Management of Urban Services

Research Study No. 14

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PREFACE

This monograph presents the results of a major comparative study on the management of urban services, carried out in nine Indian cities of varying sizes, functions and geographical location. The cities in order of population size are: Baroda, Bhopal, Tiruchirapalli, Villupuram, Dhoraji, Sehore, Hoshangabad, Devakottai and Kadi.

How to better provide, deliver and manage basic services to the increasing number of urban areas is the main underlying theme of the study. Undertaken at a time when there is considerable uneasiness about the manner in which the urban local bodies function, and when questions are being raised at the national level about their capacities to be able to meet the complex onrush of urbanisation, with the National Planning Commission joining in the call to "revitalise" them, (Seventh Five Year Plan 1985-90, p 297), this study has attempted to determine the management and organisational problems that the urban local bodies encounter in efficiently delivering the services, identify the points in the delivery process of services at which the problems arise, the factors that cause them, and what can be done to overcome them.

The study was funded by a grant from the International Development Research Centre (IDRC), Ottawa, Canada, awarded under contract NO. 3-P-82-0233. Besides the generous grant, the study benefitted greatly from the most valuable contributions and comments of Dr. Yue-man Yeung, then the Senior Programme Officer at the headquarters and Mr. Elwood A. Pye, Regional Programme Officer of Singapore office of

the IDRC. Ms. Lynn Thurston's contribution to the study needs to be singled out for her perceptive comments on the city study reports which were submitted to the IDRC in advance of this monograph as well as for her ideas on the agenda for future research in this complex field.

Within the National Institute of Urban Affairs, Dr. K. Sreeram, Professor, (Management Studies) took upon himself the task of designing, supervising and coordinating the research study. In an area which was hitherto unexplored, Dr. Sreeram's systematic approach to this study has to be specially complemented. Dr. Sreeram was assisted by an equally competent interdisciplinary team of staff which included M.P. Mathur, Ajay Nigam, Ms. Usha P. Raghupathi, A.K. Gupta and Mohd. Haneef. Ms. Ravinder, Tek Chand and Ms. Santosh Bhandari typed the manuscript and carried out the secretarial work relating to this study.

Two other individuals without whom the study could not have been initiated, need to be specifically mentioned and thanked. Dr. K.B. Lal, Chairman, Indian Council for Research on International Economic Relations (ICRIER) who put this Institute in contact with the IDRC, and helped in securing the support for the research study, and Mr. M.N. Buch, the former Director of the National Institute of Urban Affairs and currently the Vice-Chairman of the National Commission on Urbanisation who accepted the research study and established its broad parameters and objectives.

Mr. Vijay Pande, Representative of the International Development Research Centre in New Delhi and his dynamic colleague, Ms. Susan Mowat equally deserve our thanks for their unstinted support to the study.

A study of this nature involving large scale assembly of data which the urban local bodies are often reluctant to share and part with, leaves the team of researchers in a state of flux on the one hand, and of inquisitiveness on the other. For us at this Institute including myself who has participated in the drafting of this monograph, this study has certainly made us inquisitive to explore this subject further, and we feel gratified to that extent.

July 1986

OM PRAKASH MATHUR
DIRECTOR

PART ONE

INTRODUCTION

I. THE GENESIS AND OBJECTIVES

II. ANALYTICAL FRAMEWORK AND METHODOLOGY

III. THE CHARACTERISTICS OF THE CASE STUDY (SAMPLED) CITIES

I THE GENESIS AND OBJECTIVES

1. As of the year 1951, the year of the first census undertaken in independent India the total urban population of the country was 62.09 million, distributed somewhat unevenly over 3034 settlements of various sizes and functions. The last census held in the year 1981 placed the country's urban population at 157.7 million,[1] showing an increase of 154 per cent in a brief spell of thirty years. The average population size of an urban settlement which was 20,465 in 1951 jumped to 47,875 during the same period.

2. A country whose per capita Net National Product is just about Rs.2,344 (1984-85 estimates at current prices),[2] or US $ 260 per capita GDP according to the WORLD DEVELOPMENT REPORT 1986 has to inevitably ask as to how, and by what configuration of means, this size of urban population can be provided with basic services such as water supply, sanitation, education, and primary health, and how such large numbers of urban settlements expanding under the impact of varying circumstances and pressures can be kept "moving".[3] The country has a vital stake in seeking answers to these questions as any impediment in

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1 Source: General Population Tables, Part II A(i), Census of India, 1981. The 1981 population estimate excludes the population of Assam.

2 Central Statistical Organisation, Monthly Abstract of Statistics, Vol.39 No.5, May 1986.

3 The total number of urban settlements according to the 1981 census was 3239 (excluding Assam). The size distribution and population in each category is given in Annex. Table 1.

the provision of basic services to these urban areas which contribute no less than 47 per cent of the total Gross National Product and which are at least three times more productive compared to their rural counterparts,[4] can cause serious setbacks to its already low rate of economic development. Every route that can enable the country to better utilise its limited resources has therefore to be explored. Every possible avenue that can enhance the efficiency of the urban areas has to be identified and experimented with.

