Pricing of Urban Services

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PREFACE

Of the many major urban questions that are occupying the attention of urban planners and scientists, the one on the pricing of urban services is highly complex and formidable. What considerations should go into the pricing of services like water supply, solid waste disposal, primary health, street lighting and road maintenance? Should these be guided purely by financial and economic considerations or take into account the extent of the use of services, or factors like the income-groups of users? These questions have been most elusive, and effective and implementable approaches to such questions are not yet in sight. Only what seems to be clear is that unless such questions are attended to urgently, the municipal bodies who are currently responsible for the provision of these services will become financially unviable and bankrupt.

In this study entitled, PRICING OF URBAN SERVICES, which has been carried out with the support of the International Development Research Centre (IDRC), Ottawa, (Canada) under Contract No. 3-P-86-0261, an attempt has been made to examine as to how do the municipal bodies price the two important services namely - water supply and solid waste disposal, and whether they are able to recover from the users of them services what they spend on their provision. Water supply, for instance, is one of those services which is chargeable directly to the consumers. On the other hand, solid waste disposal is an

indirectly charged service. The analysis carried out as a part of this study shows that both services are underpriced, and are seriously jeopardizing the overall financial viability of the municipal bodies. In order to improve their financial performance and to make these services self-paying, the tariffs of water will have to increase substantially; metering of the un-metered connections and charging of water supplied through stand posts, though necessary and important, will not be adequate to improve the financial viability of municipal bodies. The analysis brings out that the municipal bodies have yet to recognize the financial worth of solid wastes. Most municipal bodies provide these services, but charges the users indirectly, that is, as a part of the property taxes. Since property taxes are stagnant and unable to respond to the real estate market, revenues on this account too remain depressed. At the same time, there is no denying of the fact that solid wastes are a significant resource, and have to be appropriately exploited by the municipal bodies. Much more needs to be done in this direction. This is a sample of the kinds of results that this study has brought out.

I would like to place on record my gratitude to the International Development Research Centre, Ottawa, for the generous support that it provided to the National Institute of Urban Affairs (NIUA) for conducting this study. I would also like to record my appreciation for Ms. Lynn Thurston, then responsible for this study at IDRC, Ottawa, and with whom we had

the privilege of discussing the profiles of this study, and for Ms. Susanne Mowat, Programme Officer, IDRC, New Delhi. The National Institute of Urban Affairs would like to pay tributes to the intellect of Ms. Susanne Mowat in providing guidance to this study in its initial stages. Her most unfortunate death prevented the NIUA from taking advantage of her understanding of the subject. I would like to also place on record the support received from Mr. Vijay Pande, Resident Representative of IDRC, New Delhi.

At NIUA, Dr. K. Sreeram, Professor (Management Studies) held charge of the study. He designed, supervised and conducted the field work, and prepared the first draft of the report. He was assisted by a team of NIUA's senior staff members. I would like to acknowledge the hard work put in by Dr. K. Sreeram and his team. Dr. Sreeram left NIUA early this year to take up another assignment, and the responsibility of preparing the final draft of the study report was shouldered by the Director, NIUA.

Issues relating to the pricing of urban services are complex; this study heralds a beginning in trying to come to grips with its complexity.

November, 1991

Om Prakash Mathur
Director

PROJECT TEAM

Research Staff :	Dr. K. Sreeram	Professor (Management Studies)
	Dr. M.P. Mathur	Senior Research Officer
	Dr. Madhusree Mazumdar	Senior Research Officer
	Dr. Indu Patnaik	Senior Research Officer
	Mr. Ajay Nigam	Junior Research Officer
	Mr. Vijay Kurra	Research Analyst
Computer Staff :	Mr. T.C. Sharma	
	Mrs. Ravinder Grover	
	Ms. K.D. Laxmi	
	Ms. Aradhana Singal	
Secretariat : Assistant	Mrs. Durga Goplani	

INTRODUCTION

1. General Context

The starting point of this study which has been titled as the **PRICING OF URBAN SERVICES** is that the expenditure that the municipal governments incur on the provision and maintenance of services like water supply, solid waste collection and disposal, drainage, sewerage, primary health, street lighting, and road maintenance is usually in excess of what they are able to recover from the users by way of users charges, taxes, and levies and duties of various sorts. This phenomenon which is common to a large number of municipal bodies of developing and developed countries has been explained in literature though tentatively, in terms of a number of factors, including - (i) inappropriate pricing of services, i.e., the inability of municipal governments to fix the prices of services in a way that they can cover at least the costs that they incur on their provision, and, (ii) the financial mismanagement, i.e., the inability of municipal governments to effectively and efficiently manage the limited financial resources that they have at their command. The available literature on the subject has taken pains to point out that generally, the prices and tariffs which are fixed by municipal governments for services like water supply, or the tax rates that are determined by them for meeting the costs of community services like drainage and sewerage systems, road maintenance and street lighting are grossly inappropriate and low, and that these hardly ever take into account the various elements of costs which inevitably enter into their provision.

The entire exercise of price, tariff and tax rate fixation, it is held, is an independent, if not an isolated exercise, with the result that the incomes and revenues of municipal bodies remain, to a significant extent, depressed, stagnant, and temporally unresponsive.

Studies to which references have been made in subsequent paragraphs indicate that the problem of imbalance between municipal expenditures and municipal incomes lies not only in the inability of municipal governments to be able to raise resources by appropriate pricing mechanisms, but it is equally rooted in the ever-rising municipal expenditures. According to the municipal finance studies, expenditures on a unit basis are unusually high in most municipal bodies because they pay little, if any, attention to the management of financial resources. Several municipal bodies suffer from financial inefficiencies and wastages, make virtually no use of strategies that would enable them to reduce costs, or practice cost effectiveness along major expenditure lines. The result is that the expenditure levels in municipal bodies continue to escalate and widen the imbalance between expenditures and incomes.

The problem of financial imbalances among municipal bodies, it ought to be mentioned, is neither new, nor is it a feature of only the developing countries. According to the National League of Cities (USA), approximately one-third of cities and towns in the US were expected to suffer an actual reduction in revenues during the late 1980s unless, of course, they discovered new

sources of revenues to prop up their finances.[1] Another study shows that in 1987, 52 per cent of the 545 US communities resorted to reduced capital spending, 26 per cent either retrenched their employees or froze fresh recruitments, and 58 per cent increased users fees in order to cover the rising costs and expenditure involved in the provision of services.[2] According to Glassberg, the urban fiscal crisis in the US was now "routine", and the real question was "what gets cuts and how".

In India, municipal governments have faced the problem of finances almost from the time they were created towards the end of the 19th century. During the dyarchy period (1921-37), the incomes of municipalities rose very slowly and, "possibly, in real terms, the revenues in some instances had a fall."[3] According to Rao's study, most municipal bodies during that period encountered serious problems in raising their own funds, and, in many of them, the percentage of tax arrears to demand increased.[4]

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1. Morgan, David, R., and William J. Pammer, Jr, "Coping with Fiscal Stress : Predicting the Use of Financial Management Practices among U.S. Cities", in Urban Affairs Quarterly, Vol.24, Number 1, (69-86), September 1988.

2. Glassberg, A., "The Urban Fiscal Crisis becomes Routine", in Public Administration Review, Vol. 41, (165-172), January 1981.

3. Rao, N.R., Municipal Finance in India, Inter-India Publications, New Delhi, , 1986.

4. Ibid.

In recent years, however, the financial problems of municipal bodies in India have grown and multiplied both in size and complexity. On the one hand, the pressures of population on most municipal bodies have increased at an unprecedented rate. During the period 1971-81, population in nearly 25 per cent of the total number of cities and towns increased by approximately 50 per cent and more; and in another 55 per cent of them, between 20 and 50 per cent. These trends have persisted since 1981. According to the provisional results of the 1991 Census, population pressures in a large number of municipal bodies have become more severe, and are likely to mount in the years to come.

On the other hand, the financial powers and responsibilities of municipal bodies have neither undergone any noticeable changes nor have the municipal bodies seriously attempted to respond to the growing urban challenges. The statutes that govern their powers and responsibilities have, in substance, remained essentially unchanged since their enactment. For instance, few municipal bodies are able to use the financial powers without the endorsement from or approval by the higher levels of governments. They have suffered in recent years neglect of other forms, preventing them from practicing modern management and from introducing cost-efficient financial management techniques in their day-to-day functioning.

Recent studies on the state of municipal finances in India show that in nearly 40 per cent of municipal bodies, expenditures are in excess of the incomes, with the result that many of them have had to divert capital funds for purposes of budget balancing

and meeting the day-to-day operational and maintenance expenditures.[5] Also, the excess of incomes over expenditures in the remaining municipal bodies is, at best, illusory in the sense that they are required by statutes to maintain a reserve or post a surplus of anywhere between one to three months of their total financial requirements. Studies show that the financial position in smaller municipal bodies is particularly disconcerting, as a significant proportion of them are facing a twin problem of rising expenditures and falling incomes, that is, when these are adjusted against price rise.[6]

2. Issues and Objectives

This study on **Pricing of Urban Services** has grown out of such general concerns. What should be done to improve the financial position of municipal bodies? How can the existing mechanisms and systems of pricing be redefined to make municipal bodies financially viable?

It ought to be mentioned that this study is not a full scale enquiry into the finances of municipal bodies; rather, it is limited to two fundamental questions, namely --

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5. National Institute of Urban Affairs, Upgrading Municipal Services : Norms and Financial Implications (2 Volumes), New Delhi, 1989.

6. National Institute of Urban Affairs, The Nature and Dimension of the Urban Fiscal Crisis, Research Study Series No. 18, 1987, New Delhi.

i. **What does it cost the municipal bodies to provide services like water supply and solid waste disposal and treatment?; and**

ii. **what parts of the costs are the municipal bodies able to recover by the provision or sale of these services?**

The study has attempted to suggest as to what might be done to bring about a better balance between the cost of providing the services and the prices recovered from the users. This is viewed as an important aspect of the process of strenghthening the financial viability of municipal bodies.

The study has a brief history. In 1986, the National Institute of Urban Affairs completed under IDRC Contract Number - (3-P-82-0233) a study on **Management of Urban Services**. The main purpose of the study was to locate in selected municipal bodies the management inefficiencies in the delivery of two core services, namely, water supply, and environmental sanitation and waste disposal. This study was among the very first in the country which analysed and probed into the management and organisational aspects of basic services like water supply and solid waste disposal. It yielded extremely useful data, showing the various stages where inefficiencies occurred. The study also produced a list of indicators which represented the inefficiencies of the service delivery systems. In the process, it helped better understanding of what ailed the municipal bodies, and why they were not effective and efficient when it came to the provision of basic services like water supply. The study indicated, albeit indirectly, an absence of sensitivity on

the part of municipal bodies to properly market the services. Although highly revealing, the one aspect that this study did not cover related to the finances of municipal bodies, leaving a lurking feeling that **the failure of the service delivery systems need not be wholly on account of the management inefficiencies but equally on account of the financial problems - that is, attributable either to the rigidities on the income side or the absence of control and monitoring of municipal expenditure.** It is this that has led to the present complementary effort in terms of a more detailed examination of the revenue and expenditure patterns of municipal bodies, revenues representing the recoveries and earnings from the sale of services, and expenditures representing the costs incurred on the provision of services. The services that have been studied are water supply and solid waste disposal.

More specifically, the objectives of the present study on **Pricing of Urban Services** as embodied in the Contract (No.3-P-86-0261), inter-alia, are --

- "to make a factual analysis of the taxation and other revenue raising powers with which the selected local bodies are endowed;
- to analyse the extent to which these powers are being utilised and the principles on which various taxes/fees/charges are fixed; and

- to determine the cost at which the various utilities and services are produced and supplied, and the prices at which these are sold.

3. Spatial Context

This study has been conducted in nine (9) cities and towns -- the same cities and towns where the earlier study on Management of Urban Services was carried out.

Table 1

Population 1981 and 1985 (Estimated), Area, Density, and Financial Specialisation

Sampled cities and towns	Persons		Area in Km2 1981	Population Density (Km2) (1981)	Functional Specialistion
	1981	1985			
Madhya Pradesh					
Bhopal	671,018	9,93,971	284.90	2,355	Service
Sehore	52,190	52,190	16.42	3,178	Service-cum-Industry
Hoshangabad	39,997	39,997	6.27	6,379	Service
Gujarat					
Vadodara	734,473	9,04,000	108.26	6,784	Industry
Dhoraji	76,556	90,000	15.54	4,926	Service-cum-Primary Activities
Kadi	34,595	36,700	2.85	12,139	Service-cum-Trade and Commerce
Tamil Nadu					
Tiruchirapalli	362,045	3,85,100	23.26	15,565	Industry-cum-Trade
Villupuram	77,091	85,010	8.92	9,299	Commerce-cum-Transport
Devakottai	35,684	38,600	12.42	2,873	Service-cum-Trade and Commerce

Selection of towns whose details are given in the earlier study on **Management of Urban Services**, has been made on the basis of population size, population growth rates, functional specialisation, and their civic status. Diversity rather than homogeneity has been the guiding principle in their selection.[7]

A summary of the main characteristics of the nine sampled towns and cities is given in Table 1. As would be seen, cities and towns selected have been drawn from the three states of the country, namely Madhya Pradesh, Gujarat, and Tamil Nadu. Their population sizes vary, and so do their density patterns, and functional specialisation. In terms of the overall financial situation, the sampled cities and towns are largely representative of other cities and towns in the country. As may be seen from the following table (Table 2), of the nine sampled cities, incomes are in excess of expenditures in respect of four cities; in the remaining five, expenditures are in excess of incomes. Thus, these represent both situations.

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7. The procedure for the selection of cities and towns is given in the earlier study on Management of Urban Services, see pages 9-13, Ibid.

Table 2

Total Municipal Revenue Income and Revenue Expenditure, 1984-85

(Rs.)

Sampled cities by size@	Revenues	Expenditure
Class I (over 100,000 population)		
Baroda (Vadodara)	216,942,000	228,637,000
Bhopal	54,224,700	65,498,131
Tiruchirapalli	39,876,226	36,888,547
Class II (50,000 - 100,000)		
Dhoraji	8,752,509	7,981,772
Sehore	8,723,461	8,882,149
Villupuram	6,517,136	7,227,545
Class III (20,000 - 50,000)		
Devakottai	2,399,170	2,537,958
Kadi	3,353,927	3,244,500
Hoshangabad	3,165,454	3,142,929

As indicated earlier, this study has looked at only two services, namely, water supply and disposal of solid wastes. Provision of these services is an essential function in all the sampled municipal bodies. Water supply is chargeable to individual and groups of individuals; on the other hand, disposal of solid wastes is largely, though not wholly, an indirect charge on the consumers.

@ Class I cities are those cities that have over 100,000 population; Class II cities are in the population range of 50,000-100,000, and Class III have population ranging between 20,000-50,000.

The study is based on a detailed analysis of the budgets of municipal bodies of the sampled cities and towns. Budgets relate to the years 1982-83, 1983-84, and 1984-85. In addition, a small scale survey of households has been done in all the nine cities and towns with the purpose of finding out what the households spend on these two services, and what these spendings are as a proportion of the household incomes.

The subject matter of the study report is presented in three sections, with the first two sections dealing with Urban Water Supply and Solid Waste Disposal. In the third section, we have tried to bring together the highlights of the study and suggested a framework for addressing the main issue -- **the issue being, to mention once again, how to bring a better balance between the cost and prices of services.**

Contd....

