the piped supply for drinking and cooking.

Recycling and conservation

As a water conservation measure, check dams across Kortaliyar river have been constructed which has resulted in the raising of the water Table C. in the wellfields. Also, rainwater harvesting has been made mandatory in the development of new properties such as multi-storey buildings. Finally, a small

Water demand

During the year 1998/99 (till January 1999), an average supply of 440 mld to the city for domestic use and about 50 mld for the industries was maintained. The per capita supply, which was about 70 lpcd in 1998 was increased to about 100 lpcd during 1999. Due to a poor monsoon in 1999, the city supply dropped to about 255 mld for domestic use and about 50 mld for industrial use.

The maximum availability of water for Chennai from existing sources is about 70 lpcd inclusive of demands by industry and other non-domestic consumers. The corresponding Figures for other cities are 253 lpcd for Mumbai, 220 lpcd for Delhi, 190 lpcd for Calcutta, and 125 lpcd for Bangalore, making Chennai the most water-deficient metropolis in India. The average per capita domestic daily availability in Chennai is only 47 litres, which is well below the Indian standard of 70–100 lpcd for individual connections in urban areas and 50 lpcd for consumers using stand pipes.

In years with poor monsoons, water supply is reduced to one to three hours on alternate days. Occasionally, this low level of supply for domestic use can only be maintained by restricting industrial water supply requiring industries to curtail or even cease their operations. Failure of the monsoon combined with the practice of overdrawing from the reservoir system has in the past resulted in almost complete depletion of the storage reservoirs.

Water treatment

Metro Water supplies drinking water of the standard recommended by the CPHEEO (Central Public Health Environmental Engineering Organisation). Section 5(2)(a) of the CMWSS Act requires Metro Water to 'have due regard to public health, safety and convenience of the public' in discharge of its functions. Section 42(2) requires that 'the water supplied for drinking purposes is at all times wholesome and fit for domestic consumption'. The quality control of water is exercised by the Quality Assurance Wing. The main functions include the following.

- Monitoring raw water quality in the surface water sources at Cholavaram and Redhills lakes, and Krishna water, in the groundwater from the wellfields, that is, Minjur, Panjetty, Thamaraipakkam, flood plains, Kannigaipper, Poondi, south coastal aquifer, and sea water intrusion.
- Monitoring the treated water quality at the water treatment plants in Redhills and Kilpauk and in the ancillary headworks.

of procedures for getting the service connections, payment of water charges and taxes, information on arrears, etc.

For instance, the consumer services application, which was in the form of a bulky booklet, has now been simplified and reduced to a one-sheet form. In this application, the rates for services have been provided so that the charges payable for the service connection can be worked out by the applicant himself. The time limit for the provision of service has also been indicated.

To make Metro Water more accessible to the public, a number of initiatives have been undertaken. These include an interactive voice response system through which the status of arrears can be ascertained by a consumer and a web site from which information regarding the CMWSS Act, tenders invited, water and sewer applications, etc., can be accessed and downloaded by consumers.

Citizens Charter

Metro Water brought out the Citizens Charter in April 1998 laying down standards of services and commitment (Table C.4). Metro Water is the first water utility in India to publish a Citizens Charter setting the standards for various services provided to the consumers. The objectives of the Charter are defining the standards of service delivery, and developing transparent administration by taking the consumer into confidence. The following standards of service are detailed in the Citizens Charter.

A reliable water supply

Wherever the pipe network is absent, Metro Water shall supply good quality drinking water by tankers.

Limiting service interruptions

- Metro Water will be on call 24 hours, 7 days a week, and have senior personnel available to respond to service emergencies.
- Metro Water will be on-site to undertake repairs within 6 hours of a serious water service fault.
- Metro Water will make every effort to limit an interruption to not exceed 6 hours.
- Metro Water will provide drinking water on request if an interruption exceeds 6 hours.
- When Metro Water needs to undertake planned service interruptions, at least 24 hours notice to domestic customers and at least 3 days notice to industrial customers would be provided through newspapers.

Consumer complaints redressal

Complaints receiving points

A Central Complaints Cell is functioning in the head office round-the-clock with two dedicated telephone lines. Complaints are also received in all the ten area offices. Consumers also have access to the telephones of the Managing Director and the Chief Engineer (O&M).

Complaints redressal mechanism

Immediately on receipt of a complaint in the Central Complaints Cell or at the head office, the complaint is recorded, a number is assigned, which is informed to the consumer for his reference and follow-up, and then the complaint is transmitted to the respective area office by wireless. The area offices in turn pass on the message to the unit office (depot).

The complaints received in the Central Complaints Cell are recorded in a three-part form. One part is retained in the Cell. The other two parts are sent to the respective area office the same day. After attending to the complaint, the third part containing the feedback acknowledgement slip is returned by the area office to the Complaint Cell where a closing entry is made. Similar data on the complaints received in the area office is also sent by the area office to the Cell.

At the area office, a similar procedure of preparing duplicate complaint form is followed in respect of the complaints received. The original complaint forms with the signature of the complainant are sent to the area office. The duplicate copies are retained in the depot.

Complaints Cell monitoring

The Information and Facilitation Officer at the head office, who is monitoring the functioning of the Complaints Cell, processes the complaints redressal and prepares a weekly statement on the status of complaints. This statement is reviewed by the Managing Director every week with reference to the standards set in the Citizens Charter. The performance on the consumer service with reference to the Citizens Charter is reviewed by a Citizens Charter Review Committee chaired by a well-known public activist and has as members representing consumer fora, and public, besides three officials of Metro Water. A consolidated monthly report is published in the house journal that is also made available to the public. Quarterly reports on the status of complaints are furnished to the state government as well.

Commercial consumers comprise the bulk of the metered connections in Chennai (Table C.6). However, as a proportion of the total revenue collected from all metered consumers in the city, commercial consumers currently account for only a marginally higher proportion than industrial consumers (Figure C.2).

Table C.6 Metered connections in Chennai

Type	Numbers
Commercial	3920
Partly commercial	5380
Institutional (government)	578
Municipal bulk supplies	2
Industrial	39

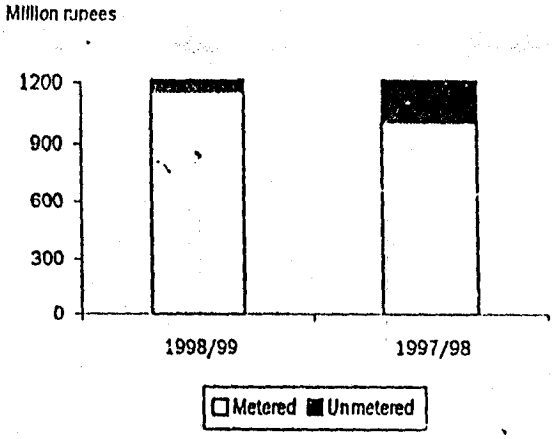


Figure C.1 Income from metered and unmetered connections (million rupees)

Source Metro Water (2000a)

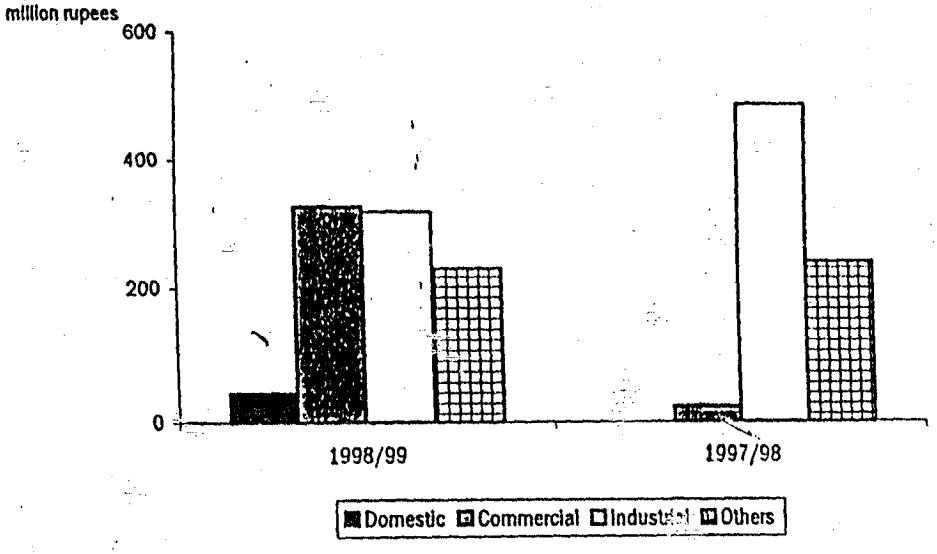


Figure C.2 Income from various types of metered connections (million rupees)

Source Metro Water (2000a)

and unmetered consumers is given in Table C.7 and 8. Sewerage charges are 25% on water supply charges wherever sewer connections are provided.