3. This report on MANAGEMENT OF URBAN SERVICES is concerned with the efficiency of urban areas -- with ways in which urban basic services such as water supply, sanitation and disposal of waste can be better delivered and managed. Synthesising the results of studies carried out in nine Indian cities located in different socioeconomic and spatial settings, this report has attempted to specifically identify the points in the delivery process of services at which inefficiencies arise, the factors that cause these inefficiencies, and what can be done to overcome them.

4. The study has grown out of the newly-emerging belief that there are many avenues for improving the efficiency and functioning of the urban areas which have neither been systematically studied nor experimented with. Thus, it is argued that the key factors in the Third World Countries (TWCs) including India which constrain the efficient functioning of the urban areas are not so much the lack of financial resources as the absence of appropriate management, organisation, and trained manpower. Those who hold this view point out that the urban

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4 Rakesh Mohan, "Urbanisation in India's Future", Population and Development Review, Vol.11 No.4, December 1985.

local bodies in India which are responsible for providing basic services are poorly staffed, that the staff responsibilities are unclear and often fragmented, and that their capacities and motivation to deal with the increasingly complex urban needs are extremely low. The result is that the resources at their command which are scarce to begin with, are not put to efficient use and are, in a sense, wasted. This study on MANAGEMENT OF URBAN SERVICES has attempted to test this belief.

5. This particular stance of the study constitutes a sharp departure from the earlier studies which almost invariably analysed the problems relating to the performance of the urban local bodies within the framework of the financial resources, and also sought solutions to the problems within the financial framework. For instance, the Committee on AUGMENTATION OF FINANCIAL RESOURCES OF URBAN LOCAL BODIES (known popularly as the Zakaria Committee Report) set up by the Government of India in 1963 examined the resource position of the urban local bodies and concluded that additional resources to the tune of Rs.990 million per annum would have to be found for them to augment the services (water supply, sewerage and sewage disposal, roads and parks, education, medical and health services) to levels which it considered most essential and desirable.[5] In 1983 the National Institute of Urban Affairs (NIUA) updated and revised these estimates to Rs.8,100 million, and pointed out that the resources that were required to provide these services according to the norms laid down in the Zakaria Committee Report were massive and would call for recurring and non-recurring investments of very high magnitudes. According to the NIUA's study

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5 Government of India, "Augmentation of Financial Resources of Urban Local Bodies", New Delhi, November 1983.

entitled A STUDY OF THE FINANCIAL RESOURCES OF URBAN LOCAL BODIES IN INDIA, AND THE LEVEL OF SERVICES PROVIDED, the gap between the presently available resources of the urban local bodies and those that were required was "unbridgeable", calling for very large scale resource mobilisation efforts at various levels.[6] The focus of these studies was almost wholly financial. They paid virtually no attention to exploring other than financial routes to improving the performance of the urban local bodies.

6. It is in this context that the present study on MANAGEMENT OF URBAN SERVICES assumes particular significance. The thrust of the study is on finding ways to improve the efficiency of the urban local bodies within the limits imposed by the available financial resources. Specifically, it has attempted to:

> "(i) examine the existing level of the efficiency of management of infrastructural services and financial resources of local bodies; and
>
> (ii) explore the feasibility to propose ways and means to improve local bodies, efficiency and managerial capability."[7]

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6 National Institute of Urban Affairs, A Study of the Financial Resources of Urban Local Bodies in India, and the Level of Services Provided, New Delhi, 1983.

7 See, National Institute of Urban Affairs "Research proposal on the Efficiency of Management of Infrastructural Services and Financial Resources of Local Bodies", submitted to the International Development Research Centre, Ottawa, Canada, 1983.

II ANALYTICAL FRAMEWORK AND METHODOLOGY

7. As mentioned in the previous section, the thrust of the study was towards identifying and measuring the inefficiencies in the delivery of the two core municipal services: (i) water supply, and (ii) environmental sanitation and waste disposal, and to suggest ways to overcome or at least to reduce the impact of the inefficiencies. The key questions relevant for developing the framework and methodology were:

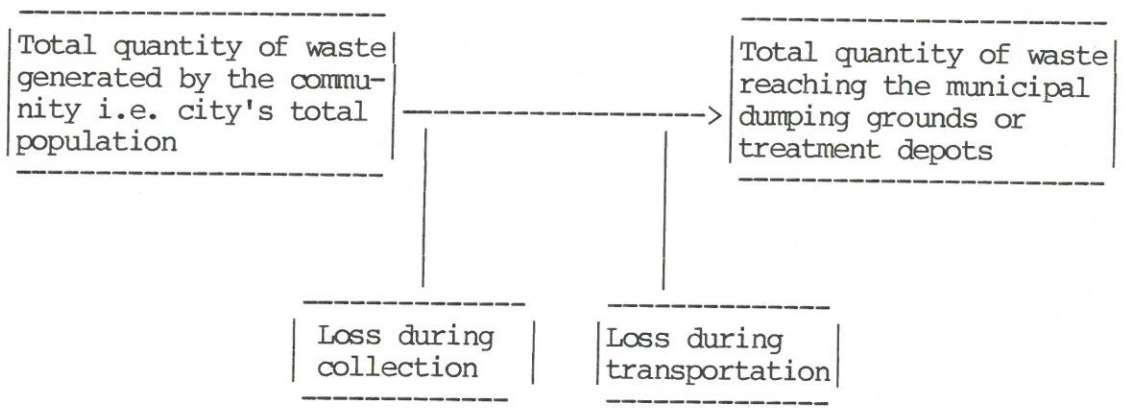
(a) What exactly constituted the inefficiencies? How can one define them?