URBAN WATER SUPPLY

1. Urban Water Supply and Five Year Plans

Provision of safe drinking water has all along been a priority agenda in India's development planning. A national programme to provide safe drinking water to India's urban areas came to be launched as early as 1954 and, since then, progressively larger investments have been made for urban water supply schemes in the Five Year Plans. It was, however, not until the commencement of the Fourth Five Year Plan (1969-74) that the Government of India acknowledged and recognised that the provision of safe drinking water combined with proper facilities for the disposal of wastes constituted the principal environmental control measure against the transmission of water borne diseases, and that bold and fresh initiatives were needed in this respect. But, aside from proposing that efforts for the provision of water supply to urban areas should be intensified, and that the spillover schemes should be expeditiously completed, neither the Fourth Plan nor did its successor (1974-79) offer any fresh initiatives in this respect.

Urban water supply programme received a major impetus in the Sixth Five Year Plan (1980-85) which coincided with the commencement of the International Drinking Water Decade Programme (1980-90). It laid stress on meeting the water supply needs of especially the smaller and medium- sized towns and cities. It also recognised that the problems of urban development were

inextricably linked with the provision of safe drinking water, and emphasised in this regard the need to formulate urban development policies and programmes in an integrated manner.

As a result of the efforts of the past decade, the overall position with respect to safe drinking water in the urban areas of the country has shown some improvement. For instance, in 1980, about 67 per cent of the urban population in the country had access to the municipal water supply system. By 1985, this proportion had risen to about 72 per cent. However, notwithstanding the improvement and the emphasis given to water supply during the Water Decade, and the growing importance of water as an essential good for the survival of mankind, the fact that 28 per cent of the urban population still have no access to safe water is a matter of serious concern. Also, the fact that 72 per cent of the urban population has access to safe water does not necessarily mean that the quantum of water supplied is adequate or that water is equitably distributed among different income groups, or that it reaches out to the poorer sections of the society.

Studies have pointed out to very significant inequities in the availability of water, with the urban poor households having extremely limited access to safe water.[8] Plan investments in the water sector have also not been able to rise fast enough to augment the supply to meet the growing requirements of urban

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8. National Institute of Urban Affairs, The Challenge of Urban Poverty, (forthcoming), New Delhi, see Annex 1.

population. In most cities, the operations and maintenance of water supply systems are extremely dismal, in part, for the reason that the expenditure on maintenance is far below the norms which have been laid down as minimum expenditure norms for proper maintenance. According to a 1989 study, average per capita annual expenditure on water supply is only Rs. 18.6 - this being the average for 157 cities with populations of 100,000 - to one million.[9] The same study also shows that in 99 out of 138 cities, the per capita annual expenditure of water supply is less than Rs. 20 as against the norm of Rs. 67 for cities in this size category.[10]

Water supply is one of those services which is extremely complex in nature, and whose availability, adequacy, and costs are a function of a wide variety of factors. Water is drawn from a number of sources (rivers, lakes, tube-wells, dry-wells, etc.), many of which are seasonal and, therefore the availability is highly fluctuating. Further, there are multiple systems of delivering water to the consumers. Also, there are different methods of charging for water. In many cases, there is differential pricing, with one price for domestic users and another for non-domestic users. A part of the water is also supplied free to selected categories of beneficiaries. In recent

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9. National Institute of Urban Affairs, Upgrading Municipal Services, 1989, New Delhi.

10. Ibid.

years, the provision of water supply has also got entangled with humanitarian issues, the argument being made that water is a nature's gift - a free good and should therefore, be provided free of cost to those categories of households who are unable to pay for it. This position contrast with that where it is suggested that water should be fully paid for irrespective of the economic or social status of the consumers.

2. Statutory Provisions

In India, provision of water supply is a state subject; the Government of India's role is limited to providing technical guidance for the formulation and implementation of water supply schemes. Within the states, according to the existing statutes, the provision of safe and potable water is an obligatory function of the urban local bodies. The Gujarat Municipal Act 1965 (Gujarat Act No. 34 of 1964), which is one of the states where this study has been conducted lays down that "it shall be the duty of every municipality to make reasonable and adequate provision for obtaining a supply or an additional supply of water, proper and sufficient for preventing danger to the health of the inhabitants from the insufficiency or unwholesomeness of the existing supply". In Tamil Nadu, Article 129 of the Act provides that Municipal Councils shall, so far as the funds at its disposal may admit, provide a sufficient supply of water fit for the domestic use of the inhabitants. Similar provisions in respect of the provision of water supply exist in the Acts of other states including that of Madhya Pradesh.

In order to enable the municipalities to perform their obligatory functions such as the provision of safe water, they are endowed with specific responsibilities and financial powers. For example, Section 90 of the Gujarat Municipalities Act provides that "if any municipality supplies water through pipes, it shall take such steps, at such intervals, and on payment of such fees, as may be determined by a general or special order made by the State Government, to ascertain the condition of the water so supplied, by inspection and analysis at a laboratory approved by the State Government in that behalf". **The municipal bodies are empowered by the same statutes to charge for this service, and where such charge is not paid by the consumers, they have the powers to withdraw or sever the water connection.** The Tamil Nadu District Municipalities Act lay down that, --

i. if any water-tax or any sum due for water for the cost of making a connection or for the cost or hire of a meter or for the cost of carrying out any work or test connected with the water supply which is chargeable to any person by or under this Act, is not paid within fifteen days after a bill for such tax or sum has been presented; and

ii. if, after receipt of a notice from the (executive authority) requiring him to refrain from so doing, the owner or occupier continues to use the water or to permit it to be used in contravention of any by-law made under this Act, the municipal bodies will have the authority to cut out water supply.

The Gujarat Municipalities Act provides for the imposition of a general water rate or a special water rate or both for water supplied by the municipality, which may be imposed in the form of a tax assessed on building and lands or in any other form, including that of charges for such supply, fixed in such mode or modes as shall be best adapted to the varying circumstances of any class of cases or of any individual case.

Thus, in pursuance of these provisions in the statutes, the responsibilities of municipal bodies in respect of water supply are wide, and include a whole range of functions such as the identification of the source of raw water, harnessing of those resources for meeting the requirements of population, treatment and filteration, distribution of water, fixing of rates and charges, and proper maintenance of the production and distribution of water. Their responsibilities also include laying of the water lines, as well as taking decisions on the location of public hydrants.

In addition to the municipal bodies, there are other departments and institutions which share the responsibility of providing water. The general division of responsibility is that the Public Health Engineering Departments or parastatal agencies such as the state-level Water Supply and Sewerage Boards assume responsibilties for capital works, and the municipal bodies undertake the task of maintaining these works and of water distribution.

In Gujarat, the municipal corporations plan, design, construct, operate, maintain, finance and collect revenues for their systems but they make use of the expertise of the Gujarat Water Supply and Sewerage Board (GWSSB). In the case of the other local bodies the GWSSB is responsible for financing, planning, designing and execution of projects, while they (the local bodies) only operate and maintain the systems. The GWSSB is reimbursed by the local bodies for the works, and the State Government for the construction costs and its services. In Madhya Pradesh, the Public Health Engineering Department (PHED) is entrusted with the execution of all urban water supply schemes. Operations and maintenance are, however, carried out by the local municipal bodies in some cases and by the PHED in others.There are nearly half a dozen agencies which implement the water supply programme in Tamil Nadu but the Tamil Nadu Water Supply and Drainage Board is responsible for planning, designing and construction of the water supply systems except in the Madras Metro Area. Operation and maintenance of the systems are the responsibilities of municipalities and municipal townships. They also construct minor works within the financial limits prescribed for each grade of towns. In all the nine case study towns the local bodies are responsible for the operation and maintenancce of water supply.

3. The State of Water Supply in Sampled Cities and Towns

Supply of water to the urban areas is basically determined by the sources of water itself - these being the flow sources such as the rivers or streams (surface sources), and the

undersurface sources which include tube-wells, deep borewells etc. Most urban settlements including the towns which form a part of this study use a combination of the surface and undersurface sources. The nature of the sources together with the utilisation ratios are given in the following table -- .

Table 3

Sources and Level of Utilisation of Water Supply, 1984-85

Sampled Cities and Towns	Source of raw water supply	Designed capacity (MLD)	Quantity of water available for distribution (MLD)	Percentage utilisation factor
Vadodara	River/Tubewell	185.00	148.60	80.32
Bhopal	Lake/dugwells/ Tubewells	65.25	53.76	82.39
Tiruchirapalli	River	56.88	48.00	84.38
Villupuram	River	4.55	3.89	85.49
Dhoraji	River	4.50	4.50	100.00
Sehore	Dugwells	2.57	1.34	52.14
Hoshangabad	River/Tubewells/ Dugwells	3.18	2.24	70.44
Devakottai	Tubewells	2.00	2.00	100.00
Kadi	Tubewells	4.00	3.40	85.00

As would be seen, the case study towns draw their supplies of water from various sources. While some of the towns have a single source of supply, other depend on a combination of sources. Tubewells and dugwells are the most common sources; Bhopal, Vadodara, Sehore, Devakottai, Hoshangabad and Kadi are dependent on them. Rivers are the only source of water supply in

Tiruchirapalli, Dhoraji and Villupuram, while in Vadodara and Hoshangabad river sources supplement the tubewells. Bhopal is also dependent on a lake for its water supply. Here too, dugwells and tubewells supplement the water supply sources.

The designed capacity of the water supply systems evidently varies in the sampled towns, with larger cities having larger designed capacities. The percentage utilisation factor is consistently higher in cities with over 100,000 population, but varies in the other towns with cent per cent utilization reported by Dhoraji and Devakottai but only a little over 50 per cent by Sehore.

In the towns under consideration, the population served in most cases is higher than the figure for urban India (72.88%). Tiruchirapalli has reported cent per cent coverage. In Vadodara, Kadi and Hoshangabad over 90 per cent of the population is served by water supply. Low coverage has been reported by Villupuram and Sehore (Table 4).

Table 4

Population Served by Water Services, 1984-85

Sampled cities and towns	Estimated population 1984*	Population Served by Water Supply in 1985			Unserved Population %	Per Capita Supplies (LPD)
		Domestic	Public standposts	Total served		
Vadodara	900,000	700,000 (77.78)	166,762 (18.53)	866,762 (96.30)	3.70	165
Bhopal	893,971	476,039 (53.24)	194,439 (21.75)	670,478 (74.99)	25.01	60
Tiruchirapalli	385,700	269,990 (70.00)	115,710 (30.00)	385,700 (100.00)	-	124
Villupuram	85,010	25,970 (30.54)	27,000 (31.76)	52,970 (62.30)	27.70	46
Dhoraji	90,000	62,000 (68.89)	10,074 (11.19)	72,074 (80.08)	11.92	50
Sehore	62,099	30,422 (48.99)	13,047 (21.01)	43,469 (70.00)	30.00	21
Hoshangabad	52,294	31,408 (60.06)	16,180 (30.94)	43,588 (91.00)	9.0	43
Devakottai	38,600	21,700 (56.21)	12,000 (31.08)	33,700 (87.29)	12.71	51
Kadi	36,700	18,000 (49.04)	16,592 (45.20)	34,592 (94.24)	5.76	93

* These figures were provided by the concerned local bodies.

An examination of the two modes of supply, namely, domestic connection and public standposts, shows that 25.33 per cent of the population in the case study towns is dependent on stand posts. There is, however, no direct relationship between the size of the town and percentage of population dependent on stand posts.

The extent to which water is used for non-domestic purposes affects the total revenues from water supply.

The data on water supplied to non-domestic users are weak and indirect, and estimates have, therefore, been made by subtracting the quantity of water distributed to domestic users from the total water supplied (Table 5). These figures are on the higher side because they include leakages from the distribution system, and unauthorized tapping of water connections. Table 5 shows that non-domestic consumption is significant in Class I towns, especially in Bhopal and Vadodara, where this proportion is 27.93 per cent and 25.76 per cent respectively. In Tiruchirapalli, non-domestic consumers use 15 per cent of the total water distributed. In the smaller towns non-domestic use is insignificant.

Table 5

Water Available for Non-Domestic Purposes, 1984-85

Sampled cities and towns	Water distributed (MLD)	Water distributed (MLD) through			
		Domestic connec-tions	Standposts	Water supplied for domestic purposes	Balance (Non-domestic uses)
Vadodara	148.60	94.33	17.98	112.31	36.29 (25.76)
Bhopal	53.76	31.52	3.88	35.40	18.36 (27.93)
Tiruchirapalli	48.00	35.68	5.12	40.80	7.20 (15.00)
Villupuram	3.89	3.08	0.30	3.38	0.51 (13.11)
Dhoraji	4.50	3.29	0.36	3.65	0.85 (18.88)
Sehore	1.34	0.86	0.35	1.21	0.13 (9.70)
Hoshangabad	2.24	1.68	0.25	1.93	0.31 (13.83)
Devakottai	2.00	1.60	0.30	1.90	0.10 (0.50)
Kadi	3.40	3.16	0.24	3.40	Nil

Note : 1. Figures in brackets are percentages to total water supplied
2. Figures are inclusive of leakages.

On the whole, the towns which form a part of this study are characterised by four features as far as water supply is concerned. These are -

i. Multiple sources of water supply;

ii. variable levels of utilisation of the designed capacities;

iii. supplies through standposts; and

iv. high non-domestic use of water in large cities.

4. Components of Costs in Water Provision

Broadly speaking, the expenditure on municipal services falls into two categories, namely, (i) operations and maintenance expenditure, and (ii) the repayment of capital loans and interest charges. The operations and maintenance of water supply involves incurring expenditure in several stages including the following -

- collection or pumping of water from the source of supply;
- treatment of water;
- transmission and distribution of water to users;
- accounting and billing expenses; and
- administration and general expenses.

i. Water Treatment

The extent of the treatment of raw water and, consequently, the costs incurred depends on the initial quality of water. Water drawn from undersurface sources requires less expenditure on treatment than water from surface sources. The findings of the first phase of this study showed that with the exception of Bhopal and Vadodara, no full-fledged water treatment was undertaken in any of the sampled towns. In Bhopal, surface water is treated at three different locations, whereas in Vadodara water is drawn from a single location and undergoes treatment in one plant. Even here, all the raw water does not undergo full treatment. While the water drawn from Sarovar undergoes full-scale treatment, only chlorine is added to the water drawn from the Mahi River. In Bhopal, a part of the tubewell water is being directly pumped into the

distribution system. In other towns, which are mainly dependent upon ground water sources, only bleaching powder or chlorine is used for purposes of treatment and filteration. On the whole, costs incurred on the treatment of water are not substantial, and form only a small proportion of the total costs incurred on the provision of water.

ii. Transmission and Distribution

Transmission and distribution costs are usually very high. Undersurface sources of water entail a larger expenditure on electricity because of pumping. In Vadodara where surface sources are augmented by underground sources, the electricity charges account for 67.36 per cent of the total expenditure incurred on water supply, whereas in Tiruchirapalli which is solely dependent upon river water, electricity accounts for 35 per cent of the total expenditure on water supply. In Hoshangabad and Kadi which are small towns of less than 50,000 population and where tubewells are the main source, electricity charges are over 40 per cent of the total expenditure on water.

The density of outlets in the water supply system also have an impact on operating costs. The density of outlets depends on (i) the type of land use; (ii) population density, and (iii) the number of domestic connections versus standposts. Thus, industrial outlets may involve fewer and larger pipes with greater flow capacities and thereby lower pumping costs. A larger proportion of high rise buildings

increases the pumping costs. The higher the density of population, the lower are the per capita costs. An examination of the figures for Kadi and Hoshangabad makes this point clear. In Kadi, the density of population is 8,350 per km. whereas in Hoshangabad the corresponding figure is 2,337, and these differences in density are reflected in the operating and maintenance costs. Further, the topography of the area covered by the water supply system has a direct bearing on operating costs since this factor determines the cost of the distribution system. An uneven and irregular terrain increases the pumping costs and also requires a larger network of pipes. On the other hand, a system based on gravity has considerable savings in operating costs. The Bhopal distribution system is one such example. The extent of utilization of plant capacity is another factor which has a bearing on the average unit costs. Overburdening the limited capacity may result in higher costs because of diminishing marginal productivity.

iii. Accounting and billing expenses and administration and general expenses

Towns with a large proportion of metered connections incur larger accounting and billing expenses. On the other hand, stand post supplies are free of charge and no billings are involved. However, it is argued that charging for water is important because it prevents wastage. For financing water supply projects, the financing agencies set a pre-condition that water charges should be increased and

connections should be metered. A study of urban areas in Gujarat indicates that the introduction of metered connections may not always be feasible in the domestic section of small towns owing to small scale operations.[11]

The administrative arrangements and managerial responsibility for water provision also influences the average unit cost. Where the service is operated by an independent agency, these costs tend to be higher. If the system is a part of an existing set-up such as a Municipal Council, the costs are reduced or concealed because all operations are carried on in one place and the staff may have multiple responsibilities. Labour cost is not expected to account for a significant proportion of the total cost for water provision because of the capital intensive nature of the water production processes. Wherever higher expenditure on 'Establishment' is discernible, either the salary structure is high or the undertaking is probably engaging more manpower than is necessary.