Table C.7 Water tariff for metered consumers

Category	Quantity (kilolitre)	Rate (rupees per kilolitre)	Minimum charge per month(Rs)	Frequency
Domestic	Up to 10	2.50	50.00	Monthly
	10-15	10.00		
	15-25	15.00		
	Above 25	25.00		
Commercial	Where monthly consumption (non-water intensive) exceeds 500	25.00	200.00	Monthly
	Where monthly consumption (water-intensive)* exceeds 500	40.00	400.00	Monthly
Partly commercial	Up to 10	5.00	150.00	Monthly
	10-15	15.00		
	Above 15	25.00		
Institutional	Entire consumption	20.00	200.00	Monthly
Municipal bulk supply	Entire consumption	15.00		Monthly

*Water-intensive means premises used fully or partly as theatres, hostels, boarding houses, lodges, clubs, private hospitals, private hostels, kalyanamandapams, clinics with inpatient facility, baths, places for keeping animals, vehicles service stations, nurseries.
Source Metro Water (2000a)

Table C.8 Water tariff for unmetered consumers

Category	Water charges (Rs per month)*
Domestic	50
Commercial	
Non-water-intensive	200
Water-intensive	400
Partly commercial	150
Institutional	200
Public supply tubewell pumps or Mark II pump	40

*The frequency of billing is half yearly
Source Metro Water (2000a)

In addition, special services are charged for in the following manner.

- Public supply (hydrant and public fountains): Rs 400 per fountain per month including maintenance charges (monthly)
- Mobile water supply to slums: Rs 4 per 1000 litres for the entire quantity supplied (monthly)

Production and treatment

Operation and maintenance of 29 borewells in two aquifers (Tamaraipakkam and Poondi) has been entrusted to a private contractor. Operating personnel are provided and minor repairs attended to by the contractor. However, the energy cost is met by the board. The contract for this has savings of about 56% of total cost of O&M.

In addition, the O&M of the water treatment plant at Redhills is entrusted to a private contractor. Operating personnel, supply of chemicals, minor repairs to equipment, and meeting the prescribed water quality standards, are the private operator's responsibility. The power cost is met by the board.

Distribution of water

Water is transported through tankers for filling the static tanks located in areas where there is inadequate supply through mains during drought, where economically weaker sections are located, etc. The water tanker service has been contracted out. It was discovered that vehicle repairs were 3% of the O&M costs and vehicles were off the road for half the time. Metro Water disposed of 59 vehicles and is now hiring vehicles, in particular, tankers. This transportation has been privatized. At present, 338 tankers are hired from 220 agencies.

The privatization of tanker operations is the earliest privatization efforts taken more than 13 years back. In view of the regularity of the operations, the cost quoted by the operators has been gradually decreasing in spite of the increase in cost of inputs like diesel. However, given the primitive form of PSP in this case, regulation is hardly an issue.

Reverse osmosis plants

The project involving reverse osmosis plants was initially being developed as a BOOT project. However, this did not work out and was subsequently given on an O&M contract. Three small reverse osmosis plants of capacity 150 000 litres per day, designed to supply water to the local community, are under privatized maintenance by the contractor who erected the plant.

Regulatory oversight

With PSP in only discrete function in the water supply sector, active regulation in the sector is not required. Currently, Metro Water performs most of the regulatory activities in this sector. These activities largely relate to monitoring the compliance with the terms and conditions of the contract.

Institutional framework

The RMC was formed in 1973 under the provisions of the BPMC Act, 1949 (Bombay Provincial Corporation Act). Prior to this, the municipality carried out the civic functions. As per the BPMC Act, the RMC consists of two wings, the legislature and the executive. The municipal commissioner is the chief executive of the corporation and exercises all powers that are delegated to the municipal corporation.

As with other municipal corporations in Gujarat, the RMC is responsible for providing water supply and sewerage services as part of its obligatory duty under Section 63(20) of the BPMC Act.[54] This provision of water supply under the obligatory function of the municipal corporation existed even before the enactment of the 74th Constitutional Amendment (1993).

The municipal corporation's elected wing is called the General Board of the Corporation. The mayor chairs the General Board, which is the apex body of the corporation. From this General Board, the Standing Committee is constituted under the provisions of Chapter II Section 4(1) of the BPMC Act. Water services, like other municipal services, are under the scrutiny of the Standing Committee comprising 12 members and 1 chairman. It has the power to recommend the budget, including water tariff to the General Board. Other (non-statutory) committees are established by the corporation under Section 30(1). The non-statutory committee that deals with the water sector is called the Water Works Committee. The General Board, the Standing Committee, and the Water Works Committee share the statutory powers of the corporation for the provision of water services. The authority to determine all tariff-related issues, including water tariff and water charge, rests with the Standing Committee and the General Board. The Water Works Committee, with five members, has limited powers to recommend and sanction projects worth more than 300000 rupees.

In the provision of water services, the municipal commissioner is assisted by the deputy municipal commissioner (technical). The deputy municipal commissioner is assisted by four city engineers, who are in turn assisted by deputy executive engineers. The staff structure of the RMC for water services is given in Table D.1.

[54] Under Section 63, it is the obligatory function of the corporation to make reasonable and adequate provision by any means or measures which it is lawfully competent for it to use or to take the management and maintenance of all municipal water works and the construction or acquisition of new works for a sufficient supply of water for public and private purposes.

Rajkot has three filtration plants for water treatment at Ribda, Aji and Nyari. One more filter plant at Ghanteshwar is nearing completion. The details of the treatment capacity in the city are given in Table D.3.

Table D.3 Details of water treatment capacity in Rajkot Municipal Corporation

Treatment particulars	Yield (MLD)*
Design capacity	131.5
Utilised capacity	112.5
Water received from source	112.5
Water transmitted to reservoirs	112.5

Source RMC (2000)

*million litres per day

The water supply distribution network in is divided into four major zones, Jubilee, Gurukul, Nyari and Aji (Table D.4 and 5). The distribution network comprises of 900 mm pipes.

Table D.4 Water supply zones in Rajkot Municipal Corporation

Water supply zone	*Ground level service reservoir*	*Elevator storage reservoir*	*Ward covered*
Jubilee	2	2	1, 2, 3, 13, 15, 16
Gurukul	2	2	2, 4, 6, 7, 8, 9, 10, 21
Nyari	4	1	9, 10, 11, 12, 13, 14, 22, 23, 24
Aji	6	-	4, 5, 6, 17, 18, 19, 20

Source RMC (2000)

Table D.5 Distribution network in Rajkot Municipal Corporation

Main types	*Pipe material*	Main types	*Pipe material*
Trunk main		Transmission main	
750 mm	Prestressed	863 mm	Mild steel
600 mm	AC pressure	900 mm	Prestressed
450 mm	AC pressure	700 mm	Prestressed
750 mm	Hume steel	750 mm	Prestressed
450 mm	Cast iron	Feeder main	
Distribution main		400 mm	AC pressure
150 mm	AC pressure	300 mm	AC pressure
100 mm	AC pressure	250 mm	AC pressure
80 mm	AC pressure	200 mm	AC pressure
150 mm	Cast iron	150 mm	AC pressure
100 mm	Cast iron	450 mm	Cast iron
80 mm	Cast iron	300 mm	Cast iron
		250 mm	Cast iron
		200 mm	Cast iron
		150 mm	Cast iron

Source RMC (2000)

region is about 10% of the total demand–supply gap in Gujarat even though it comprises less than 2% of the state's population.