5. Expenditure on Water Supply Provision

What do the municipal bodies spend on water supply provision, or in other words, **what does it cost the municipal bodies to provide water supply is one of the central questions dealt with in this study.** The question implies that the expenditure incurred on water supply varies from place to place,

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11. Operations Research Group, Feasibility of Introducing Water Meters in Urban Area in Gujarat, 1984, Ahmedabad.

and while a part of the expenditure variation may be on account of the external factors, other factors causing such variations are internal to the system. In this section, we have analysed the pattern of expenditure on water supply, in order to better understand what it costs the municipal bodies to provide safe water, and what are the main cost constituents. We have used for this purpose three indicators namely, per capita expenditure on water supply, per unit cost of providing water supply, and expenditure on water supply as a proportion of total municipal expenditure.

Table 6 below gives the total and per capita expenditure on water supply in the sampled cities and towns. According to the table which has been prepared from the budgets of the municipal bodies, the total expenditure and the per capita expenditure on water supply vary considerably among the sampled towns. As would be expected, **the larger-sized cities spend more on water supply provision, with Vadodara spending on a per capita basis Rs.27.77,** and incurring a total expenditure of Rs.26 million on this service. Bhopal has shown a comparatively low per capita expenditure in this class of cities. Among the towns in the population category of 50,000 - 100,000, expenditure in Sehore is disproportionately high (Rs.107.07), which is due to a massive grant given by the State Government to repay the capital loans. Repayment of loans alone accounts for over 97 per cent of the total expenditure on water supply in this town. The amount spent by Villupuram municipal body is extremely low, both in total and in per capita terms. **The cost differentials among small towns**

are not significant, with Devakottai showing a per capita expenditure of Rs.4.27 and a total expenditure of Rs.163,177. One notable feature is the relatively low level of expenditure incurred across the towns in Tamil Nadu, which is partly attributed to the fact that the water is not subjected to full-fledged treatment.

Table 6

Annual Expenditure on Water Supply, 1984-85

Sampled cities and towns	Expenditure (Rs.)	Per capita expenditure (Rs.)
Vadodara	26,053,000	27.77
Bhopal	11,418,879	12.77
Triruchirapalli	8,461,966	22.17
Villupuram	339,940	4.06
Dhoraji	1,369,002	15.69
Sehore	6,655,103	107.17*
Hoshangabad	487,356	8.42
Devakottai	163,177	4.27
Kadi	369,538	9.50
Zakaria Committee Norm		Rs. 60.07 (for cities in the population range of 1 - 500,000

* Includes a special grant from the State Government to repay a loan.

Higher or lower per capita expenditure on water supply does not by itself give a correct position of the cost of water supply. In order to obtain a more realistic assessment of what it costs the municipal bodies to supply water, it is necessary to look at the data on per unit costs which are given in the following table.

Table 7

Per Unit Cost of Supplying Water, 1984-85

Sampled cities and towns	Total water supplied (Annual) (ML)	Operations and maintenance expenditure (Rs.)	Operation and maintenance costs per 1000 ltr. (Rs.)
Vadodara	54,239	26,053,000	0.48
Bhopal	19,622	11,418,879	0.58
Tiruchirapalli	17,520	8,461,966	0.48
Villupuram	1,420	339,940	0.24
Dhoraji	16,433	1,369,022	0.83
Sehore	489	189,560	0.39*
Hoshangabad	810	487,356	0.60
Devakottai	730	163,177	0.22
Kadi	1,241	369,538	0.30

* (Excluding the loan component)

The table points out that **it costs the sampled municipal bodies anywhere between Rs.0.22 and Rs.0.83 to supply 1000 litres of water.** According to the table, the supply costs fall into three broad tracks:

i. **Low cost track:** Municipal bodies spending anywhere between Rs.0.22 and Rs.0.39 per 1000 litres of water. These include very small municipal bodies of Devakottai (Rs.0.30), and Sehore (Rs.0.39);

ii. **Medium cost track:** Municipal bodies spending between Rs.0.40 and Rs.0.60 per 1000 litres. These include all the three major sampled cities of Vadodara, Bhopal and Tiruchirapalli, and

iii. **High cost track:** Municipal bodies spending on a per unit basis extremely high amounts. Dhoraji is the only town in this category where the cost of supplying 1000 litres of water is as high as Rs. 0.83.

Expenditure on water supply as a percentage of total municipal expenditure is given in Table 8. It varies from as much as 75 per cent in Sehore to as little as 4.70 per cent in Villupuram. Although Vadodara spends the largest amount on water supply, this amount forms only 11 per cent of the total municipal expenses. In the other Class I towns, namely, Tiruchirapalli and Bhopal water supply services account for about one-fifth of the total expenditure of concerned local bodies. As in the case of other indicators also, water supply forms a relatively smaller proportion of total municipal expenditure in the Tamil Nadu towns.

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Table 8

Municipal Expenditure and Expenditure on Water Supply, 1984-85

Sampled cities and towns	Expenditure		
	Total (Rs.)	Water supply (Rs.)	% of expenditure on water supply to total
Vadodara	228,637,000	26,053,000	11.39
Bhopal	65,498,131	11,418,879	17.43
Tiruchirapalli	36,888,547	8,461,966	22.94
Villupuram	7,227,545	339,940	4.70
Dhoraji	7,981,772	1,369,002	17.15
Sehore	8,882,149	6,655,103	74.93
Hoshangabad	3,142,929	487,356	15.51
Devakottai	2,537,958	163,177	6.43
Kadi	3,244,500	369,538	11.39

There is a reasonable degree of stability in the levels of expenditure on water supply over a period of time, with the expenditure levels in the case of larger municipal bodies being strikingly consistent for the three years, 1982-83 to 1984-85, for which data have been compiled for this study. **It is only in the case of smaller municipal bodies where the water supply sources are subject to high risks and fluctuations that discontinuities in the expenditure pattern are pronounced and noticeable.** For instance, as may be seen in the following tables, in Dhoraji, Sehore and Villupuram, the expenditure pattern has undergone quick shifts between these three years. In other small towns too, shifts are quite considerable.

Table 9

Percentage of Expenditure on Water Supply to Total Municipal Expenditure, 1982-83 to 1984-85

Sampled cities and towns	Years		
	1982-83	1983-84	1984-85
Vadodara	9.59	10.89	11.39
Bhopal	21.97	18.97	17.49
Tiruchirapalli	21.99	21.38	22.94
Villupuram	5.41	2.79	4.70
Dhoraji	17.71	12.19	17.15
Sehore	47.75	32.56	74.93
Hoshangabad	17.10	8.55	15.51
Devakottai	4.08	7.13	6.43
Kadi	14.85	13.75	11.39

Table 10

Per Capita Expenditure on Water Supply, 1982-83 to 1984-85

Sample cities and towns	Per capita (Rs)		
	1982-83	1983-84	1984-85
Vadodara	20.33	25.82	27.77
Bhopal	16.38	14.19	12.77
Tiruchirapalli	20.86	19.87	22.17
Villupuram	4.11	2.02	4.06
Dhoraji	11.42	8.51	15.69
Sehore	42.30	22.27	107.17
Hoshangabad	8.22	4.62	8.42
Devakottai	2.27	4.78	4.27
Kadi	9.23	10.49	9.50

What are the main components of expenditure on water supply? The data from the budgets show that **electricity is the single most important component of expenditure in the provision of water supply.** As would be seen in Table 11, in cities having population of over 100,000, expenditure on electricity is as high as 73.8 per cent in Tiruchirapalli, 54.4 per cent in Vadodara, and 49.4 per cent in Bhopal. In Dhoraji and Kadi also, expenditure on electricity is a major item of expenditure on water supply provision. In the remaining towns, separate information on the expenditure on electricity is not available, and is merged with miscellaneous items.

Establishment which includes payment of salaries and wages to the staff engaged in various stages of water production, treatment and filteration, and distribution is yet another important component of expenditure on water supply. In percentage terms, **establishment costs in smaller towns are larger as compared with the establishment costs in the larger towns.**

In the following table we have brought together the information on the main indicators of expenditure on water supply.

Table 11

Expenditure on Water Supply by Components, 1984-85

Sampled cities and towns	Percentage expenditure on						
	Establishment	Electricity	Repairs and maintenance	Loans repayment	Materials	New works	Miscellaneous
Vadodara	10.29	54.42	11.65	-	6.54	0.88	16.22
Bhopal	21.10	49.37	6.88	-	5.32	8.76	8.56
Tiruchirapalli	9.03 (20.58)	32.37 (73.77)	0.02 (0.04)	56.12 -	2.46 (5.60)	-	-
Villupuram	38.88 (89.75)	4.28 (9.87)	0.16 (0.38)	56.68 -	-	-	-
Dhoraji	20.16 (32.61)	36.61 (59.20)	-	38.17	4.97 (8.03)	-	-
Sehore	1.39 (48.74)	-	0.05 (1.61)	97.15	-	-	1.41 (49.65)
Hoshangabad	25.99	-	-	-	-	-	74.00
Devakottai	31.72 (40.38)	-	-	21.45	-	-	46.83 (59.62)
Kadi	5.31	67.25	6.69	-	13.80		6.96

Note : Figures in brackets exclude the loan component.

Why do the costs vary? Are factors like the source of water supply, or the density patterns, or the per capita supplies important in determining the costs of delivering water to the different groups of beneficiaries? In Table 12, we have brought together the key variables alongwith the main expenditure indicators. An analysis of this table shows that there is practically no consistency in the pattern of the cost behaviour. Thus, in Vadodara and Tiruchirapalli where the population densities are very different from each other, and where the sources of water supply vary, the operations and maintenance

costs on a unit basis are largely the same. Similarly, in Villupuram and Devakottai, despite the variations in the density patterns and the sources of water, the per capita and the operating costs are surprisingly similar, suggesting that the **costs are a function of a multiplicity of factors, which can not be easily isolated and explained.**

It is important to reiterate that it costs the municipalities anywhere between Rs. 0.22 to Rs.0.83 per 1,000 litres of water to maintain and operate the water supply system, and the next logical question is how much of these costs are the municipal bodies able to recover by the levy of taxes, and charging of various kinds of water tariff.

Expenditure on Water Supply, 1984-85
A Summary Statement

Sampled cities and towns	Density per sq. km. (1981)	Source of water supply	Daily per capita water supply (lpcd)	Expenditure (Rs.)		
				Per capita	Per 1,000 ltrs	% to total municipal expenditure
Vadodara	6,784	River/Tubewell	165	27.77	0.48	11.39
Bhopal	2,355	Lake/Dugwell & Tubewell	60	12.77	0.58	17.49
Tiruchirapalli	15,565	River	124	22.17	0.48	22.94
Villupuram	9,299	River	46	4.06	0.24	4.70
Dhoraji	4,926	River	50	15.69	0.83	17.15
Sehore	3,178	Dugwells	21	107.17@	0.39*	74.93@
Hoshangabad	6,379	River/Tubewell & Dugwells	43	8.42	0.60	15.51
Devakottai	2,873	Tubewells	51	4.27	0.22	6.43
Kadi	12,139	Tubewells	93	9.50	0.30	11.39

@ Including the grant component; * Excluding the grant component

6. Charging for Water : Existing Practices

What do the municipal bodies earn from the sale of water, and what proportion of the total costs are they able to recover from the sales is clearly the central question underlying this study, It is dealt with in this and the following section. Before presenting the data in respect of question, it is useful to point out that in theory, incomes from the sale of water are expected to cover --

i. all operating costs, such as wages and materials together with depreciation;
ii. operating costs and that portion of the capital expenditure which is needed for replacement and renewals; and,
iii. a small amount towards creating fresh capital assets -- the capital assets for meeting the future requirements of water.

In practice, however, **most local bodies in India find it exceedingly difficult to meet even the expenditure on operating and maintaining water supply system; rarely are the municipal bodies able to generate internal resources for meeting the future needs or for loan repayments.** This is, in most cases, attributable to the generally low water tariffs, high proportion of unmetered connections, and a large population served by stand posts which provide free supply.

The water tariff structure in India is based on two principles : (i) cost recovery, and (ii) equity. Generally,

water rates are fixed with cost recovery in mindalthough free water is supplied to the poorer sections through stand posts. The latter implies differential water rates which increase with the paying capacity of households or the volume of consumption.

There are three methods of charging for water which, in technical terms, are referred to as charging vehicles. These are-

i. **As a Percentage of Rateable Value :**

It is an indirect method of charging for water, and involves a water tax on the annual value of the premises calculated on the basis of gross annual value or rent. Though this method of collection is widely used, there is no scientific relationship between the annual value of premises and water consumption. This system, however, recognizes the principle of "ability to pay". The assumption is that the higher the incomes, higher is the annual value of houses, and consequently, higher should be the taxes. Tax based on annual value is also used as a minimum charge even where meters are installed, and, in case consumption is below the minimum level, a rebate is given in some places based on the charges calculated on actual consumption.

ii. **Charges based on Meter Reading :**

This is a scientific method of charging for water as it is based on the quantity of water consumed. It helps to build up accurate data on the pattern of consumption and demand, which are very valuable for planning and co-ordination. However, inaccurate measurement owing to

defective meters and fraudulent practices, administrative difficulties in meter reading, billing, and so on, have become major problems in the country, and have consequently affected the costs of water supply considerably. Although meter reading is an accurate method, it does not take into account the ability to pay. A study carried out in Gujarat indicates that metering may not be feasible in small towns because of the small scale of operations, and high average cost of installation of meters and their maintenance. According to the study, it works out to be Rs. 60 per year at 1985 prices.

In larger towns, the norms practiced for metering are -

a. Continuity in the supply of water, and, at least 70-80 lpcd for better functioning;

b. Organisational structure and an efficient maintenance programme as well as billing of consumers.

iii. Other Methods and Systems :

Other methods include ferrule rating which is a preferred method because it simplifies the accounting procedures and eliminates the problems of reading and repairing of water meters and billing of the customers. However, since charges are fixed there is no control on the amount of water consumed. It is also generally difficult to maintain pressures at all points of the distribution system. The same size of ferrule discharges varying quantitites of

water resulting in unequal service for a particular payment. In addition, the tendency for the consumers to get small size ferrules in high pressure areas can not be controlled. This leads to a reduction in the earnings without corresponding reduction in consumption.

The system of tariff (domestic consumption) in the local bodies under consideration is as follows :

State	Local Body	Charging Vehicle/s
Gujarat	i. Vadodara	(a) Meters (b) Ferrule rates
	ii. Dhoraji	(a) Ferrule rates
	iii. Kadi	(a) Ferrule rates
Madhya Pradesh	i. Bhopal	(a) Meters (b) Ferrule rates
	ii. Sehore	(a) Fixed rate
	iii. Hoshangabad	(a) Ferrule rates
Tamil Nadu	i. Tiruchirapalli	(a) Water tax (b) Meters for excess water or minimum tap rate (c) Fixed rates
	ii. Villupuram	(a) Water tax (b) Meters for excess water or minimum tap rate
	iii. Devakottai	(a) Water tax (b) Meters for excess water or minimum tap rate.