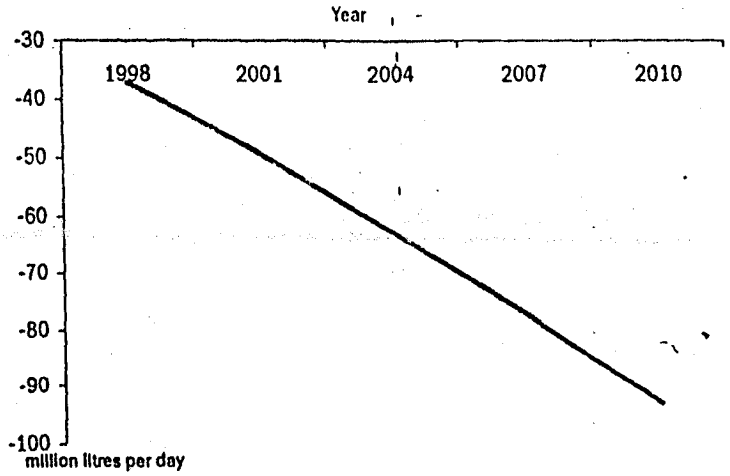


Figure D.3 Demand-supply gap (million litres per day)

Source GIDB (1999)

However, with the supply currently having fallen to less than 77 MLD, the present shortage in water supply is nearly 65 MLD.

The cost of augmenting supply has been estimated at over 8.5 billion rupees (Table D.7). Based on a norm of 7.9 million rupees per MLD. The investment for augmenting the distribution system is based on a norm of Rs 200 per capita. The estimates assume that no capacity addition takes place in the previous years.

Table D.7 Cumulative investment required for the water sector in Rajkot (Rs million)

Year	Sourcing	Distribution	Total
2001	390	3764	4154
2004	495	4988	5484
2007	610	6327	6938
2010	736	7793	8529

Source GIDB (1999)

As is the case with other Municipal Corporations in Gujarat, a significant proportion of the water supply is for domestic purposes (Table D.8). The RMC

- *Construction of Lapasari check dam* If a small check dam is constructed on Bhakarwadi river near Lapaśari village, 8 km away from the city, the water could be diverted to the Aji dam every monsoon, increasing the dam's capacity by at least 1415 million litres. The estimated cost of the project is 35 million rupees. The project is in the execution stage.
- *Provision for drinking water from the Mahi Canal* The RMC has submitted a proposal to the Government of Gujarat for making a provision for drinking water from the Mahi–Narmada canal. It will be possible to get nearly 84 MLD water through the scheme. The project is still at proposal stage.

Extension of distribution network

To provide piped potable water to about 200 000 people of Raiya and Nana-Mava area, the Nyari-II based drinking water supply project including the filtration plan, the distribution system, and the zonal reservoir was designed. The project with estimated cost of 16.50 million rupees involved the laying of about 150 km of AC pressure pipes of 80–300 mm diameter. It is proposed that from 2001, about 25 000 house connections will be provided through this distribution system.

Complaint redressal in RMC

There is an elaborate compliant redressal mechanism in RMC. Complaints can be registered round the clock. However, complaints can be registered at a central control room only. The complainant has to fill and submit a three-part form. The information on the complaint is passed on to the field staff. Once the complaint has been attended to, two parts of the filled-up complaint form are sent to the field staff who are required to get these signed by the complainant and send back one part of the form to the head office.

Fiscal framework

As with all other municipal corporations in the state, the RMC's activities are guided by its budget. Under Section 95 (Chapter IX) of the BPMC Act, the municipal commissioner is required to prepare an estimate of the expenses in the next financial year, balances available, receipt of revenue, and proposals for taxation. This is presented to the Standing Committee, which reviews it and sends it to the corporation for approval and adoption.

From 1994/95 to 1999/2000 the RMC has earned a revenue surplus (Table D.10). However, in the current financial year (2000/2001), it is expected that

per 1000 litres is collected. This analysis does not take into account capital cost, rate of interest thereon, and depreciation of machinery.

Table D.11 Subsidy in water supply

Total water supply O&M expenditure (Rupees thousand)	139 750
Total supply (million litres per day)	92
Number of days a year water is supplied	350
Cost of supplying water in (paise per litre)	0.43
Total revenue from the water sector	32 550
Revenue from water (paise per litre)	0.10

Source RMC (2000)

Since 1990, there has been no increase in the water charges. However, O&M costs have increased by about 105% since 1995. Per capita subsidy also rose by 115% (RMC 2000) over the same period.

Municipal taxation

Under the BPMC Act, the municipal commissioner is to propose taxes and charges and prepare an estimate of the revenue from the receipts of taxation. These are to be approved by the Municipal Board after being reviewed by the Standing Committee.

The municipal corporation can impose a water tax as a part of the property tax as per the provisions of the Chapter XI (Municipal Taxation) of the BPMC Act. Section 127(1)(a) enjoins upon the corporation to impose property tax. Under Section 129, the property tax consists of a water tax (Section 129[a]), a conservancy tax (Section 129[b]), and a general tax (Section 129[c]). Alternatively, as per the provisions of Section 134, the corporation can also levy a fixed charge ... in lieu of taxes for water supplied. Under this provision, the corporation can, instead of levying the water tax in respect of any premises liable thereto, charge for the water supplied to such premises by measurement at such rate as shall from time to time be prescribed by the said (Standing) Committee in this behalf or by the size of the water connection with the municipal main.... It is under this provision that RMC, instead of levying a water tax as a part of the property tax, levies a water charges, based on the size of the connection from the main. Under the provisions of this section, the Corporation is free to prescribe any level of water charge it desires. Thus, the corporation is more or less independent in the setting of water tax rates under the present legal framework.

The corporation can levy water tax only on properties that draw water provided by it. However, there are certain areas in the city where the municipal

F1 is the market value of the land in the area where the building is located
F2 is the age of the building
F3 is the type of usage
F4 relates to whether self occupied or not.

Thus the new property tax formula would not give any indication of the water consumption at all.

Private sector participation

As elsewhere, there is no evidence of any significant privatization initiative in the water sector in Gujarat. There has been some degree of private sector involvement in the water sector in the RMC. The RMC has privatized the maintenance of water distribution system, that is the pumping stations and the pipeline network. For this an annual maintenance contract is fixed with private contractors based on a bidding process. In this, the private contractors were asked to make arrangements for repair and maintenance of pipelines round the clock.

One of the reasons for not initiating private sector involvement in the RMC is the enormous gap in the demand and supply of water. It is argued that private operators would not involve themselves in this sector unless it is operated on commercial principles. Also, since water is such a scare resource in the region, and given the universal service obligation issues in the water sector, it would be difficult to ensure social acceptability and political will for commercializing this sector in the region. Nevertheless, given the criticality of the demand–supply gap in the area, and the consequent investment requirements, private sector involvement in this sector is an option that should be explored.

Conclusions

- As mentioned in the previous section, there is a considerable gap between the demand and supply of water, and this is projected to increase appreciably in the future if supply is not augmented. The investment required for this purpose has been estimated to be over 8.5 billion rupees. This would imply substantial involvement from the private sector.
- There is considerable subsidization of the water sector. The collection of charges from the water sector is not even enough to meet the O&M expenditure for water supply.
- There is significant cross-subsidization from the industrial and commercial consumers to the domestic consumers in the RMC.

solutions. As a result of TEA representation to GoTN with regard to severe infrastructure bottlenecks in the region, the GoTN drafted out the TADP (Tirupur Area Development Programme). The TADP was envisaged as a development programme with the twin objective of meeting the infrastructure requirements of the town and industry while at the same time restraining the environmental degradation within the region. While the proposed TADP covers a number of infrastructure areas, the first essentially relates to water supply, waste water, and industrial effluent treatment. This approach has been adopted to facilitate a focused approach, induction of strategic partners, project recourse funding, and timely execution of the various projects.

Recognizing the need to improve local infrastructure, GoTN and the TACID (Tamil Nadu Corporation of Industrial Infrastructure Development Limited) mandated IL&FS (Infrastructure Leasing & Financial Services Limited) in 1993 to identify the infrastructure requirements of Tirupur with the end objective of enhancing the export and industrial potential. After a detailed study IL&FS evolved an integrated area development programme for Tirupur comprising several projects. The principal project components were water supply, drainage and effluent treatment, road network improvements and expansion, telecom upgradation, and housing. The GoTN sanctioned its share in the investment in the form of equity. The project also enjoyed equity participation and support of the Government of India which approved the investment of 100 million rupees as their contribution for the project.

IL&FS also recommended that a 'special purpose vehicle' be set up to implement the project on a commercial basis. Subsequently, a public limited company, the NTADCL (New Tirupur Area Development Corporation Limited), was promoted jointly by TACID, TEA, and IL&FS to execute the TADP.

The NTADCL is implementing the project on a BOOT (build-own-operate-transfer basis). The BOOT structure envisages selection of an operator for the design and construction of the project facilities and their operation and maintenance over the concession period. Ownership of the project assets shall lie exclusively with the NTADCL in its capacity as the concessionaire.

Existing service levels

Presently, the TM provides water, through the municipal system, for domestic consumption for two hours every alternate day. The water requirements for industry are met entirely through groundwater abstraction transported over long distances by private water tankers. The municipality does not have a sewage collection, treatment, and disposal facility. Approximately 65% of all

estimated based on analysis of the existing service levels and projected population in the service area.

Domestic demand

The consortium used the estimated growth in population, the required service levels and the existing alternate supplies for estimating the domestic demand for both the TM are and wayside villages. The service levels also factor into account the living standards within the TM area and outside. The demand estimates, net of existing available supply, are summarized in Figure E.1.

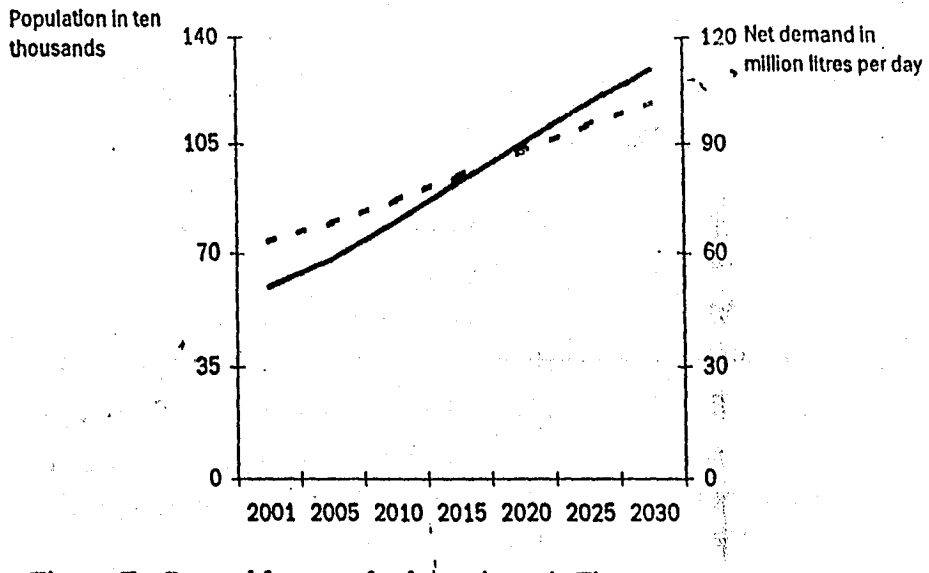


Figure E.1 Demand for water for domestic use in Tirupur

Source IL&FS (1999)

Industrial demand

The future demand is forecast based on the trend in volume of textile products exported from Tirupur. An analysis of 13 year data indicates a likely growth of textile production volumes by 10% to 15% per annum. The consultants, on a conservative basis, have assumed the demand to stabilize at a level of 3% per annum after year 2002. The demand has been estimated for three growth scenarios of low, medium and high growth rates, as well as assuming shift in technology. The projected demand is given in Table E.1.

treatment to potable standards as specified in the manual on Water Supply and Treatment, published by the CPHEEO (Central Public Health and Environmental Engineering Organization).

Project characteristics

This project is a unique public–private partnership and aims to be a catalyst to significant socio-economic benefits for the region.

Sponsors

The institutions involved in the project as either investors or lenders are listed below.

- Government of India
- Government of Tamil Nadu
- Tirupur Exporters Association
- Infrastructure Leasing & Financial Services Limited
- The World Bank
- USAID (United States Agency for International Development)

Several experts have been drawn on to provide necessary inputs on various aspects of the project along with an active support of the World Bank throughout the development phase.

Contractual framework

A concession has been granted to the project company allowing for exclusive rights for the provision of water supply and waste water treatment in the region. The project seeks to replace existing water supply sources and hence does not require huge incremental demand for viability.

A credible contractual framework has been established allocating roles and responsibilities of and rights and obligations of the project's various stakeholders. The construction contractors would have to commit to a lump sum, fixed-time / fixed-price / turnkey contracts with compensation for delays.

A CA (concession agreement) grants NTADCL an exclusive franchise to provide the services delineated earlier. The GoTN through the CA has agreed to introduce appropriate legislation, which would prohibit the extraction of groundwater for non-domestic use in the TLPA for a minimum of 15 years from the commencement of services by NTADCL. Further, NTADCL would be given the right of first refusal for provision of like services within the TLPA.

been split up into multiple activities with an attempt to assign each activity to various agencies as depicted in Table E.2.

Table E.2 Allocation of responsibility

Activity	Agency responsible
Land acquisition and transfer free of encumbrances	GoTN (Government of Tamil Nadu) / TM (Tirupur Municipality)
Water source risk	GoTN
Design, engineering and construction	EPC Consortia
Operation and maintenance of water/wastewater system within TM	TM
Billing and collection within TM	TM
Operation, billing and maintenance outside TM	Operator
Collection outside TM (including wayside villages)	Operator (risk on NTADCL)
Financial arranger	IL&FS (Infrastructure Leasing and Financial Services
Oversight of project and acceptance of unallocable risks	IL&FS

The strategy adopted for the project execution is detailed in the following sub sections.

Memorandum of understanding

The GoTN and TEA approached IL&FS to examine the feasibility of implementing the project on a commercial basis. Based on an examination of the proposal, the project was judged to be commercially viable. Thereafter, through an MoU (memorandum of understanding), it was agreed that GoTN, TM, TEA, and IL&FS would jointly develop the project. The responsibility for achieving financial close vests with IL&FS.

Special purpose vehicle

In order to implement the project, a 'special purpose vehicle', the NTADCL was incorporated. The board of directors of the NTADCL comprised representatives of each of the initial shareholders and provided a formal platform for implementing the project on a public–private partnership basis. The NTADCL has a full time managing director supported by a team of experienced personnel. A committee of experts comprising water sector specialists was also constituted to assist and advice the board during the project documentation and bidding stages.

Provision for investment leveraging

The key driver for the project is provision for water and waste water infrastructure. However, as a corporate objective of area development, the

TM throughout the concession period. At the end of the concession period, NTADCL would hand over the facilities to the GoTN, in good working order and free of cost.

Time frame of implementation

The project would be implemented in two phases over a six-year period. Phase I would be completed in the first three years and would include the water supply, on-site sanitation for slums and select components of the sewerage scheme. Phase II represents the balance sewerage scheme to be implemented within the next three years. The implementation plan has been designed to optimize the capital investment programme while at the same time achieving the desired service levels of the programme.