It will be noted that larger towns have metered connections while the smaller towns have unmetered connections. Tamil Nadu is an exception where all the three towns under study have metered connections. Of the nine towns, only the towns in Tamil Nadu, and Bhopal and Vadodara have metered connections.

The rates, water tax and water charges vary from town to town, and there is no uniformity not only between towns belonging to the different states but also towns within the same state. The enclosed chart gives the rates for metered and unmetered connections, separately for domestic and non-domestic consumption.

As will be seen, there are significant variations in the rates as applicable to the different categories of consumers and according to the charging vehicles. These vary according to the --

i. rates per quantity of water supplied in the different towns. In Bhopal, it is Rs. 0.30 per 1,000 litres; while in Vadodara, it is Rs. 0.50. In other places, it is Rs. 0.50 but there is a minimum monthly charge;

ii. the size of the diameter in the case of unmetered supplies;

iii. number of connections without any regard to the size of the pipe diameter;

iv. variation in the rate in the case of a second or third connection in the same house; and

v. the user - whether the use is for domestic consumption or non-domestic consumption.

Table 13

Water Rates and Tariff Structurei in the Sampled Cities and Towns

Sampled Cities and Towns	Water Tax	Domestic Consumption		Non-Domestic Consumption	
		Metered	Unmetered	Metered	Unmetered
Vadodara	No	Rs.0.50	Rs.2 p.m. for 1/2" diameter with Rs.1 p.m. for additional family. Rs.4.50 for 3/4" diameter with Rs.2.25 for additional family. Rs.7.50 for 1" diameter with Rs.5 for additional family	+ Rs.0.50 per 1000 litres for Industrial Rs.1.00 per 1000 litres for commercial	
Bhopal	No	Rs.0.30 per 1000 litres	+ Rs.3 p.m. for 1/2" diameter + Rs.6 p.m. for 3/4" diameter + Rs.8 p.m. for 1/2 diameter	+ Rs.0.05 per 1000 litres (Commercial) + Rs.0.30 per 1000 litres for filtered waterr and Rs. 0.25 for raw water (Industrial)	- 1/2" diameter Rs.115 p.m. 3/4" diameter Rs.200 p.m. and 1' diameter Rs.300 p.m. for Institutional
Tiruchirapalli	7% of the A.R.C.	Rs.0.50 per 1000 litres or minimum charge of Rs.8.50	Rs.8 p.m.	Rs.2 per 1000 litres or Rs.20 p.m. minimum charge	
Villupuram	4% of the A.R.V.	Rs.0.50 per 1000 ltres minimum charge of Rs.7.50 p.m.	-	Rs.1 per 1000 litres p.m.	-
Dhoraji	Nil	-	1/2" diameter Rs.5 p.m.	Nil	.2" diameter Rs.10 p.m. (induatrial) 1" diameter Rs.20 p.m. (commercial)
Sehore	Nil	-	Rs.8 p.m. per connection	Nil	Rs.20 p.m. per connection (commercial)

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Sampled Cities and Towns	Water Tax	Domestic Consumption		Non-Domestic Consumption	
		Metered	Unmetered	Metered	Unmetered
Hoshangabad	Yes	Rs.0.27 per 1000 litres	1/2" diameter at Rs.3 p.m. 3/4" diameter at Rs.4 p.m. 1" diameter at Rs.6 p.m.	Nil	1/2" diameter Rs.6 p.m. 3/4" diameter Rs.10 p.m. 1" diameter Rs.12 p.m.
Devakottai	3% of the A.R.V.	Rs.0.60 per 1000 litres minimum charge of Rs.7.50 p.m. per connection	-	Rs.1.50 per 1000 litres p.m.	
Kadi	Yes	-	1/2" diameter at Rs.6 p.m.	Nil	1/2" diameter Rs.33 p.m. (Industrial) 1/2" diameter Rs.10 p.m. (Commercial)

(A.R.V. : Annual Rental Value)

For non-domestic consumption, rates are based on the type of use : commercial, industrial and institutiuonal and on the type of water supplied, that is, unfiltered and raw or filtered. Superimposed on these distinctions is the difference on the basis of charging. While some towns use ferrule charges, other have meters. The highest charges for metered supply are levied in Tamil Nadu with as much as Rs.2.00 for 1,000 litres in Tiruchirapalli with no differentiation between the various types of non-domestic use. On the other hand, Bhopal charges only Rs.0.30 for filtered water and Rs, 0.25 for raw water (industrial) and Rs.0.35 per 1,000 litres (commercial). Amongst the towns charging ferrule rates, Vadodara has extremely high charges, as much as Rs. 7.50 for a 1" diameter connection. Sehore charges a fixed rate of Rs.20 p.m. per commercial connection, irrespective of the level of water consumed.

2. Earnings from Water Supply

Incomes of municipal bodies from water supply accrue from two sources, namely, i. water tax, and ii. water rates and charges. High or low incomes are entirely a function of the rates of water taxes and water charges, and the efficiency with which these are applied and collected. Incomes also depend, as pointed out earlier, on the quantum of water which the municipal bodies supply through stand posts, and which is not charged for by them.

This section presents details of the incomes of sampled municipal bodies earned from the sale of water. The details relate to i. per capita earnings, ii. earnings per unit of water, and iii. earnings from water supply as a proportion of total municipal incomes. Table 14 gives the total and per capita earnings from water supply. According to the table, **earnings from water supply are uniformly low and depressed in all municipal bodies**, and particularly so in Bhopal, Dhoraji and Kadi. In Bhopal, the per capita earnings amount to only Rs. 2.77 which is explained by the extremely low water tariff for non-domestic use. This factor alone has affected the earnings of Bhopal municipal body considerably. On a per unit basis, the earnings from water are only Rs. 0.13 per 1,000 litres. in Bhopal.

The table further shows that the annual per capita earnings from water supply for Tiruchirapalli are Rs. 11.44, which are several times higher than that of Bhopal. Similarly, the per capita earnings from the sale of water in Villupuram (Rs.11.34) and Devakottai (Rs.12.55) are significantly higher compared to that in Sehore, for reasons already given in the earlier part of the study, being the only exception. **One of the reasons for the higher level of earnings in Tamil Nadu towns is the levy of a water tax on the annual rateable value.** In Tiruchirapalli, the water tax is 7 per cent of the annual rateable value which is 4 per cent and 3 per cent respectively in Villupuram and Devakottai. Yet another very important reason for the higher level of earnings in the Tamil Nadu towns is the efficient

collection of water taxes and water charges. In Villupuram and Devakottai, the 1984-85 water tax collections were reported to be as high as 96.9 per cent and 98.9 per cent, and in Tiruchirapalli, it was assessed at 82.8 per cent of the total tax demanded. The following table provides the relevant information.

Table 14

Per Capita Earnings from Water Supply, 1984-85

Sampled Cities and Towns	Total earnings from water (Rs.)	Per capita earnings (Rs.)
Vadodara	10,883,954	11.60
Bhopal	2,472,457	2.77
Tiruchirapalli	4,365,845	11.44
Villupuram	949,995	11.34
Dhoraji	453,434	5.20
Sehore	3,533,421	56.90
Hoshangabad	213,836	3.70
Devakottai	479,759	12.55
Kadi	245,935	6.32

* Includes a grant from the State Government for repayment of loan.

On a per unit basis, like in the case of cost tracks, earnings fall into three broad tracks. These are :

i. **High earnings track** consisting of Villupuram (Rs. 0.67) and Devakottai (Rs.0.66),

ii. **Medium earnings track** which includes towns in all the size groups, namely Sehore (Rs. 0.34), Dhoraji (Rs. 0.28), Hoshangabad (Rs. 0.26), Tiruchirapalli (Rs. 0.25), and Vadodara and Kadi, each with an earning of Rs. 0.20 per 1,000 ltrs of water, and

iii. **low income earning track** consisting of Bhopal.

Table 15

Per Unit Earnings from Water Supply, 1984-85

Sampled Cities and Towns	Earnings per 1,000 ltrs (Rs.)
Vadodara	0.20
Bhopal	0.13
Tiruchirapalli	0.25
Villupuram	0.67
Dhoraji	0.28
Sehore	0.34
Hoshangabad	0.26
Devakottai	0.66
Kadi	0.20

Table 16 is a statement of earnings from water supply services as a percentage of the total municipal revenues. In 1984-85, the highest percentage was recorded by Sehore, but this was an exceptional case because of the grants that it received for meeting its capital loan obligations. Generally, **the earnings from water supply as a proportion of the total earnings seem to be lower in larger towns as compared to the smaller towns.** Thus, while amongst the Class I towns the contribution of water supply earnings is the highest in Tiruchirapalli at 10.95 per cent, in Devakottai, the corresponding figure in 20 per cent. During the period under study the contribution of revenues from water supply changed only marginally except in cases where grants were provided by the State Government.

Table 16

Percentage of Revenues from Water Supply Services to Total Municipal Revenues

Sampled cities and towns	1982-83	1983-84	1984-85	Three years average (Percentage)
Vadodara	4.97	5.26	4.55	4.93
Bhopal	12.00	11.47	10.95	11.47
Tiruchirapalli	5.59	5.24	5.02	5.28
Villupuram	5.64	4.99	5.18	5.27
Dhoraji	6.20	17.52	40.50	21.41
Sehore	14.06	15.98	14.58	14.87
Hoshangabad	21.22	19.04	20.00	20.09
Devakottai	4.61	4.74	6.76	5.37
Kadi	13.35	7.01	7.33	9.23

Table 17 gives details of the various sources of earnings from water supply which show that **the charges from the sale of water are the mainstay of earnings from water.**

In Vadodara and Bhopal, these account for over 90 per cent of the total earnings from water supply. In Tiruchirapalli, water tax is the main source of income. High earnings from "excess water charges" suggest that the majority of water meters are out of order, and the charges are being calculated on average monthly consumption basis. In Vadodara, earnings from metered connections have shown a steady increase, whereas in the case of incomes from unmetered connection no distinct trends are discernible.

Table 17

Revenue Receipts from Various Sources

Local Body	1982-83	1983-84	1984-85
a. Bhopal			
i. Water Rates (Retail)	20,96,254 (74.11)	22,97,680 (78.75)	21,13,867 (85.49)
ii. Water Rates (Bulk)	6,81,919 (24.43)	5,21,521 (17.88)	2,43,878 (9.86)
b. Tiruchirapalli			
i. Water Tax	17,14,210 (44.80)	17,95,370 (42.03)	18,33,100 (41.98)
ii. Excess Water Charges	5,38,230 (14.06)	7,49,430 (17.54)	8,18,299 (18.74)
iii. Tap Rate Charges	12,35,930 (32.30)	13,82,660 (32.37)	13,41,231 (30.72)
c. Vadodara			
i. Water Charges			
a. Metered	63,09,000 (64.90)	67,41,000 (69.64)	77,98,000 (71.64)
b. Unmetered	23,36,000 (26.90)	21,80,000 (22.52)	23,65,000 (21.73)
a. Dhoraji			
i. Water Fees	3,87,470 (100.00)	3,62,476 (100.00)	4,53,434 (100.00)
b. Sehore			
i. Sale of Water	1,85,507 (100.00)	1,33,954 (21.12)	1,68,421 (4.77)
ii. Grants	-	5,00,000 (78.87)	33,65,000 (95.23)

Contd....

Local Body	1982-83	1983-84	1984-85
c. Villupuram			
i. Water Tax	5,11,486 (53.08)	5,79,759 (50.75)	5,63,656 (59.33)
ii. Excess Water Charges	3,93,257 (40.81)	4,14,621 (36.29)	3,40,956 (35.89)
iii. Tap Rate Charges	50,037 (5.19)	-	-
a. Devakottai			
i. Water Tax	1,66,917 (38.52)	1,73,622 (38.38)	1,87,525 (39.08)
ii. Tap Rate Charges	2,40,913 (55.59)	2,50,134 (55.30)	2,72,151 (56.72)
b. Hoshangabad			
i. Water Tax	1,11,662 (92.70)	1,36,939 (92.91)	2,05,891 (96.28)
ii. Water Sale	8,786 (7.29)	9,993 (6.74)	7,432 (3.48)
c. Kadi			
i. Water Tax	1,70,000 (50.15)	2,10,000 (100.00)	2,35,000 (95.55)
ii. Grants	1,69,008 (49.85)	-	10,935 (4.45)

Note: Income from meter rent, connection charges, etc. which account for negligible proportions of the total receipts have been excluded.

Amongst the Class II towns (50,000-100,000 population size), both Dhoraji and Sehore earn revenues from either water fees or sale of water; there are no other sources of earnings. In Villupuram, income from "Water Tax" accounts for 59.33 per cent of the earnings, while "Excess Water Charges" contribute 35.89

per cent. Income from the latter is quite substantial, though, in percentage terms, it has registered a decline of about 4.52 per cent points between 1982-83 and 1983-84.

On an average, income from water tax constitutes over 38 per cent of the total water receipts in Devakottai, whereas the income from "Tap Rate Charges" accounts for nearly 56 per cent. The 3-year average figures for Hoshangabad show that water tax accounts for nearly 94 per cent, and the sale of water for rest of the income.

Table 17a

Sources of Earnings for Water in Tamil Nadu, 1984-85

Sources	Towns		
	Tiruchirapalli	Villupuram	Devakottai
Water Tax	41.98	59.33	39.08
Excess Water Charges	18.74	35.89	-
Tap Rate Charges	30.72	-	56.72
Total*	91.44	95.22	95.80

* Balance accures from other miscellaneous sources.

Table 18

Revenues from Water Supply Services

(Rs.)

Local body	1982-83		1983-84		1984-85	
	Total	Per Capita	Total	Per Capita	Total	Per Capita
Vadodara	9,798,873	11.72	9,679,388	10.93	10,883,954	11.60
Bhopal	2,791,362	3.60	2,917,322	3.51	2,472,457	2.77
Tiruchirapalli	3,826,330	10.38	4,270,760	11.39	4,365,845	11.44
Villupuram	963,570	12.16	1,142,213	14.02	949,995	11.34
Dhoraji	387,470	4.71	362,476	4.28	453,434	5.20
Sehore	185,507	3.26	633,954	10.66	3,533,421	56.90
Hoshangabad	120,448	2.33	147,385	2.69	213,836	3.70
Devakottai	433,323	11.87	452,260	12.11	479,759	12.55
Kadi	339,000	9.15	210,000	5.53	245,935	6.32

The above analysis shows that --

i. Per capita incomes from water supply are extremely low and depressed. Particularly depressing are the earnings in cities like Bhopal where, on account of the extremely low tariffs for non-domestic use, the per capita earnings are a bare Rs. 2.77.

ii. On a per unit basis too, the earnings from water supply continue to be low, except for Villupuram and Devakottai.

iii. Earnings from water supply either as a proportion of total municipal expenditure or in per capita terms have not been increasing over time. There is a striking degree of stagnation in the earnings.

8. Expenditure-Income Gap

In the previous section, we focussed our analysis on two questions, namely --

i. what do the municipal bodies **spend** on the provision of water supply?; and

ii. what do the municipal bodies **earn** from the sale of water?

The analysis showed that barring the municipal bodies of Tiruchirapalli and Devakottai, expenditure on water supply services was in excess of the incomes from the sale of water. The analysis further showed that --

i. the expenditure on this service rose faster than the incomes, during the years 1982-83 to 1984-85; and

ii. the incomes earned on this service declined in four out of nine municipal bodies during this period, and even in others, there was a relative stagnancy in the growth rate of incomes.

In this section, we have extended the analysis to further examine the expenditure-income relationship, the main focus being the proportion of expenditure that the municipal bodies are able to cover by way of incomes derived from the sale of this service, and the extent to which the unmetered supplies and supplies through stand posts affect the overall incomes of this service.