Regulatory framework

The regulatory framework in the Tirupur project is divided into two separate components. These are presented in detail below.

Regulation of tariff

The CA provides an option to the concessionaire to charge separately for water supply and sewage disposal facilities. NTADCL initially proposed to levy a combined charge based on volume of water offtake. The CA also provides the users to pay a connection fee and security deposit (three months for industrial users, one month for others). The formula for tariff determination is spelt out calculated on pre-defined formulas based on inflation indices. The initial charges have been fixed, based on the requirement of achieving a commercial rate of return and willingness to pay of the purchasers.

Additionally, a Charges Review Committee has been constituted to regulate periodic changes in the tariff structure and for contingencies that may arise beyond the control of the concessionaire. This committee is required to be constituted by NTADCL under the terms of the CA. Approval of the committee would be required for any revision in water charges as proposed by NTADCL. The committee comprises representatives from the concessionaire and the state government, to be presided over by an independent judge.

Curiously, the Charges Review Committee would be appointed by NTADCL. Thus under the present arrangement, the concessionaire is required to appoint the regulator. Quite obviously, there could be conflict of interest for the committee in this case.

- Certify the accuracy of the landed cost submitted in consultation with the IE.
- Audit and verify the total cost of project determined by NTADCL.
- In the event NTADCL is unable to recover the total cost of project as determined under the concession period, the IA shall submit a report to that effect to GoTN and NTADCL certifying the amount of shortfall.
- Furnish data to the Prices Review Committee at the request of NTADCL or as requested by the Prices Review Committee from time to time.
- Monitor the special purpose bank account opened by NTADCL in relation to the development income, and provide a report on the stock of lands sold or otherwise alienated vis-à-vis stock of land continuing in the hands of NTADCL, every six months to GoTN and TM. The said report shall further confirm whether all funds within the special purpose bank account have been used for the purposes of the project or not.

Again, the IA and IE would be appointed and paid for by NTADCL. As a result, regulatory functions are discharged by entities commissioned by the concessionaire. Thus regulatory independence is not guaranteed under the present arrangement.

Lessons for Gujarat

- Detailed feasibility studies by competent agencies are key to the success of any project. This would include preparing comprehensive financial and regulatory frameworks for the execution of the project.
- Initiatives like the Tirupur project that have been developed with substantive public–private partnerships are important to ensure that public interests are met along with ensuring the commercial viability of the sector.
- It is essential to have a well defined and definitive contract for any long-term private sector involvement in this sector so as to ensure that the private operator has confidence in the liberalization process. At the same time, it is important to provide flexibility in the regulatory mechanism to account for unforeseen events.
- An adequate rate of return for private investment needs to be assured for initiating private sector participation in this sector.
- Stakeholder involvement is necessary for the success of any such project. This would require that a mechanism for constant interaction with the stakeholders is established.

Table F.1 Performance indicators of the Obras Sanitarias de La Nation: 1985

Indicators	Federal capital	13 districts	Total
Population with water service (million)	2.9	2.6	5.5
Population with sewerage service (million)	2.9	1.7	4.6

Water production	3 578 000 cubic metres per day
Water connections	1 002 176
Water meters	148 354
Sewer connections	665 347
Treatment	97 080 cubic metres per day
Employees	9600 (average age: 52)
Average consumption per person/day	600 litres (36 cubic metres per person every two months)
Age of the water system	In the federal capital 83% over 40 years and 55% over 60 years
Average delay for repair or handling leaks	1 month in the federal capital and 2 months in Greater Buenos Aires

Source IADB (1999)

Private sector participation

Private sector participation was introduced to reduce fiscal burden and improve efficiency and quality of water provision and sewerage services. The government preferred a 30-year water concession to a management contract or lease, as it wanted the investor to take responsibility for new investments. The government decided against selling water assets as it feared that collecting requisite information on valuation of water assets would be time-consuming. The bid was competitive, and five consortia were prequalified. Aguas Argentinas, headed by Lyonnaise de Eaux – Dumez, which offered to reduce water tariff by 26.9% was selected as a concessionaire. Its share in the consortia is 50.4%, other shares are held by local investors (39.6%) and company employees (10%). The private operator is responsible for planning and financing new investment, supervising new works including design and construction, various service provisions like concession, O&M (operation and maintenance) of installation, renewal of equipment, billing and collection, and control of water quality. Any investment beyond 10 million dollars has to be procured through international competitive bidding. Under the contract, the government retained asset ownership as well as the charge of sectoral policies, management of water resources, and of defining legal and regulatory framework.

The concession agreement laid down a set of targets for population coverage, sewerage treatment, network renovation, and unaccounted for water during the entire concession period (Table F.2).

Regulatory framework

Since 1993, ETOSS (Ente Tripartite de Obras de Servicios de Saneamiento), as independent regulator, has been monitoring the concession agreement granted to Aguas Argentinas. Its other functions include

- determination of tariff
- approval, and monitoring the company's five year investment plans
- hearing and investigation of complaints by consumers and others
- imposition of penalties when it finds that company is not complying with its regulation.

ETOSS is governed by a six member board: two representatives from the presidency, two from the provinces of Buenos Aires, and two from the municipality of Buenos Aires. Directors are appointed for six years with the possibility of reappointment. Members are appointed by the executive in each of the above jurisdictions and congress has no say in this regard. They can be removed from office only for a cause. In practice, most directors were not in office for more than two years. (The different levels of government represented on ETOSS have pressurized the regulator to make politically motivated decisions.)

In the event of a conflict between the regulator and company, the latter can appeal to the judiciary.

ETOSS is financed by all the company-invoiced customers who are charged a nominal fixed sum. It receives funding in proportion to the revenue of the regulated entity, which equals 2.67% of billing. Thus, the financial fortune of the regulator is dependent on the fortunes of the concessionaire. This arrangement affected the regulator's objectivity and effectiveness. It also did not preclude its 'capture' by the regulated company. The fines levied on the company's wrong-doing should be set aside for giving rebate to the customer on the first bill of the year (during 1994/95, the fine amounted to 46 400 dollars).

There is no provision for public hearing to resolve conflicts or address regulatory decisions.

The regulator's decisions are subjected to audit by the Judge Advocates Office of the nation but there is no open hearing system for resolving conflicts.

Water tariff

The concession agreement provided a complex formula for determining water and sewerage tariff. Prior to the concession agreement, water consumers paid charges at a flat rate. Now, unmetered tariff is set by taking into account the

Table F.3 Access charges in 1995 (dollars)

Head	Minimum	Maximum
Water		
Connection fee	208	297
Infrastructure charge	43	340
Total water access charge	251	637
Sewerage		
Connection fee	284	319
Infrastructure charge	572	572
Total water access charge	856	891
Total access charge	1107	1528

Source World Bank (2000b)

There can be 'ordinary' and 'extraordinary' revisions of the price; ordinary revisions are meant to take care of the need for enforcement of the contract for addressing the issue on expansion plans or improvements according to five-year plans, while extraordinary revision takes care of rate changes that would arise from modification of the costs incurred by the company by more or less than seven percent or changes in the expansion plans, quality requirements, exchange rate, and taxes. There is a provision that the company has to go through a competitive bidding process if the cost of investment exceeds a sum of 10 million dollars.

In February 1997, the company argued for shortfall of its revenue, about 80% of which was allegedly beyond its control. It also requested for suspension of fines imposed by ETOSS because of delays in meeting various targets. The contract renegotiation took place with direct intervention of government – it resulted in changes (e.g. withdrawal of infrastructure charges) in terms and conditions of contract, especially the target schedule, tariff structure, etc. (Table F.4).

Table F.6 Trends in Aguas Argentinas: financial indicators (in millions of dollars)

Increased population served with water	84 400 inhabitants (115% of goals, as reported by the company)
Increased population served with sewers	386 000 inhabitants (340% of goals, as reported by the company)
Repair of water pipe system	634 km (155% of goals)
Water not accounted for	31% (goal for year 15 attained) Initially (in the speculations) the loss was 43%
Meter installation	92 500 (116% of goals, according to ETOSS Ruling No. 66/95)
Increase in productive capacity	37 % (24% due to the rehabilitation of pre-existing plants)
Water pressure in the federal capital	
Percentage of connectors with over 8 meters pressure	From 15% (year 1) to 97% (year 3)
Percentage with pressure under 2 meters	From 2% (year 1) to 0% (year 3)
Water pressure in Greater Buenos Aires	
Percentage of connections with over 8 meters pressure	From 13% (year 1) to 54% (year 3)
Percentage with pressure under 2 meters	From 4% (year 1) to 1.7% (year 3)
Hours of delay in resolving water complaints	From 70 in 1993 to 50 in 1995
Hours of delay in resolving sewerage complaints	From 70 in 1993 to 25 in 1995
Collection within 6 months	Rose from 86% at the beginning, to 89% by the end of the third year
Investment	$625 million ($145 in year 1, $127 for upgrading the company; $210 in year 2; and $270 in year 3, $157 in expansion, $50 in rehabilitation of existing assets and $64 in upgrading the company)
Staff	Initially 7365; first year 3800; since then, growing at 2%/year

Source IADB (1999)

Lessons from Argentina's experience

The following are the lessons from the Argentinian concession agreement.

- Contract should indicate clear risks and responsibilities of the private partner.
- The regulator should have its own fund, and its fund should not depend on the revenue of the regulated entity.
- Regulator should not be loaded with partisan officials. Executive branch should not interfere with the regulatory process.
- Decision-making should be transparent and rule based.

- limiting the area of concession
- rights and obligations of the concession holder
- programmes for investments and their execution
- guarantees for contract fulfilment
- effects of declaration for revocation
- conditions for modification of contract
- sanctions
- technical conditions and quality of supply
- parameters for continuity of service
- stipulations to protect and conserve the environment.

Article 44 further stipulates the procedure to offer licences to EPSA or the municipal government for provision of water and sewerage services in non-concessionable zones. The licences may be granted, by the regulator. The licence, however, did not confer any exclusivity rights to the municipal governments or the EPSA in those areas.

Although in 1992, the Ministry of Urban Affairs, developed a National Regulation which defined in-house water and sewer service as the only acceptable long-term water and sanitation solution to urban areas, the regulation was hardly enforced. Thereafter, in 1994, the government decided to create an 'independent national regulator' called the Superintendencia de Aguas in the water sector. Its responsibilities are to

- offer concessions and licences for potable water and sanitation services
- declare and arrange revocation of concessions
- monitor fulfilment of obligations and rights of concessions
- approve goals of quality, expansion, and development of EPSA consistent with the national plan
- recommend rates that municipal governments should collect for provision of services of potable water and to forward such recommendations to the government
- determine the rights of the users of services of potable water and sanitation services
- assure that the services provided are of adequate quality
- maintain a commercial, financial, and technical system of information as regards concession and licence matters
- approve and verify the application of prices and tariff ceiling and publish the same for wider information
- apply sanctions in the case of violations in the terms of concessions.

- simplicity, and
- transparency.

The regulation also laid down the meaning of such principles:

- By economic efficiency, it is understood that the tariff should not reflect the cost of inefficient management, and would not permit the introduction of non-competitive prices keeping in mind the productive efficiency, and that tariff structure should give a correct signal to users about the shortage of potable water resources requiring its efficient use.
- It should be non-discriminatory.
- Tariff structure should be such as to redistribute costs reflecting the capacity of payments by various users.
- Tariff should guarantee the recovery of costs and expenses of operation including expansion, renovation, and maintenance of the system, while permitting sufficient remuneration to service providers, and enabling them to utilize technologies and managerial efficiencies that guarantee the best quality, continuity, and security to the users.
- Tariff structure should be such that its comprehension is easy.
- Tariff determination process should be made public.

It is further stipulated that in case there is any conflict amongst the above principles, the criteria of efficiency and sufficient financial guarantee should have priority in the determination of tariff. In case there is any contradiction between the criteria of efficiency and sufficient financial guarantee, the latter will prevail.

Article 50 of the Regulation of 1994 sets out a principle that would govern the rates in the non-concessionable zones. Such tariff, should recover

- cost of operation and maintenance, and
- cost of repair that would guarantee the sustainability of service and assurance to the users for a lower cost.

Under Article 51 as regards equity in determination of tariff, stipulates that

- whenever there exists justification on equity grounds without compromising the economic efficiency criteria, the regulator should permit the differentiated tariff structure among the groups of users; and
- in areas where the capacity of payments by the users is less than the amount which could be recovered, the public budget is expected to incorporate such funds so as to expand the services in these areas.

Under the regulation, the local communities have the following rights and obligations as regards the provision of potable water and sanitation services

- To participate actively in the management of services.
- To inform the regulator about the gaps in the provision of such services.
- To participate in the sanitary education programme and to inform to the community about their rights and obligations for such services.

Lessons for Gujarat

- The regulatory legislation should lay down the principles for determining the tariff, and the role of regulator in tariff revision.
- The objectives of private sector participation should be clear, and the legislation should spell out the overall objectives of the government in water and sanitation sector. The regulator has to work within these objectives.
- The involvement of the communities in provision of water and sanitation services is expected to prepare the sector's performance.
- The urban areas in Gujarat can be divided into concession zones as well as non-concession zones. In concession zones, the private partner can provide the water supply and sanitation services through concession agreements, while in non-concession zones, the public utility can deliver such services.

meeting the target for developing sewerage network: a target of 52% coverage by 2000 for sewerage treatment would require an investment of about 400 million dollars every year, a figure almost double the amount spent in 1995. Water quality in urban areas was not very high. An analysis of water samples in 1992 showed that 8.3% of the total of services monitored had bacteriological problems, 6.3% had chlorine waste, 26.7% did not comply with chemical quality standards, and 40.7% of the sample water was turbid (Savedoff et al. 1999).

The water sector also witnessed fluctuation of workforce serving in various government companies: in 1960 the Bureau of Water Works (DOS) had a workforce of 3800 employees which increased to 13500 in 1973, and then plummeted to 3000 when the water industry was reorganized.

Table H.2 Operating costs (1995 US dollars)

Year	Costs (million)	Connection (thousand)	Cost per connection
1990	203	1.533	132
1991	233	1.751	133
1992	221	1.828	121
1993	215	1.909	112
1994	202	2.018	100
1995	199	2.100	95

Source IADB (1999)

Till 1977, Chile's water industry was monitored by the Bureau of Water Works (DOS) under the Ministry of Public Works. The other state agencies in the water sector included the Division of Water and Sewerage Services (Ministry of Housing and Urban Planning), the Potable Water Company of Santiago (Municipality of Santiago), the Municipal Sewerage Company of Valparaiso, Vina del Mar (Municipality of Valparaiso), and the Office of Rural Sanitation (Ministry of Health). Since DOS was a part of the central government, it had no administrative or financial independence. There were other agencies working in the water sector although their main functions related to real estate developments. These small companies were not initially subject to formal regulation. Most of these companies were not able to finance themselves with the rates set for them, later on, by the Ministry of Economy.

Under law DFL No. 382 MOP 1989, a set of rules were enacted setting the principle for granting concessions. The law permits companies already in existence to be issued concessions in areas they are serving, but they have to formalize the terms and conditions of the concessions according to the procedures laid down under the general law. These concessions could be transferable and differentiated into potable water production, potable water distribution, waste water collection, and waste water disposal and treatment. Concessions could be granted for specific locations, and the water supply and sewerage services have been made obligatory within a restricted geographical area, which was originally limited to population being served, and also areas included under the expansion plans under way. The legislation mandates a regulatory body to take steps for issuing concessions for an indefinite time period to such companies.