Table 19 gives the data on the expenditure and incomes, and the proportion of expenditure that is recouped by incomes. It shows that **at the existing tariff rates and mode of supplies, the**

Table 19

Expenditure-Income Gap

Sampled cities and towns	Expenditure (Rs.)	Income (Rs.)	Gap (Rs.)	Income as a proportion expenditure
Vadodara	26,053,300	10,883,954	15,169,046	41.8
Bhopal	11,418,879	2,472,457	8,946,422	21.6
Tiruchirapalli	8,461,966	4,365,645	4,096,321	51.6
Villupuram				
Dhoraji	1,369,022	453,434	915,588	33.1
Sehore	189,560	168,421	211,39	88.1
Hoshangabad				
Devakottai	163,177	479,759	-316,582	294.0
Kadi	369,538	245,935	123,603	66.6

provision of water is a major financial drain on most municipal bodies, in the sense what they earn by way of "selling" water is far less that what they spend on its provision. The table shows that **the incomes from the sale of water are able to cover only a part of the costs incurred by the municipal bodies, the proportions being in the range of 21.6 per cent and 88.8 per cent.** The Bhopal Municipal Corporation covers only 21.6 per cent of the total expenditure that it incurs on the provision of water supply; Vadodara and Tiruchirapalli cover 41.8 and 51.6 per cent respectively. The performance of other cities, except as stated earlier, in Villupuram and Devakottai where the municipal bodies have been able to make substantial gains is equally unsatisfactory.

The issue of the expenditure-income gap has also been looked at with the help of what is commonly referred to as the operating ratios which are the ratios of incomes to expenditures on a unit

basis. These ratios which are given in the following table show that **Bhopal has the most unfavourable operating ratio, (1:4.46) followed by Dhoraji (1:2.96) and Hoshangabad (1:2.31). In Tiruchirapalli and Vadodara too, these ratios are very high, showing once again that the incomes from water supply constitute only a small proportion of the total expenditure that is incurred by the municipal bodies of these two cities.** The absence of uniformity in the tariff structures, variations in the efficiency of revenue collection machinery as also the different processes of production and distribution of water are stated to be the main factors for the unfavourable operating ratios.

Table 20

Operating Ratio, 1984-85

Sampled cities and towns	Income per 1,000 litres	Expenditure per 1,000 litres	Operating ratio
Vadodara	0.20	0.48	1:1.92
Bhopal	0.13	0.58	1:4.46
Tiruchirapalli	0.25	0.48	1:1.92
Villupuram	0.67	0.24	1:0.36
Dhoraji	0.28	0.33	1:2.96
Sehore	0.34	0.39	1:1.15
Hoshangabad	0.26	0.60	1:2.31
Devakottai	0.66	0.22	1:0.33
Kadi	0.20	0.30	1:1.50

9. Implications of Unmetered Supply of Water and Water Supplied through Stand posts

i. Unmetered Supplies

Unmetered supply of water is a common practice in India's numerous cities and towns. Essentially what it means is that water is supplied on a fixed charge, irrespective of the quantum of water used by the different categories of consumers. The fixed charge may either be a monthly charge or a charge based on the size of the water pipe. It is contended that water supplied this way has serious implications for the overall finances of municipal bodies, though it is also held that "metering" of water supply has immense costs, particularly in small cities which can barely absorb such costs. In this section, we have attempted to analyse the financial implications of unmetered water supply and water supplied through standposts and have compared, in a limited manner, the charges payble by households with metered connections and with unmetered connections. This has been done for the three large cities, namely, Vadodara, Bhopal and Tiruchirapalli for which data are available.

It is important to point out that unmetered water supply forms an important component of the total water supplied in these cities. In Vadodara, it is 20.7 per cent; in Bhopal it 18.8 per cent and in Tiruchirapalli, it is 45.1 per cent. Thus, this mode of water supply is important to Indian cities.

Table 21

Unmetered Water Supply

Sampled cities and towns	Number of unmetered connection	Quantum of unmetered supplied (in '000 litres)	%of unmetered to total water supplied	Existing rate per month per unmetered connec-tion (Rs.)	Rate for metered water supply per 1,000 litres (Rs.)
Vadodara	45,618	30,726	20.7	4.0	0.50
Bhopal	8,471	10,095	18.8	8.0	0.30
Tiruchiraplli	13,651	21,648	45.1	8.0	0.50

Incomes earned from unmetered connections and what the municipal bodies would earn if these connections were metered are shown in the following table. It shows that the **incomes from unmetered supply are absymally low. It further indicates that the conversion of unmetered connections to metered connections will prop up municipal revenues considerably -- by over 150 per cent in Vadodara, by over 200 per cent in Tiruchirapalli, and about one-third in the case of Bhopal.** Further, the proportion of costs that is currently being covered by incomes will also increase considerably (though not wiped out) as a result of the metering of connections, i.e. if metering is extended to these cities.

Table 22

Financial Implications of Unmetered Water Connections

Sampled cities and towns	Estimated incomes at existing rates for unmetered connections for one year (Rs.)	Estimated incomes if metered charges are applied (Rs.)	Percentage increase in incomes as a result of of metering
Vadodara	2,189,664	5,607,495	156.1
Bhopal	831,216	1,105,464	33.0
Tiruchirapalli	1,310,496	3,950,716	201.5

ii. Stand Posts : Financial Implications

Stand posts are normally installed by municipal bodies to provide water to the economically weaker sections who are unable to afford individual connections. No charge is, therefore, imposed on such connections, and, in principle, the municipal bodies are expected to cover the cost of supplying water through stand posts from general revenues or through a system of cross subsidization by applying high tariff rates on other users. However, in some towns a nominal fee is charged for stand posts.

Table 23

Stand Posts : Financial Implications

Urban centre	Quantity distributed per year (ML)	Approximate annual income (in Rs.)
Vadodara	6,562.70	3,281,350
Bhopal	1,416.20	424,860
Tiruchirapalli	1,868.80	934,400

Note : Financial figures were calculated at the rate applicable to metered connections in the respective towns.

Analysis of data for cities with over 100,000 population reveals that if water from stand posts is charged at rates applicable to metered connections the annual incomes would increase substantially in the case of Vadodara (nearly Rs. 3.3 million), by Rs. 0.9 million for Tiruchirapalli and Rs. 0.42 million for Bhopal. Thus, over 21 per cent of the gap in Vadodara's revenues would be covered if stand posts supply is charged; the corresponding figures for Tiruchirapalli and Bhopal, being 22.81 per cent and 4.75 per cent, respectively.

SOLID WASTE COLLECTION AND DISPOSAL SERVICES

1. Solid Waste and Municipal Legislations

The term "solid waste" is used to describe, in international parlour, non-liquid waste materials arising from domestic, trade, commercial, industrial, agricultural, and mining activities, and public services. "Non-liquid" is a relative term because certain kinds of sludge fall within the scope of solid wastes management, for example, which arise mainly from industrial sources and from sewerage treatment plants. Solid waste consists of different materials such as dust, food wastes, packaging in the form of paper, metals, plastics or glass, discarded clothing and furnishings, garden wastes, and so on.

Waste disposal is a crucial service for all urban centres. Approximately 22 million tonnes of solid waste is generated every year by the over 159 million urban residents (Census of India, 1981).[12] Added to this mammoth absolute figure is the climate of the country which causes rapid putrefaction and multiplication of harmful organisms and necessitates frequent collection and disposal. From the public health point of view, the main risks arise from the breeding of disease vectors. The most visible damage caused is aesthetic, that is, the ugliness of street litter. No universally applicable solid waste management systems are available. Every country must evolve an indigenous technology based on quantity and character of the wastes.

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12. Estimated on the basis of figures in Dr. B.B. Sunderasan's "Street Cleaning and Waste Storage and Collection", in John R. Holmes (Ed.), Managing Solid Wastes in Developing Countries, 1984.

In India, in all Municipal Acts, "Public Health and Sanitation" has been dealt with under different headings such as "Scavenging", "Sanitary Provisions", "Sanitation", "Conservancy", and so on. The Acts enjoin upon the Chief Executives of municipal bodies to provide receptacles, dust bins, depots or places for temporary deposit of rubbish at convenient locations, and require the occupants of premises to deposit the rubbish in the depots and dust bins. The collection and transportation of rubbish and other wastes to the disposal points are of crucial importance as environmental cleanliness depends on the efficient performance of these functions.

The question that arises is : Who is responsible for the removal of refuse and waste from the houses? The answer to this, according to the Acts, varies from state to state. In the Gujarat Municipalities Act, no specific mention has been made in respect of this question, except to state that the municipal councils shall make provision for cleaning of public streets and places. The Madhya Pradesh Act vests this responsibility upon households who, according to the provisions, are required to deposit the refuse and other offensive matter in public dust bins. In the local bodies of Tamil Nadu, the Municipal Councils undertake door-to-door collection of waste.

Among the Corporations, in Vadodara, the position is not clear. In Bhopal, an interesting situation is observed:

- In some parts of the city the Corporation undertakes the door-to-door collection;

- in some parts, the Corporation provides dustbins\ and receptables, and the households are required to deposit the refuse and other offensive matter into the dust bins, and
- the households are required to keep the refuse in a heap on the streets which is then collected by the Corporation as a part of the street cleaning operations.

In actual practice, in smaller and medium-sized towns all households and commercial establishments throw the refuse and offensive matter on the streets, from where it is collected by the municipal bodies. In the larger local bodies, where door-to-door collection by municipal agencies is not practiced, the households enter into private arrangements with the municipal scavengers or private sweepers to get the refuse and offensive matter collected from the houses and deposited in the public dust bins.

2. Solid Waste Collection Practices

Waste generation practices vary in the towns that constitute the sample for this study. By and large, the main consituents of wastes are domestic wastes, and waste generated by commercial establishments, office premises and community centres such as schools, hospitals etc. Only in Vadodara, industrial waste forms a significant volume of total waste, although in many areas the Corporation does not undertake the responsibility for its removal. Refuse from hotels, restaurants, hospitals and such other establishments is collected separately.

Table 24 indicates the details relating to solid waste collection and disposal in the case study towns during 1984-85.

Table 24

Solid Waste Collection and Disposal (1984-85)

Sampled cities and towns	Population		Total waste per day (tons)		Per capita per day (grams)	
	1981	1985	Gene-rated	Collec-ted	Gene-rated	Collec-ted
Vadodara	734,473	900,000	270.00	210.60	300	234
Bhopal	671,018	893,971	357.59	222.60	400	240
Tiruchirapalli	362,045	385,700	106.84	88.33	277	229
Villupuram	770,092	850,010	19.81	8.67	233	102
Dhoraji	76,556	62,099	27.94	23.78	450	383
Sehore	52,190	62,099	27.94	23.78	450	383
Hoshangabad	39,997	52,294	15.69	6.54	300	125
Devakottai	35,684	38,600	9.65	5.83	250	151
Kadi	34,595	36,700	11.45	7.96	312	217

Among the class I towns (towns with over 100,000 population), total waste generation and collection is the highest in Bhopal. This is because in addition to the town's refuse collection, the Corporation discharges this function in the Bharat Heavy Electrical Limited township. In Tiruchirapalli, waste generation and collection is nearly half of what it is in Vadodara although in per capita terms it almost equals the latter. Besides the more efficient discharge of this function in Tiruchirapalli, the town's refuse consists of a significant proportion of agricultural waste which accounts for the higher per capita figures. Although Vadodara is a highly industrialised

town, the waste generation and collection is not large because the Corporation does not undertake collection of industrial wastes. The waste generated and collected is mostly from domestic and commercial sources.

Among the Class II and III towns (towns in the population range of 20,000-50,000 and 50,000-100,000), Sehore and Hoshangabad account for higher waste generation in both absolute and per capita terms. The waste largely consists of domestic and commercial waste. Although waste collection is one of the responsibilities of local bodies, a large percentage of waste is not collected. **In the local bodies selected for this study, the uncollected waste accounts for about 15 to 40 per cent.** Obsolete equipment, inadequate use of infrastructure as well as under-staffing are cited as the main reasons for the large quantum of uncollected waste.[13] These problems also arise on account of the financial constraints of municipal bodies in general, and the low chargeable rates for this service, and often the inability of the local bodies to determine the recoveries from this service. In Hoshangabad, for instance, it is not possible to identify this component separately. Relatively low percentage of total expenditure is incurred on this service in Vadodara and Sehore.

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13. National Institute of Urban Affairs, "Management of Urban Services", Ibid.

3. Expenditure on Solid Waste Collection and Disposal

Solid waste disposal in India generally involves three separate steps: (i) Sweeping and roadside collection; (ii) transportation of waste to collection points or storage chambers; and (iii) transportation of waste to disposal sites and primary treatment. Except in a few cases, waste as has been noted earlier, is not collected from individual homes.

Solid waste disposal is a labour intensive service. The report of the Government of India Committee on Urban Wastes puts the staff requirement at 2.8 persons per 1,000 population. In the cities covered by this study, the actual deployment of staff in all excepting Tiruchirapalli and Hoshangabad is lower than the norms. Correspondingly the load per sanitary worker also varies, with the per capita load being very high in some places and low in others.

Table 25

Waste Disposal : Staff Deployment - 1984-85

Local body	Staff deployed per thousand population
Vadodara	1.83
Bhopal	1.85
Tiruchirapalli	3.14
Villupuram	1.87
Dhoraji	2.24
Sehore	1.90
Hoshangabad	3.75
Devakottai	2.72
Kadi	2.51

On account of the critical nature of the service, most municipal bodies earmark and spend a significant proportion of their budgets on solid waste collection and disposal. According to the data compiled from the budgets, the per capita annual expenditures on solid waste collection, disposal and treatment vary between a low of Rs.14.52 and a high of Rs.31.04, with several municipal bodies spending on an average Rs.20-30 on this service. As may be seen in Table 26, when grouped according to the levels of expenditures, the municipal bodies fall into three categories -

i. Those which spend less than Rs.20 annually on this service. This group includes Bhopal, Villupuram and Sehore.

ii. Those which spend on an annual basis of Rs.20-30. In this group are the municipal bodies of Vadodara, Tiruchirapalli, Hoshangabad, Devakottai and Kadi; and

iii. Those which spend more Rs.30. Dhoraji is the only municipal body which has reported a spending level of over Rs.30.

Table 26

Per Capita Annual Expenditure on Solid Waste Collection and Disposal, 1984-85

Sampled cities and towns	Total annual expenditure (Rs)	Per capita expenditure (Rs)
Vadodara	22,813,000	24.32
Bhopal	15,886,692	17.77
Tiruchirapalli	10,837,635	28.50
Villupuram	1,400,213	16.87
Dhoraji	2,708,116	31.04
Sehore	901,978	14.52
Hoshangabad	1,201,397	20.76
Devakottai	841,381	22.15
Kadi	818,500	21.04

When expenditure on refuse collection is examined as a percentage of total municipal expenditure, the percentage is higher among the three smallest local bodies (Table 27). Thus, in Hoshangabad refuse collection accounts for as much as 38 per cent of the total municipal expenditure. Other towns where such expenditure accounts for over one-third of the total municipal expenditure are Devakottai and Dhoraji. In Vadodara, despite the large total expenditure on this service, the corresponding figure is only about 10 per cent. The percentage share of expenditure on refuse collection, thus, varies from one-tenth to over one-third of the total municipal expenditure in the towns selected for this study.