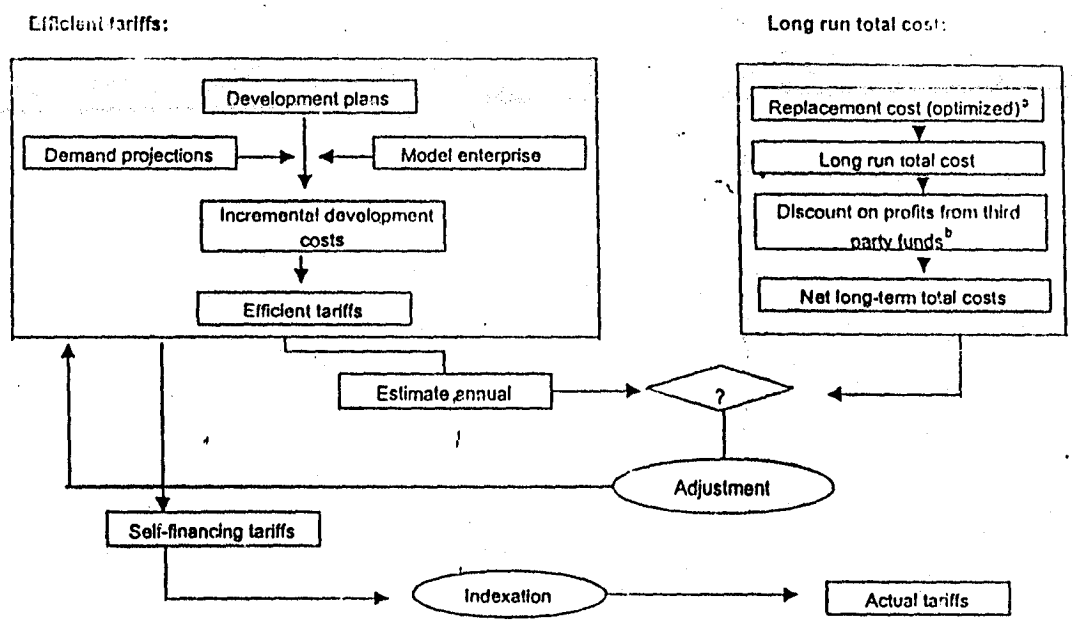
Law No. 18902 of 1990 created a regulator called Superintendent of Water and Sewerage Services with a separate legal entity and assets under the supervision of the president of republic through the Ministry of Public Works. It is mandated to

- set tariff
- set and enforce technical standard
- monitor, award, and revoke water and sewerage concession
- control liquid industrial effluent
- apply sanctions.

In the event of a conflict between the regulator and the concessionaire, there is a mechanism for arbitration through a commission of three experts: one appointed by the regulator, second by the concessionaire, and the third by the regulator based on a list previously agreed upon with the regulators. The rulings of the expert commission are appellable to the court.

Although, quality of water services and sewerage system is set by the Ministry of Health, the regulator is required to oversee the compliance with water quality standards and services in general. It also lays down goals for extending coverage within the concession area in case the targets are not fulfilled. In the event of non-compliance with such goals, the law provides a system of sanctions ranging from fines to terminating the concession.

demand projections Thereafter, tariff is set to cover new investment plus operation and maintenance costs associated with meeting forecast growth and to allow a benchmark firm to a minimum annual return on assets (seven percent). Simultaneously, long-term total costs are calculated, and tariff calculated in the first stage is adjusted by such a factor so as to ensure that the company can break even over five years. Thereafter, tariff is indexed for inflation.



a Replacement cost of a plant large enough to meet demand for the five year period of the tariff;
b Discounts on profits from funds from outside the enterprise

Figure H.1 Tariff setting process

Source World Bank (2000c)

Subsidy issues

Under law No. 18778 of 1989, the government introduced a subsidy programme for low income users. The subsidy, which would be used for paying potable water and sewerage discharge bills of low income users, is administered by the municipalities. The local bodies are required to enroll and select applicants based on certain criteria. The companies are then informed about the details of the low income users. The municipality pays the subsidy amount directly to water companies, who then subtract the appropriate amount from each householder's water bill. The subsidy programme is intended to ensure that no family pays more than five percent of its income for water and sewerage.

private operator would be responsible for O&M (operation and maintenance) of the water supply and sewerage system and for meeting investment targets. There is an agreed business plan and targets for achieving coverage and quality. Further, the operator is required to collect information to help the government develop a tariff regulatory regime. Under the interim arrangement, WASA is responsible for new investment, billing, and collection.

The management fee for the private operator consisted of a fixed element and an element as bonus for meeting specified targets. The switchover to the permanent operating arrangement may take place any time after three years of the initial contract date. Under the new arrangement, the private operator will be required to finance investment, billing, and collection, in addition to the existing responsibilities. The new arrangement would cover a period of 30 years.

The proposals for the PSP were evaluated in a complex manner. First, the technical proposal was evaluated on the basis of business plan, increase in water service, coverage qualification and experience of candidates for top management, series of performance targets based on the requirements, fixed and bonus elements of the management fees, etc. More points were assigned to those willing to undertake more risks by linking their remuneration more to performance-related targets than to fixed fees. All the five firms in the running scored the minimum points for their technical proposals and were considered for the next stage in the financial valuation. Second, the financial evaluation considered the amount of non-guaranteed loan that each bidder would extend to WASA in order to cover its operating deficits, interest rate on loan, and management fees. Third, each bidder submitted a supplementary proposal. It was designed to obtain information on alternative options to the management contract. These included request for proposals for a water treatment plant in Trinidad and Tobago. This was meant to provide safeguard, in case the management contract was found unattractive.

The arrangement for PSP included a provision to allow winning bidders preferential rights for the concession contracts at the end of the management services contract. Thus, once there is a switchover long-term concession contract, it was envisaged that the existing private operator could be invited to negotiate the terms and conditions of the contract. If such an arrangement failed, a competitive bidding process would be undertaken, which would exclude the existing operator.

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 share of any of the water companies. The companies operate under licences, granted initially for 25 years. The licences can be revoked after that period, although ten years notice period 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 privatized companies. Under their licences 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.

Regulatory framework

The regulatory functions of the England and Wales water authorities passed on to the following three regulatory bodies which were created on privatization:

- The DWI (Drinking Water Inspectorate),
- The EA (Environment Agency) is responsible for protecting the environment, and improving the quality of rivers, estuaries, and coastal waters. It controls discharge consents (i.e. licences which set out conditions under which organizations can pump treated sewage or industrial waste into water), encourages water conservation, redistribution and expansion surface and groundwater supplies, and issues licences for abstracting water from river and borewells.
- OFWAT

All the regulators are independent of government, and their roles and powers are defined in legislation. The Director-General of Water Services heading the OFWAT is appointed by the secretary of state for the Environment, Transport and the Region, and is the economic regulator for the water industry. It regulates water and sewerage companies in a fair manner to help them continuously improve quality of service. Among others, the regulator

- sets price limits for water and sewerage bills
- ensures that companies fulfil their legal responsibility
- sets the standards of service to customers
- promotes economy and efficiency of companies
- promotes competition in the industry
- publishes reports on company's performance

would show the number of properties likely to be affected by sewer flooding due to overloading more than 12 times in 10 years and more than once in 10 years and the other could show the number of properties affected by internal flooding due to problems such as blockages. The 'billing contacts' indicator would show the total number of written and telephone billing contacts received by a company, and the number of such complaints dealt with in 2, 5, 10, 20 and more than 20 working days. The percentage of metered customers who receive at least one bill during the year based on actual meter reading is indicated under 'bills for metered customers'. Under this parameter, the company is also required to report on the number of meters that they have not read in 2 years or more. The 'ease of telephone contact' indicator would show speed of response for telephone contact within 15 and 30 seconds, the number of abandoned calls, and amount of time all lines to the company were engaged. Adequacy of water resources of each company is also monitored.