Table 27

Percentage of Expenditure on Solid Waste Disposal to Total Municipal Expenditure (Percentage)

Local body	1982-83	1983-84	1984-85
Vadodara	8.60	7.92	9.95
Bhopal	17.82	24.94	29.23
Tiruchirapalli	24.89	27.94	29.38
Villupuram	14.23	19.59	19.37
Dhoraji	27.92	34.49	33.93
Sehore	17.34	23.45	10.15
Hoshangabad	32.04	41.95	38.23
Devakottai	24.20	32.92	33.15
Kadi	28.59	28.15	25.23

Being a labour intensive operation, establishment, meaning salaries and wages, is the single most important item of expenditure. Indeed, on an average, over 75 per cent of the total expenditure on solid waste disposal is on meeting the

establishment costs; other items of expenditure such as the repairs and maintenance, and materials are insignificant cost items. A break-up of the components of expenditure is given in the following table --

Table 28

Components of Expenditure, 1984-85

Sampled cities and towns	Components %			
	Establish-ment	Repairs & maintenance	Materials	Misce-llaneous
Vadodara	62.49	2.13	-	35.39
Bhopal	74.93	4.41	0.98	19.68
Tiruchirapalli	79.88	3.61	12.94	3.57
Villupuram	93.41	6.59	-	-
Dhoraji	72.56	13.00	-	14.44
Sehore	65.29	1.82	-	32.89
Hoshangabad	59.07	-	-	40.93
Devakottai	99.86	-	-	0.14
Kadi	79.90	15.67	-	4.43

It is interesting to note that in Tamil Nadu towns, establishment accounts for nearly 80 per cent of the total expenditure in Tiruchirapalli, and over 90 per cent in the case of the other two towns. As a result, only a very small proportion is spent on other aspects of the operation of this service.

4. Income from Solid Waste Collection Services

While refuse collection and disposal is a high cost service, the municipal authorities in India are not vested with resource raising capabilities commensurate with the expenditure involved. The two main sources of income from the provision of this service

are, i. taxes which are normally levied as a part of the property taxes, and ii. proceeds from the sale of compost manure.

The taxes which are levied in lieu of waste disposal services are known variously as "sanitary cess", "conservancy tax", "scavenging tax", "drainage tax", "latrine tax" and so on. According to municipal officials, to make a distinction between the incomes derived from the collection and disposal of refuse, cleaning of drains and provision of conservancy services is difficult, and may also be misleading as the three functions tend to overlap, especially in smaller and medium towns. In view of this, income from all sources has been analysed as a composite figure. The figures of total revenue income and per capita income from this service are given in Table 28.

Table 29

Income from Solid Waste Disposal

(Rs.)

Sampled cities and towns	Total Income			Per Capita Income		
	1982-83	1983-84	1984-85	1982-83	1983-84	1984-85
Vadodara	7,090,020	7,267,060	10,905,240	8.48	8.21	11.63
Bhopal	712,442	1,312,035	767,701	0.92	1.58	0.86
Tiruchirapalli	2,593,330	2,650,430	3,215,186	7.05	7.09	8.46
Villupuram	394,235	442,003	436,414	4.99	5.46	5.26
Dhoraji	270,121	101,245	124,577	3.28	1.19	1.43
Sehore	33,479	30,480	13,699	0.59	0.51	0.22*
Hoshangabad	92,770	123,060	109,293	1.79	2.25	1.89
Devakottai	84,249	87,150	64,320	2.31	2.34	2.48
Kadi	2,000	2,000	2,000	0.05	0.05	0.05

* Excluding grants

Sehore, Kadi and Dhoraji do not levy any taxes in lieu of refuse disposal services (1984-85). In all other towns, except Bhopal where grants from the State Government are the primary source of income, taxes are the main source of income. In Hoshangabad, 100 per cent of the income is from conservancy taxes. In Devakottai too, less than one per cent of income is derived from sources other than taxes.

In the local bodies where no taxes are levied for this service, either grants from the State Governments or the sale of manure are the main sources of income. In Kadi, sale of manure is the only source of income. However, a pathetically small sum of Rs.2,000 is raised annually from this source. Sale of compost accounts for over 80 per cent of the income in Sehore and nearly 40 per cent of that in Dhoraji. In Dhoraji, the other source of income is the grant from the State Government which accounts for over 60 per cent of the income from this service. State Government grants are included in the budget of only one other town, namely, Bhopal where these account for about 60 per cent of the income from waste disposal.

In most towns, income from the sale of manure/compost is very small (in Bhopal, this item is clubbed with conservancy charges and the exact contribution is difficult to assess). This item is not listed separately in the budgets of Tiruchirapalli and Vadodara. In Hoshangabad, no income has been reported from this source in 1984-85, while in Villupuram and Devakottai it accounts for 2.99 per cent and 0.58 per cent of the total income.

Thus, the two major sources of income from waste disposal are taxes and sale of compost/manure. The latter source as is evident, has not been exploited in the towns and even where composting is practiced its contribution to the total income is negligible. Even in towns such as Kadi, Sehore and Dhoraji where it is the primary source of income, the absolute amount contributed by this source is very small.

This is the case with most urban centres in India. It has been estimated that 90 per cent of the solid waste in towns and cities is disposed of by landfilling, and only 10 per cent is turned into compost. The physical and chemical characteristics of urban solid waste show that 40-60 per of it is compostable, and it has adequate nutrient and moisture level to produce high grade manure. The other source of income, namely, the taxes imposed in lieu of waste disposal services are invariably levied as a part of property taxes. Therefore, these taxes suffer from the shortcomings of the parent tax, namely narrow base and low recovery rate. For example, according to the information made available by the Corporation of Vadodara, 97.10 per cent of the total number of properties subject to property taxes have an annual rateable value of less than Rs.5,000. Further break-up shows that the annual rateable value of half the properties is less than Rs. 600, while in another 31.50 per cent, the assessment ranges between Rs. 600 to Rs. 2,000 per annum (1984-85).

5. Income from Solid Waste Disposal and Total Municipal Income

Income from waste disposal forms only a small proportion of the total municipal revenues. In no case, as may be seen from the table, does it exceed ten per cent (Table 30). Within this small range, the percentage within each size class of town is highest in Tamil Nadu. In Kadi, income earned from solid waste disposal as a percentage of total municipal income is abysmally low, only 0.60 per cent. This town is able to raise only Rs. 2,000 through the sale of manure. No charges or taxes are levied on waste disposal services.

Table 30

Revenue from Solid Waste Disposal to total Municipal Revenues

(%)

Sampled Cities and Towns	1982-83	1983-84	1984-85
Vadodara	4.05	3.94	5.03
Bhopal	1.23	2.11	1.18
Tiruchirapalli	8.13	7.12	8.06
Villupuram	5.75	6.18	6.70
Dhoraji	3.93	1.39	1.42
Sehore	1.12	0.84	0.50
Hoshangabad	3.55	3.96	3.45
Devakottai	4.13	3.67	3.93
Kadi	0.08	0.07	0.06

It is, therefore, clear that the situation in local bodies which do not levy taxes is especially critical. In such cases, it would be imperative to either levy taxes and/or charges in addition to making all out attempts to increase income from the sale of compost/manure.

6. Revenue-Expenditure Relationship

The efficacy and efficiency of a service impinges on its economic and financial viability. The foregoing analysis has shown that revenues from this service are relatively small. In this section, two indicators namely, per capita income and expenditure, and income and expenditure per ton of waste have been used to assess the financial aspect of this service.

Table 31 which gives the proportion of waste collected alongwith the per capita income and expenditure on this service shows that --

i. **expenditure on the service bears no relationship with the percentage of waste collected, and**

ii. **per capita income and expenditure are not related to the size of the town.**

The absence of a correlation between expenditure incurred and the extent of refuse collected shows that higher expenditure is no indicator of the efficiency of the service. There are other variables involved. Expenditure is determined by the size of the establishment, the level of wages and salaries, the type of technology used, and the age of the vehicles/equipment. Thus, while Dhoraji spends Rs. 31.64 per person and collects about 85 per cent of the sold waste, Sehore spends only Rs. 14.52 and is able to operate at the same level of efficiency.

Table 31

Percentage of Refuse Collected and Per Capita Income and Expenditure

Sampled Cities and Towns	Percentage of waste collected	Per capita (in Rs.)	
		Income	Expenditure
Vadodara	78.00	11.63	24.32
Bhopal	62.25	0.86	17.77
Tiruchirapalli	82.67	8.46	28.50
Villupuram	45.20	5.26	16.87
Dhoraji	85.45	1.43	31.04
Sehore	85.11	0.22	14.52
Hoshangabad	41.68	1.89	20.76
Devakottai	60.41	2.48	22.15
Kadi	69.51	0.05	21.04

The per capita income earned also shows little relationship to the percentage of refuse collected. This may be expected because the tariff structure is totally unrelated to either the level of service offered or the use of the service. Thus, Vadodara earns as much as Rs. 11.63 per capita, while Kadi earns as little as Rs. 0.05 per capita

Table 31 gives the gap between the income and expenditure on solid waste management in per capita terms. In almost all cases the gap has increased during the three years under study. In some cases there has been a small decline in the gap. In 1984-85, the gap was extraordinarily large in Dhoraji (Rs.29.61 per capita). Here, earnings are low and expenditures are very high. The gap is relatively small in Villupuram, Vadodara and Sehore.

The low level of expenditure incurred on this service in Sehore is responsible for the small gap; in Villupuram and Vadodara, the expenditure is not as large but the earnings are relatively high.

Income and expenditure per ton have been analysed in Table 32. Expenditure per ton is highest in Dhoraji followed by Vadodara. Sehore incurs the smallest expenditure. Income, on the other hand, is very high in Vadodara (Rs. 110.65 per ton). The town which earns the second highest amount, that is, Rs. 60.35 is Villupuram, which earns only half the amount earned by Vadodara.

Table 32

Refuse Collection and Disposal : Income and Expenditure per Ton (1984-85)

Sampled Cities and Towns	Income per ton (Rs)	Expenditure per ton (Rs)	Income Expenditure Differential (+) Surplus; (-) Deficit (Rs)
Vadodara	110.65	231.49	(-)120.35
Bhopal	5.88	121.71	(-)115.83
Tiruchirapalli	82.44	277.91	(-)195.47
Villupuram	60.35	193.64	(-)133.29
Dhoraji	13.78	299.77	(-)285.99
Sehore	1.34	88.45	(-)87.11
Hoshangabad	19.08	209.78	(-)190.70
Devakottai	26.78	238.89	(-)212.11
Kadi	0.47	195.86	(-)195.39

It is thus evident that it is one of those services on which the municipal bodies are continually losing revenues. The methods of recovering the costs seem to be totally irrelevant in the existing circumstances.

APPROACH TO THE PRICING OF URBAN SERVICES

How should the various urban services be priced has historically been one of the most contentious issues in economics and other related sciences. When the service happens to be linked with the life support systems and falls within the category of an "essential good", or even with the general quality of life, the issue assumes greater complexity, and does not remain one of pure economics. It is then argued that services such as the provision of water or collection and disposal of wastes, or basic health and security should be made available to the different strata of population at prices that they can "afford", and be related to their "ability to pay". The pure economists, however, argue that prices should be fixed in such a way that these can recover the costs incurred on the services provision, or else the agencies responsible for the services will not be able to extend or expand them, and will in the process become financially unviable. The failure to underprice a service could also result in wastages and overconsumption, which a developing country like India can ill-afford.

This study of nine cities and towns in the three states of Gujarat, Madhya Pradesh and Tamil Nadu has been most revealing in respect of issues relating to the costs and prices of services. In order to outline an approach as to how this issue be addressed, it is useful to recapitulate the main conclusions of this study, and link the approach to those conclusions.

It is evident from this study that the financial situation of water supply services in most municipal bodies is unsatisfactory. However, the study shows, **the reasons for the unsatisfactory state are not the same among the surveyed municipal bodies. In some, it is the high unit cost of supplying and providing water; in other cases, the unsatisfactory state of finances springs from low revenues per unit of water sold.** This study has shown that the high unit costs are attributable to a number of factors including, the sources of water, the nature and extent of treatment, the electricity rates, and, of course, the age of the distribution system and administrative practices and procedures. Besides the administrative costs, the rates of electricity are one of the most important cost items in water supply provision. Likewise, low revenues owe themselves to the tariff structure, efficiency of the collection machinery, the number of domestic and non domestic users of water, and the quantities of water which are either unmetered or supplied free to the different categories of consumers. It is equally dependent on the billing practices.

Unmetered connections are a common feature in most municipal bodies. In fact, the survey shows, that **the share of unmetered connections is disproportionately high in many municipal bodies,** According to the household survey, the proportion of unmetered connections is extremely high in Vadodara, Sehore and Kadi (see Annex). Consequently, these are a big drain and are largely responsible for the low revenues of several municipal bodies. **An examination of the data of Vadodara, Bhopal and Tiruchirapalli**

shows that the revenues from water in Tiruchirapalli could increase by 82 per cent if the unmetered connections were charged at metered rates and if water supplied through stand posts was similarly charged. Corresponding figures for Vadodara and Bhopal are 61.6 per cent and 28.3 per cent, respectively. In respect of the comparatively smaller cities, although studies other than the present one (e.g. Operations Research Group) have shown that metering of connections is not a worthwhile proposition, the results of this survey puts forward a strong case for metering of water connections.

Provision of water through stand posts also falls into the same category, although it is argued that the low-income and poor households, who are the main consumers of water supplied through stand posts, should not be charged the market price, and that they should be treated differently in matters of pricing of services. The evidence from the household survey conducted as a part of this study, however, shows that as a proportion of their incomes, the low-income households spend more on the provision of water supply. According to the results, the lowest income category of households (less than Rs 500 per month) pay anywhere between one per cent (11.7 per cent of households) to 6 per cent (20 per cent of households). The balance spend 3 per cent of their incomes on water supply. On the other end are the households with incomes over Rs 2000 who spend between 0.1 per cent (29.7 per cent of households) and 1 per cent (18.9 per cent). This evidence would tend to suggest that there is little justification in supplying free water through stand posts.

Table - 33

Water Charges Paid by Households in Different Income Categories

Income Category	Monthly Water Charges					(Rs.)
	< 5	5-10	10-20	20+	NA	
< 500	7 (1%)	40 (3%)	12 (6%)	-	1	60
500-1000	27 (.3%)	72 (1%)	32 (2%)	3 (3%)	2	136
1000-2000	53 (.16%)	79 (0.5%)	124 (1%)	29 (1.7%)	7	292
2000+	63 (0.1%)	34 (0.3%)	72 (0.6%)	40 (1%)	3	212

Percentage of households paying different rents have been worked out from the median of the class range.

The overall effect of unmetered supply and water supplied through stand posts on the revenues from the water supply sector is substantial, and can be seen in the following table -

Table 34

Effect of Unmetered Supply and Water Supplied Through Standposts on the Total Revenues from Water Supply, 1984-85

(Rs)

Sampled Cities	Revenue from Unmetered Supplies if charged metered Rates	Revenues from Standposts if charged metered Rates	Total Revenue from water supply at Existing Rates	Total Revenues from Water Supply at new rates	Percentage increase in revenues as a result of metering
Vadodara	5,607,495	3,281,350	10,883,954	28,583,135	67.5
Bhopal	1,105,464	4,24,860	2,472,457	3,171,565	27.8
Tiruchirapalli	3,950,716	9,34,400	4,365,845	7,940,465	93.8

The above table shows that **metering of all connections, including the stand posts, will enhance the revenues from water supplies considerably.** For instance, Vadodra municipal body will be able to recoup 67.5 per cent of the total expenditure on water supply; Tiruchirapalli will cover 93.8 per cent of the total expenditure, and Bhopal will cover 27.8 per cent. **At the same time, as the table shows, metering will still leave a large deficit on the revenue account to be covered, and will not be adequate if the objective is to make the service self-paying.** There will thus be no escape from refixing the tariffs in order to be able to meet the expenditure on water supply.