The OFWAT benchmarks each water company on a scale of five (very good and very poor), and publishes the same. These profiles help the regulator to set targets for improving the performance of companies that perform poorly. The regulator also compares the performance of water companies with those in other sectors such as electricity, water, gas, etc.

Water quality

In UK, because of public pressure as well as the Green lobby in keeping this regulation function under the ambit of the government, the government is regulating water quality standards through its Drinking Water Inspectorate under the Department of Environment, Transport, and Regions. 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 the 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, give legally binding undertakings in relation to that action. The investigation of incidents can similarly lead to enforcement action, and it 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 (European Commission) Drinking Water Directive. Companies are required to carry out nearly three

- fisheries management.

As with the DWI, the EA has extensive powers to prosecute companies, including water companies, who cause pollution or fail to comply with their discharge consents.

All significant water abstraction in England and Wales require licences, which only the EA can issue. These are largely licences of right, and stipulate a charge of abstraction which is sufficient to cover the EA's cost in carrying out its water resources function, which at present only cover its direct costs in administering the system, but does not primarily take into account the external costs. The charges are set according to the licensed volumes, but not on the actual abstracted volume of water. Thus, there is no incentive for any water company to take less water than allowed by the licence. In 1996, a total of 48600 abstraction licences were issued amounting to 24 614 000 mega litres of water per annum, of which only 53% were actually extracted. In 1996/97, the average abstraction charge was 0.3 pence per cubic metre for raw water, which was subsequently sold to domestic customers after purification and distribution at an average price which is 20 times over the cost price.

The government is considering the possibility of introducing economic instruments to control abstractions, which would imply significant increase in charge, particularly in relation to environmentally damaging abstractions.

The agency also has a water conservation role, to ensure the efficient use of water and adoption of sensible demand management measures.

Consents are required from the agency for all significant discharges. The standards for consents derive mainly from EC directives, such as those on urban waste water treatment, bathing waters, dangerous substances, freshwater fish and shellfish waters. The consents apply to continuous discharges, such as those from sewage works and also to intermittent discharges.

The agency also controls the disposal of sewage sludge, where recent EC legislation required an end to dumping at sea, and will restrict disposal by landfill. This has lead to a significant increase in the amount of sludge recycled to agricultural land, and UK controls on this have recently been tightened significantly to ensure public safety.

The agency has achieved major improvements in water quality in recent years. These have been achieved to a large extent through tighter regulation of the water industry which as in many other countries, is the most significant source of water pollution. Between 1990 and 1995 the proportion of rivers of good chemical quality increased from 48% to 60%, with the proportion of poor

These proposed price limits compare with significant price increases that customers had to pay over the first 10 years following privatization, mainly to enable the companies to deal with backlog of maintenance and quality improvement. Also, initially, there was an underestimation of efficiency improvements that the companies would be able to make. These averaged 5% annually in real terms between 1990 and 1995, and 1.4% per year between 1995 and 2000.

Customer complaints

The OFWAT has 10 independent Regional OFWAT Customer Service Committees to deal with customer complaints and to monitor services of the water companies. At the national level, there is an OFWAT National Customer Council to deal with customer complaints. The OFWAT has prescribed the performance standards of these committees. For instance, the Customer Service Committee is to start action on a customer complaint within five working days of it being lodged in 97% cases.

Promoting competition

The OFWAT provides a framework for competition to be developed where it will benefit customers. It is expected to create a level playing field to establish competition in economic terms. Common carriage would be vital in promoting such competition. It administers the 'inset appointment' process, presses for more competition for rights to water resources, and uses comparative competition until market competition is sufficiently established to take over. Till January 2000, six inset licences were granted (in 'inset appointments', one company replaces another as the statutory undertaker for a specified geographical area). Cross- border supplies, when a customer may choose a different supplier outside his earmarked area, is yet to be developed in UK.

Comparative competition

Regulators can compare the utilities to judge their performance. The UK regulator (namely OFWAT) benchmarks companies against each other to estimate their efficiencies at a given point of time or over a period of time. The cost and performance information is used by OFWAT in its periodic price reviews with the companies. This information is available to the public, which provides indirect pressure to company shareholder, companies peer groups as well as company's customer. Publication of transparency information includes key reports such as

A further benefit of privatization is that water companies are now able to compete externally, exporting their expertise and experience. The UK government believes that they have much to offer other countries as they tackle their water supply and waste water treatment challenges. Many of the UK companies are now assisting other countries in the development of their own water sectors. Indeed, some of water companies now have more customers overseas than in England. The experience and expertise that they have gained as private companies operating under such regulatory regimes is helping other countries ensure that lessons do not have to be learned again.

Lessons for Gujarat

- The extent of regulatory oversight should be high in the divestiture mode of private sector participation.
- Price cap regulation promotes efficiency in operation of companies.
- Quality of service rules should be set and strictly enforced so that the water companies subject to price cap regulation do not lower their quality of service.
- Comparative competition through benchmarking of companies can improve the efficiency of water service providers. It is possible to compare the utilities in water and sanitation sector in Gujarat on the basis of parameters for improving efficiency and performance of these utilities. In this connection, it may be mentioned that TERI has already undertaken a project supported by the United Nations Development Programme / Ministry of Environment and Forests, Government of India, in respect of 'rating' select municipalities under the project titled USERS (urban services environment rating system). A similar initiative can be undertaken in urban municipalities in Gujarat in respect of water supply and sanitation services.
- Consultation with customers in tariff setting and enforcement of quality of standards should be encouraged.
- The UK experiment shows that governments can retain control and secure real improvements in service and quality standards and in efficiency even with full-scale privatization, provided effective regulatory regimes are established.
- Due to privatization, the water companies are freed from government interference and from constraints of government spending.
- The investments coupled with a strong regulatory framework delivered significant improvements in drinking water quality. Efficiency was improved, the benefits of which can be passed on to consumers.

Annex J.2 New non-mandatory indicator values under EC Drinking Water Directives 98/83/EC

Parameter	Current regulatory standard	New directive indicator value	Comments
Aluminium (µg/litre)	200	200	
Iron (µg/litre)	200	200	
Manganese (µg/litre)	50	50	
Chloride (µg/litre)	400[a]	250	
Colour (mg/1 Pt/Co)	20	Acceptable to consumers and no abnormal change	
Odour (no dilution)	3	-	
Taste (no dilution)	3	-	
Turbidity (FTU)	4	-	
(NTU)		1	Strive for ex works
Coliforms (no./ml)	0[a]	0	
Conductivity (µS/cm at 20°C)	1500[b]	2500	
Hydrogen ion	5.5 minimum	6.5 minimum	
	9.5 maximum	9.5 maximum	
Sodium (mg/litre)	150[c]	200	
Oxidizability (mg O_2/litre)	5	5	
Sulphate (mg/litre)	250	250	
Sulphite reducing clostridia (no./20 ml)	≤1		Parameter name change
Clostridium perfringens (no./100 ml)		0	Surface waters
Radioactivity			
Tritium (Bq/1)		100	Monitoring to be decided
Total indicative dose (MSv/year)		0.1	Monitoring to be decided

[a]95% of results must comply, [b]annual average, [c]three yearly average

Source DWI (1998)

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Rajkot Municipal Corporation

- Mr J P Gupta, Municipal Commissioner
- Mr V Anadkat, Technical Assistant to Commissioner

Urban Development Department, Government of Gujarat

- Dr M Subramanium, Principal Secretary, Urban Services, Government of Gujarat

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- Mr C K Koshy, Managing Director
- Mr Shah, General Manager

Karnataka

Bangalore Water Supply and Sewerage Board

- Ms U Ganesh, Chairman
- Mr C M Easwar, Secretary
- Mr M N Thippeswamy, Chief Engineer (Planning)

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- Mr B S Reddy, Managing Director

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- Mr S K Kumar, Principal Secretary
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Tamil Nadu

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- Mr C P Singh, Managing Director
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- Mr V N Prakashan, Junior Accounts Officer
- Mr M Thirunavukkarasu, Superintending Engineer

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