The financial issues in respect of solid waste disposal are very different from those involved in the provision of water supply. Firstly, charging for the solid waste services is indirect and, in most cases, a part of the property taxes. Secondly, it is a labour intensive service and other expenditure on the provision of this service is a relatively minor component of the total expenditure. Also, unlike water supply which has to be obtained even if it is costly and prohibitive, the collection and disposal of wastes is not viewed by the households as "essential", with the result that it constitutes an insignificant part of the household expenditure. For instance, the survey shows only 17.7 per cent of the total number of households spending some amount on this service. Further, **unlike in the case of water supply, the poor spend little or nothing on**

solid waste disposal services, while the higher-income group households spend more on these services. The following table provides the relevant data.

Table 35

Distribution of Respondents Paying Charges for Carrying Domestic Waste and Income Groups

Household monthly incomes	Not paying	Monthly Expenditure on Garbage Disposal (Carrying Domestic Waste)												Total
		< 1	1-2	2-3	3-4	4-5	5-7.50	7.50-10.0	10.0-12.50	12.50-15.00	15.0-17.50	17.50-20.00	20.0-and	
<100	2													2
100 - 200	20													20
200 - 300	79													79
300 - 400	152												1	153
400 - 500	118													118
500 - 750	316						2							318
750 - 1000	120						6		1				1	128
1000 - 1250	125					2	13		13		1		16	170
1250 - 1500	14				1		5		5				5	30
1500 - 1750	90			1			27	1	8	1	1		8	137
1750 - 2000	14						14	3	4				4	39
2000 - 2500	64			1	2	6	24	3	11				6	117
2500 & above	68			2			40		4				11	125
	1182			4	3	8	131	7	46	1	2		52	1436

Establishment accounts for a major share of the total expenditure on this service. Other items of expenditure like transportation of garbage, repairs, maintenance, chemicals, replacement of equipment etc. are a relatively minor, though an extremely important, component of the total expenditure on solid waste disposal. The extent to which the expenditure on establishment could be regulated is not clear as the norms for establishment are in terms of personnel and not in finances.

There are three main sources of revenues from this service : taxes, conservancy charges, and income from the sale of compost. Taxes are an important source of income. At present, however, these taxes are linked with the property taxes, the base of which is relatively small and from which a considerable number of households are exempted. For example, if we take the case of Vadodara, properties with an annual rateable value (ARV) of less than Rs. 300 are exempted from payment of property taxes. These properties account for over one-fourth of all properties. Since these properties also need service provision it is important that either the property taxes are delinked from taxes in lieu of services or, alternatively, a service charge be imposed on all properties. The modalities of such a tax need considerable in-depth research particularly in terms of the affordability and methods of charging. Privatisation of monthly collection charges is one possible solution which needs to be carefully considered to overcome the administrative difficulties.

Recycling of urban wastes should be explored for generating additional resources. Among the sample cities, Dhoraji and Sehore earn a considerable proportion of their revenue from this source. Studies have shown that good quality manure can be produced by composting city garbage because of adequate nutrient content. However, most practical attempts at composting have run into financial difficulties because of inappropriate technology and further research is needed to develop technologies which can produce low cost manure. Composting is only one possible use. Research in other parts of the world is revealing multiple uses of solid wastes. It is those uses that will eventually have to be made use of in putting these services on a financially viable scale.

In sum, this study suggests that -

1. The two services, namely, water supply and solid waste disposal are grossly underpriced, in the sense that what is spent on their provision is far in excess of what the municipal bodies, under the existing structure of tariffs etc., are able to recover from the users.
2. The prospects of effecting economies on the cost/expenditure side of the services do not appear to be promising. Many of the cost items are external and independent, and can not be easily regulated. Therefore, the approach to sustain the provision of these services lies essentially on the revenue/income side.

3. On the revenue/income side of water supply, metering of the unmetered connections and full charging of water supplied through stand posts is a necessary though not a sufficient step for the recovery of costs. There is no escape from linking the tariff structure with the expenditure pattern, and, of course, an upward revision of the water tariffs.

4. The disposal of solid wastes continues to be dealt with in an archaic manner, with no recognition of the fact that wastes have a vast potential and multiple uses. This is one service where R & D in terms of how waste can be used as a resource has to be pursued in a major way.

5. Charging for the solid wastes presently suffers from a dual disadvantage - the disadvantage of a stagnant property tax and the inability to bring within the charging the users of the disposal services. Although charging for this service on a use-basis presents complex problems, the existing method of charging has to be substituted by more innovative ways, including charging all users for it, rather than only those who are subject to the payment of property taxes.

Annex 1

TOTAL MUNICIPAL REVENUE RECEIPTS

LOCAL BODIES/ HEADS OF RECEIPTS	YEAR 1982-83	% TO TOTAL	YEAR 1983-84	% TO TOTAL	YEAR 1984-85	% TO TOTAL	YEAR 1982-83	% TO TOTAL	YEAR 1983-84	% TO TOTAL	YEAR 1984-85	% TO TOTAL	YEAR 1982-83	% TO TOTAL	YEAR 1983-84	% TO TOTAL	YEAR 1984-85	% TO TOTAL
	BHOPAL						TIRUCHIRAPALLI						VADODARA					
TAX REVENUES	9,677,766	17.24	12,831,480	23.14	9,588,972	17.68	19,048,010	59.74	24,245,780	65.11	24,324,903	61.00	129,244,000	73.80	136,039,000	73.70	167,764,000	77.33
NON TAX REVENUES	9,128,346	16.26	9,185,276	16.56	9,787,292	18.04	9,534,050	29.90	10,922,690	29.33	12,358,536	30.99	11,446,592	6.54	13,488,830	7.31	15,325,636	7.06
ASSIGNED TAXES	0	0.00	0	0.00	0	0.00 *	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
GRANTS	33,153,850	59.05	30,584,286	55.15	32,525,910	59.98	1,684,190	5.28	1,433,930	3.85	2,715,545	6.81	27,341,000	15.61	28,463,000	15.42	28,491,000	13.13
OTHERS	4,184,489	7.45	2,859,788	5.16	2,322,526	4.28	1,618,510	5.08	637,420	1.71	477,242	1.20	7,106,408	4.06	6,605,170	3.58	5,361,364	2.47
TOTAL	**56,144,451**		**55,460,830**		**54,224,700**		**31,884,760**		**37,239,820**		**39,876,226**		**175,138,000**		**184,596,000**		**216,942,000**	
	SEHORE						VILLUPURAM						DHORAJI					
TAX REVENUES	2,259,993	75.58	2,257,696	62.38	2,371,665	27.19	3,431,067	50.08	3,602,882	50.41	3,853,442	59.13	4,331,504	63.07	4,280,003	58.86	4,587,572	52.41
NON TAX REVENUES	166,389	5.56	315,673	8.72	189,804	2.18	1,664,153	24.29	1,843,611	25.79	1,659,030	25.46	723,923	10.54	828,197	11.39	1,389,820	15.88
ASSIGNED TAXES	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
GRANTS	537,090	17.96	1,026,529	28.37	6,045,132	69.30	1,503,115	21.94	1,439,902	20.15	785,326	12.05	1,593,374	23.20	2,041,878	28.08	2,601,197	29.72
OTHERS	26,640	0.89	19,096	0.53	116,860	1.34	252,803	3.69	261,116	3.65	219,338	3.37	218,756	3.19	121,193	1.67	173,920	1.99
TOTAL	**2,990,112**		**3,618,994**		**8,723,461**		**6,851,138**		**7,147,511**		**6,517,136**		**6,867,557**		**7,271,271**		**8,752,509**	
	HOSHANGABAD						DEVAKOTTAI						KADI					
TAX REVENUES	2,008,653	76.96	2,508,034	80.73	2,428,242	76.71	809,173	39.63	908,307	38.25	939,006	39.14	1,363,550	53.68	1,733,100	57.84	1,810,100	53.97
NON TAX REVENUES	336,902	12.91	411,628	13.25	492,436	15.56	754,843	36.97	1,023,448	43.09	893,823	37.26	309,000	12.16	344,500	11.50	421,500	12.57
ASSIGNED TAXES	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
GRANTS	148,558	5.69	116,885	3.76	201,069	6.35	466,612	22.85	433,275	18.24	558,010	23.26	750,827	29.56	812,027	27.10	1,019,627	30.40
OTHERS	115,881	4.44	70,326	2.26	43,707	1.38	11,149	0.55	9,879	0.42	8,331	0.35	116,650	4.60	106,600	3.56	102,700	3.06
TOTAL	**2,609,994**		**3,106,873**		**3,165,454**		**2,041,777**		**2,374,909**		**2,399,170**		**2,540,027**		**2,996,227**		**3,353,927**	

Annex 2

TOTAL MUNICIPAL REVENUE EXPENDITURE

LOCAL BODIES/ HEADS OF EXPENDITURE	YEAR 1982-83	% TO TOTAL	YEAR 1983-84	% TO TOTAL	YEAR 1984-85	% TO TOTAL	YEAR 1982-83	% TO TOTAL	YEAR 1983-84	% TO TOTAL	YEAR 1984-85	% TO TOTAL	YEAR 1982-83	% TO TOTAL	YEAR 1983-84	% TO TOTAL	YEAR 1984-85	% TO TOTAL
	BHOPAL						TIRUCHIRAPALLI						VADODARA					
GENERAL ADMN.	10,169,023	17.60	13,342,828	21.44	12,756,262	19.48	2,843,340	8.13	3,215,250	9.23	3,392,704	9.20	33,980,000	19.18	39,544,000	18.83	35,929,000	15.71
PUBLIC WORKS	16,424,891	28.43	15,388,629	24.72	17,183,884	26.24	6,094,760	17.43	2,927,380	8.40	3,557,524	9.64	20,476,000	11.56	23,077,000	10.99	29,457,000	12.88
PUBLIC HEALTH	12,243,339	21.19	15,019,354	24.13	16,851,497	25.73	8,700,250	24.89	9,736,660	27.94	10,837,635	29.38	15,229,000	8.60	16,628,000	7.92	22,813,000	9.98
PUBLIC SAFETY	3,905,552	6.76	4,142,283	6.65	4,411,679	6.74	1,721,740	4.93	2,728,840	7.83	2,572,988	6.98	6,765,000	3.82	8,091,000	3.85	9,225,000	4.03
REPAYMENT OF LOAN	0	0.00	0	0.00	0	0.00	8,931,200	25.55	8,744,630	25.10	8,386,062	22.73	31,870,000	17.99	34,519,000	16.44	36,603,000	16.01
EDUCATION	0	0.00	0	0.00	0	0.00	2,601,050	7.44	3,017,000	8.66	3,341,686	9.06	29,163,000	16.46	36,449,000	17.36	38,304,000	16.75
MISCELLANEOUS	15,029,178	26.01	14,353,903	23.05	14,294,809	21.82	4,066,180	11.63	4,473,160	12.84	4,799,948	13.01	39,664,000	22.39	51,662,000	24.60	56,306,000	24.63
TOTAL	**57,771,983**		**62,246,997**		**65,498,131**		**34,958,520**		**34,842,920**		**36,888,547**		**177,147,000**		**209,970,000**		**228,637,000**	
	SEHORE						VILLUPURAM						DHORAJI					
GENERAL ADMN.	368,774	7.31	457,806	11.26	504,099	5.68	730,967	12.15	824,403	13.62	834,108	11.54	747,866	15.16	1,093,786	18.47	1,349,784	16.91
PUBLIC WORKS	670,016	13.28	559,415	13.76	370,592	4.17	428,006	7.11	425,221	7.03	917,279	12.69	124,164	2.52	143,480	2.42	212,438	2.66
PUBLIC HEALTH	619,712	12.29	661,219	16.26	782,901	8.81	856,544	14.23	1,185,519	19.59	1,400,213	19.37	1,376,771	27.92	2,041,743	34.49	2,708,116	33.93
PUBLIC SAFETY	196,055	3.89	183,985	4.52	161,602	1.82	626,195	10.41	609,287	10.07	632,677	8.75	0	0.00	0	0.00	0	0.00
REPAYMENT OF LOAN	0	0.00	0	0.00	0	0.00	195,006	3.24	193,836	3.20	195,365	2.70	564,345	11.44	175,460	2.96	522,500	6.55
EDUCATION	134,845	2.67	360,440	8.86	154,451	1.74	2,233,825	37.12	2,511,732	41.50	2,955,925	40.90	142,956	2.90	177,929	3.01	205,524	2.57
MISCELLANEOUS	3,054,127	60.56	1,843,488	45.34	6,908,504	77.78	947,287	15.74	302,891	5.00	291,978	4.04	1,975,484	40.06	2,288,057	38.65	2,983,410	37.38
TOTAL	**5,043,529**		**4,066,353**		**8,882,149**		**6,017,830**		**6,052,889**		**7,227,545**		**4,931,586**		**5,920,455**		**7,981,772**	
	HOSHANGABAD						DEVAKOTTAI						KADI					
GENERAL ADMN.	588,259	23.66	607,852	20.56	582,994	18.55	311,580	15.33	394,042	15.72	524,466	20.66	542,100	23.54	699,300	24.15	724,100	22.32
PUBLIC WORKS	240,319	9.66	238,448	8.06	188,359	5.99	105,132	5.17	108,400	4.33	105,725	4.17	59,400	2.58	44,500	1.54	53,000	1.63
PUBLIC HEALTH	796,802	32.04	1,240,565	41.95	1,201,397	38.23	695,338	34.20	824,883	32.92	841,381	33.15	989,000	42.95	1,260,400	43.53	1,390,000	42.84
PUBLIC SAFETY	196,996	7.92	227,456	7.69	294,109	9.36	115,580	5.69	125,645	5.01	152,963	6.03	149,000	6.47	137,800	4.76	164,600	5.07
REPAYMENT OF LOAN	0	0.00	0	0.00	0	0.00	108,322	5.33	216,782	8.65	2,355	0.09	245,000	10.64	400,000	13.82	500,000	15.41
EDUCATION	63,214	2.54	143,701	4.86	135,373	4.31	516,021	25.38	569,486	22.72	681,599	26.86	32,800	1.42	32,300	1.12	39,000	1.20
MISCELLANEOUS	601,063	24.17	499,034	16.87	740,697	23.56	180,933	8.90	266,757	10.64	229,469	9.04	285,600	12.40	321,000	11.09	373,800	11.52
TOTAL	**2,486,653**		**2,957,056**		**3,142,929**		**2,032,906**		**2,505,995**		**2,537,958**		**2,302,900**		**2,895,300**		**3,244,500**	

Annex 3

MUNICIPAL REVENUE EXPENDITURE ON WATER SUPPLY

LOCAL BODIES HEADS OF WATER SUPPLY	YEAR 1982-83	% TO TOTAL	% TO GRAND TOTAL	YEAR 1983-84	% TO TOTAL	% TO GRAND TOTAL	YEAR 1984-85	% TO TOTAL	% TO GRAND TOTAL	YEAR 1982-83	% TO TOTAL	% TO GRAND TOTAL	YEAR 1983-84	% TO TOTAL	% TO GRAND TOTAL	YEAR 1984-85	% TO TOTAL	% TO GRAND TOTAL	YEAR 1982-83	% TO TOTAL	% TO GRAND TOTAL	YEAR 1983-84	% TO TOTAL	% TO GRAND TOTAL	YEAR 1984-85	% TO TOTAL	% TO GRAND TOTAL
	BHOPAL									TIRUCHIRAPALLI									VADODARA								
ESTABLISHMENT	1,815,610	14.31	14.31	2,262,260	19.16	19.16	2,409,354	21.10	21.10	495,170	14.90	6.44	561,760	15.38	7.54	764,368	20.59	9.03	2,009,489	11.83	11.83	2,378,360	10.40	10.40	2,680,450	10.29	10.29
ELECTRICITY	4,672,467	36.82	36.82	5,764,585	48.82	48.82	5,637,617	49.37	49.37	2,602,000	78.30	33.85	2,808,000	76.89	37.69	2,739,512	73.78	32.37	8,733,187	51.40	51.40	12,317,237	53.86	53.86	14,179,302	54.42	54.42
MATERIALS	1,242,545	9.79	9.79	629,235	5.33	5.33	608,193	5.33	5.33	101,000	3.04	1.31	65,000	1.78	0.87	208,000	5.60	2.46	910,308	5.36	5.36	2,216,283	9.69	9.69	1,704,495	6.54	6.54
MAINTENANCE	1,160,131	9.14	9.14	746,469	6.32	6.32	786,052	6.88	6.88	13,230	0.40	0.17	37,400	1.02	0.50	1,313	0.04	0.02	1,675,195	9.86	9.86	2,265,539	9.91	9.91	3,034,618	11.65	11.65
NEW WORKS	3,109,721	24.50	24.50	1,521,204	12.88	12.88	1,000,351	8.76	8.76	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	111,742	0.66	0.66	175,329	0.77	0.77	228,959	0.88	0.88
MISCELLANEOUS	689,555	5.43	5.43	864,494	7.49	7.49	977,312	8.56	8.56	111,670	3.36	1.45	179,910	4.93	2.41	0	0.00	0.00	3,552,079	20.90	20.90	3,515,252	15.37	15.37	4,225,176	16.22	16.22
TOTAL	12,690,029			11,808,247			11,418,879			3,323,070			3,652,070			3,713,193			16,992,000			22,868,000			26,053,000		
REPAYMENT OF LOAN	0			0			0			4 364,010		56.77	3 798 580		50.98	4 748 773		56.12	0			0			0		
GRAND TOTAL	12,690,029			11,808,247			11,418,879			7,687,080			7,450,650			8,461,966			16,992,000			22,868,000			26,053,000		
	SEHORE									VILLUPURAM									DHORAJI								
ESTABLISHMENT	60,763	29.19	2.52	83,316	57.52	6.29	92,399	48.74	1.39	83,810	64.28	25.76	102,709	60.71	60.71	132,182	89.75	38.88	169,630	45.13	18.04	313,969	57.48	43.51	276,012	32.61	20.16
ELECTRICITY	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	12,096	9.28	3.72	38,000	22.46	22.46	14,535	9.87	4.26	134,236	35.72	14.26	173,513	31.77	24.04	501,167	59.20	36.61
MATERIALS	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	59,634	15.87	6.34	57,467	10.52	7.96	67,991	8.03	4.97
MAINTENANCE	0	0.00	0.00	0	0.00	0.00	3,051	1.61	0.05	34,469	26.44	10.59	2,033	1.20	1.20	558	0.38	0.16	3,450	0.92	0.37	1,240	0.23	0.17	0	0.00	0.00
NEW WORKS	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	8,885	2.36	0.95	0	0.00	0.00	1,332	0.16	0.10
MISCELLANEOUS	147,373	70.81	6.12	61,528	42.48	4.65	94,110	49.65	1.41	0	0.00	0.00	26,436	15.63	15.63	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
TOTAL	208,136			144,844			189,560			130,375			169,178			147,275			375,835			546,189			846,502		
REPAYMENT OF LOAN	2,200,000		91.36	1,179,015		89.06	6,465,543		97.15	195,006		59.93	0			192,665		56.68	564,345		60.03	175,460		24.31	522,500		38.17
GRAND TOTAL	2,408,136			1,323,859			6,655,103			325,381			169,178			339,940			940,180			721,649			1,369,002		
	HOSHANGABAD									DEVAKOTTAI									KADI								
ESTABLISHMENT	135,778	42.24	31.93	152,777	60.45	60.45	126,683	25.99	25.99	37,781	45.60	45.60	38,733	26.74	21.69	51,762	40.38	31.72	15,859	5.35	4.64	17,194	4.87	4.32	19,633	5.31	5.31
ELECTRICITY	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	237,155	79.96	69.34	281,301	79.75	70.65	248,523	67.25	67.25
MATERIALS	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	3,197	1.08	0.93	8,020	2.27	2.01	51,013	13.80	13.80
MAINTENANCE	176,954	55.05	41.61	0	0.00	0.00	0	0.00	0.00	115	0.14	0.14	0	0.00	0.00	0	0.00	0.00	20,122	6.78	5.88	21,568	6.11	5.42	24,667	6.68	6.68
NEW WORKS	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
MISCELLANEOUS	8,694	2.70	2.04	99,944	39.55	39.55	360,673	74.01	74.01	44,949	54.26	54.26	106,103	73.26	59.41	76,415	59.62	46.83	20,247	6.83	5.92	24,648	6.99	6.19	25,702	6.96	6.96
TOTAL	321,426			252,721			487,356			82,845			144,836			128,177			296,580			352,731			369,538		
REPAYMENT OF LOAN	103,796		24.41	0			0			0			33,754		18.90	35,000		21.45	45,455		13.29	45,455		11.42	0		
GRAND TOTAL	425,222			252,721			487,356			82,845			178,590			163,177			342,035			398,186			369,538		

Annex 4

MUNICIPAL REVENUE INCOME FROM SOLID WASTE DISPOSAL

Local bodies/ Heads	Year 1982-83	% to total	Year 1983-84	% to total	Year 1984-85	% to total	Year 1982-83	% to total	Year 1983-84	% to total	Year 1984-85	% to total	Year 1982-83	% to total	Year 1983-84	% to total	Year 1984-85	% to total
	VADODARA						BHOPAL						TIRUCHIRAPALLI					
Taxes	6,752,000	95.23	6,945,000	95.57	10,490,000	96.19	79,326	11.13	8,322	0.64	108,262	14.10	2,448,870	94.43	2,564,820	96.77	2,618,862	81.45
Conservancy charges	-	-	-	-	-	-	174,116	24.44	130,713	9.96	200,439	26.11	-	-	-	-	-	-
Sale of compost	-	-	-	-	-	-	-	-	-	-	-	-	84,660	3.26	85,610	3.23	594,724	18.50
Grants from State Govt.	-	-	-	-	-	-	459,000	64.43	1,173,000	89.40	459,000	59.79	-	-	-	-	-	-
Miscellaneous	338,020	4.77	322,060	4.43	415,240	3.81	-	-	-	-	-	-	59,800	2.31	-	-	1,600	0.05
Total	7,090,020	100.00	7,267,000	100.00	10,905,240	100.00	712,442	100.00	1,312,035	100.00	767,701	100.00	2,593,330	100.00	2,650,430	100.00	3,215,186	100.00
	VILLUPURAM						DHORAJI						SEHORE					
Taxes	383,371	97.24	434,455	98.29	423,369	97.01	-	-	-	-	-	-	-	-	-	-	-	-
Conservancy charges	-	-	-	-	-	-	-	-	-	-	-	-	2,924	8.73	2,327	7.63	2,483	18.13
Sale of compost	10,864	2.76	7,548	1.71	13,045	2.99	12,221	4.52	63,345	62.57	48,577	38.99	30,555	91.27	28,153	92.37	11,216	81.87
Grants from State Govt.	-	-	-	-	-	-	257,900	95.48	37,900	37.43	76,000	61.01	-	-	-	-	-	-
Miscellaneous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	394,235	100.00	442,003	100.00	436,414	100.00	270,121	100.00	101,245	100.00	124,577	100.00	33,479	100.00	30,480	100.00	13,699	100.00
	HOSHANGABAD						DEVAKOTTAI						KADI					
Taxes	87,252	94.05	121,135	98.44	109,293	100.00	83,459	99.05	86,900	99.71	93,770	99.42	-	-	-	-	-	-
Conservancy charges	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sale of compost	5,518	5.95	1,925	1.56	-	-	800	0.95	250	0.29	550	0.58	2,000	100.00	2,000	100.00	2,000	100.00
Grants from State Govt.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Miscellaneous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	92,770	100.00	123,060	100.00	109,293	100.00	84,259	100.00	87,150	100.00	94,320	100.00	2,000	100.00	2,000	100.00	2,000	100.00

Annex 5

MUNICIPAL REVENUE EXPENDITURE ON SOLID WASTE DISPOSAL

Local bodies/ Heads	Year 1982-83	% to total	Year 1983-84	% to total	Year 1984-85	% to total	Year 1982-83	% to total	Year 1983-84	% to total	Year 1984-85	% to total	Year 1982-83	% to total	Year 1983-84	% to total	Year 1984-85	% to total
	VADODARA						BHOPAL						TIRUCHIRAPALLI					
Establishment (Salaries)	13,970,000	91.73	16,233,700	97.63	14,255,000	62.49	7,163,699	71.60	10,559,904	76.35	11,903,967	74.93	7,039,180	80.91	7,827,340	80.39	8,657,623	79.88
Repairs & Maintenance	306,500	2.02	394,300	2.37	485,273	2.13	1,276,718	12.76	624,223	4.51	700,541	4.41	226,610	2.61	335,690	3.45	390,922	3.61
Materials	-	-	-	-	-	-	139,702	1.40	240,823	1.74	156,380	0.98	1,113,000	12.79	1,248,000	12.82	1,402,000	12.94
Miscellaneous	952,500	6.25	-	-	8,072,727	35.38	1,424,691	14.24	2,406,756	17.40	3,125,804	19.68	321,460	3.69	325,630	3.34	387,090	3.57
Total	15,229,000	100.00	16,628,000	100.00	22,813,000	100.00	10,004,810	100.00	13,831,706	100.00	15,886,692	100.00	8,700,250	100.00	9,736,660	100.00	10,837,635	100.00
	VILLUPURAM						DHORAJI						SEHORE					
Establishment (Salaries)	803,102	94.05	1,175,722	99.18	1,307,926	93.41	829,284	60.23	1,373,686	67.28	1,964,906	72.56	499,167	57.05	517,583	54.27	588,898	65.29
Repairs & Maintenance	23,618	2.77	6,670	0.56	92,287	6.59	192,497	13.98	236,501	11.58	352,283	13.00	57,020	6.52	75,146	7.88	16,426	1.82
Materials	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Miscellaneous	27,124	3.18	3,127	0.26	-	-	354,990	25.79	431,556	21.14	390,927	14.44	318,655	36.43	360,933	37.85	296,654	32.89
Total	853,844	100.00	1,185,519	100.00	1,400,213	100.00	1,376,771	100.00	2,041,743	100.00	2,708,116	100.00	874,842	100.00	953,662	100.00	901,978	100.00
	HOSHANGABAD						DEVAKOTTAI						KADI					
Establishment (Salaries)	657,845	82.56	711,338	57.34	709,676	59.07	695,338	100.00	824,883	100.00	840,195	99.86	519,439	78.89	648,045	79.52	654,117	79.91
Repairs & Maintenance	-	-	-	-	-	-	-	-	-	-	-	-	94,682	14.38	121,727	14.94	128,230	15.66
Materials	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Miscellaneous	138,957	17.44	529,227	42.66	491,721	40.93	-	-	-	-	1,186	0.14	44,340	6.73	45,180	5.54	36,153	4.43
Total	796,802	100.00	1,240,565	100.00	1,201,397	100.00	695,338	100.00	824,883	100.00	841,381	100.00	658,461	100.00	814,952	100.00	818,500	100.00

Annex 6

Domestic Connections and Stand Posts : Number and Coverage, 1984-85

Sampled Cities and Towns	Domestic Connections					Standposts		
	Number			Approximate Population Served	Approximate Quantity of Water Supplied (MLD)	Number	Approximate Population Served	Approximate Quantity of Water Supplied (MLD)
	T	M	UM					
Vadodara	25,860	17,389	8,471	476,039	31.52 (58.63)	984	194,439	3.88 (7.21)
Bhopal	21,720	8,069	13,651	269,990	35.68 (74.33)	1705	115,710	5.12 (10.66)
Tiruchirapalli	147,521	101,903	45,618	700,000	94.33 (63.47)	N.A.	166,762	17.98 (12.00)
Villupuram	7,000	Nil	7,000	62,000	3.29 (73.11)	200	10,074	0.36 (8.00)
Dhoraji	1,580	Nil	1,580	30,422	0.86 (64.17)	217	13,047	0.35 (26.11)
Sehore	2,923	2,923	Nil	25,970	3.08 (79.17)	135	27,000	0.30 (7.71)
Hoshangabad	2,142	2,142	Nil	21,700	1.60 (80.00)	125	12,000	0.30 (15.00)
Devakottai	2,924	2,924	Nil	31,408	1.68 (75.00)	237	16,180	0.25 (11.16)
Kadi	3,102	Nil	3,102	18,000	3.16 (92.94)	135	16,592	0.24 (7.05)

(T : Total; M : Metered; U.M. : Unmetered

- Figures in brcackets in colums 7 and 10 percentages to total quantity of water available for distribution (MLD).

- The population served was worked outo only for Bhopal. For all the local bodies the figures have been provided.

Annex 7

Sample Households with Domestic Connections :
Payment of Water Charges

Local Body	Total Households with domestic connections	Per cent paying
Bhopal	102	98.00
Tiruchirapalli	42	100.00
Vadodara	150	76.67
Dhoraji	83	98.79
Sehore	64	57.81
Villupuram	79	100.00
Devakottai	55	100.00
Hoshangabad	56	48.20
Kadi	81	87.65

Annex 8

Annual Expenditure on Solid Waste Disposal

(Rs.)

Sampled cities and towns	Annual expenditure			Per capita annual expenditure		
	1982-83	1983-84	1984-85	1982-83	1983-84	1984-85
Vadodara	15,229,000	16,628,000	22,813,000	18.22	18.78	24.32
Bhopal	10,004,810	13,831,706	15,886,692	12.92	16.62	17.77
Tiruchirapalli	8,700,250	9,736,660	10,837,635	23.64	26.03	28.50
Villupuram	856,544	1,185,519	1,400,213	10.84	14.64	16.87
Dhoraji	1,376,771	2,041,743	2,708,116	16.72	24.09	31.04
Sehore	874,842	953,662	901,978	15.37	16.04	14.52
Hoshangabad	796,802	1,240,565	1,201,397	15.39	22.67	20.76
Devakottai	695,338	824,883	841,381	19.08	22.17	22.15
Kadi	658,461	814,952	818,500	17.77	21.47	21.04

Annex 9

Households Expenditure on Water Supply

Sampled Cities and Towns	Average household expenditure on water supply per month (Rs)	Percentage of household expenditure on water supply to total household income
Vadodara	4.00	0.28
Bhopal	7.00	0.68
Tiruchirapalli	7.00	0.95
Villupuram	10.00	0.97
Dhoraji	5.00	0.50
Sehore	3.50	0.38
Hoshangabad	3.40	0.23
Devakottai	13.00	2.16
Kadi	6.00	0.45

Annex 10

Distribution of Respondents Paying Charges for
Domestic Waste Street Cleaning

Household monthly incomes	Not paying	Monthly Expenditure on Garbage Disposal (Carrying Domestic Waste)												Total
		< 1	1-2	2-3	3-4	4-5	5-7.50	7.50-10.0	10.0-12.50	12.50-15.00	15.0-17.50	17.50-20.00	20.0- and	
<100	2													2
100 - 200	20													20
200 - 300	79													79
300 - 400	152												1	153
400 - 500	118													118
500 - 750	316						2							318
750 - 1000	120						6		1				1	128
1000 - 1250	125					2	13		13		1		16	170
1250 - 1500	14				1		5		5				5	30
1500 - 1750	90		1				27	1	8	1	1		8	137
1750 - 2000	14						14	3	4				4	39
2000 - 2500	64		1	2		6	24	3	11				6	117
2500 & above	68		2				40		4				11	125
	1182		4	3		8	131	7	46	1	2		52	1436

PUBLICATIONS OF RELATED INTEREST

Management of Urban Services	1986
The Nature and Dimension of the Urban Fiscal Crisis	1987
Delhi as a Union Territory Vs. Delhi as a State	1988
Provision of Urban Water Supply Institutional Options	1988
Revamping the Structure of Property Taxes : A Study	1988
Upgrading Municipal Services : Norms and Financial Implications (2 Vols.)	1989
The State, Market and Urban Services (Forthcoming)	