(b) What indicators should be utilised for identifying the inefficiencies in the delivery process of the services?

8. The analytical framework developed for addressing these questions postulated that for every urban service there were two points within which the delivery of a service takes place, and that the inefficiencies occur within the boundaries of these two points. Thus, in the case of water supply the two points were (i) the quantity of water available for supply to the consumers, and (ii) the quantity of water that reaches the consumers, as shown below:

9. The framework hypothesised that there was a difference between the two points with the quantity of water reaching the consumer (X-1) being less than the total quantity available for supply and distribution (X). This hypothesis raised several types of questions for investigation: was the difference (waste/loss) normal or excessive? at what stages in the delivery process did the wastage of water occur? what factors caused the wastage? and similar other questions.

10. In the case of environmental sanitation and waste disposal too, similar points in the process were identified. The initial point was the total quantum of waste generated (Y), while the end point was the quantity of waste deposited at the disposal and treatment depots (Y-1), with the loss occurring at various stages in the process as illustrated below:



11. Within this broad analytical framework, a comprehensive catalogue of indicators which pointed either directly or indirectly towards the efficiency and performance of the urban local bodies were determined. Thus, in the case of water supply indicators such as the following were chosen:

a. Percentage of population served by the municipal water supply system

b. Quantity of water per capita supplied

c. Type of water supplied -- treated, filtered or untreated

d. Degree of intracity variations in the supply of water

e. Percentage of population served by metered supply

f. Percentage of population served by standposts

g. Location of standposts in relation to the distribution of population

h. Estimates of the loss of water at various stages

i. Revenue generated by the sale of water and expenditure incurred on the water supply system.

12. These indicators led to further probing into factors that underlay, for example, the supply of untreated water (non-availability of chemicals, sand, pebbles, filters etc.), reasons for the losses (unauthorised connections, seepage, lack of equipment to detect seepage etc.), and the inequitable distribution of standposts (political pressures etc.).

13. In the case of environmental sanitation and waste disposal, the following types of indicators constituted the basis for data collection:

a. Provision of waste collection bins

b. Capacity utilisation of the waste collection bins

c. Availability of manpower for waste collection

d. Deployment of manpower for collection of street waste

e. Availability of trucks for carrying waste to disposal and treatment depots

f. Revenues generated through taxes levied on waste collection and scavenging, and expenditure incurred on providing basic sanitation services and facilities.

14. It also led to the examination of the various methods for waste

collection and treatment, staffing of the concerned units as well as the distribution of workload on sweepers etc.

15. The study was carried out in several interrelated phases:

Phase 1 Preparation of the analytical framework, design, and methodology.

Phase 2 Selection of cities for the study which involved a fairly comprehensive analysis of the demographic data on the pace and pattern of urban growth as well as of the data on municipal finance. The initial proposal was to select cities from states which had somewhat identical characteristics and developmental problems; however, for internal reasons, this criterion was modified. (The characteristics of cities finally covered by the study are outlined in the next section).

Phase 3 Field survey consisting of (a) collection of data on the core services from the municipal bodies, (b) observations, and (c) discussions with officials of the municipalities on the functioning of the departments/units responsible for the provision of water supply and environmental sanitation.

Phase 4 Processing of data and preliminary analysis.

Phase 5 Preparation of the case studies on the sampled cities covering two services (a) water supply, and (b) environmental sanitation and waste disposal. In addition, status notes on urban transport and education in two major cities (Ahmedabad and Tiruchirapalli) were also prepared.8

Phase 6 Preparation of the synthesis report with focus on the major areas for specific attention and action.

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8 City case studies have been finalised and submitted to the International Development Reseach Centre, Ottawa, Canada.

III THE CHARACTERISTICS OF THE CASE STUDY (SAMPLED) CITIES

16. Selection of a sample for any research study is invariably a complex task, and there is hardly ever an adequate justification for selecting one set of samples and not the other. The task becomes even more complex when the universe out of which the sample is to be drawn happens to be very large, and the sample, for reasons of time and resources, has necessarily to be small. In the case of this study, the universe consisted of 3294 cities and towns of various sizes (see Annex. Table 1) and the sample, according to the research proposal, was to consist of 9 cities.

17. The research proposal provided that the sample of cities for this study should be drawn firstly, in a way that they should display characteristics of somewhat identical nature and secondly, they should represent the major geographical zones into which the country stood broadly divided. The proposal stipulated that cities which were receiving financial assistance in one form or the other from international funding agencies should be excluded from the scope of the study. Within the parameters laid down in the research proposal, the selection of cities was carried out in two stages. In the first stage, one State from each of the three geographic regions was selected. These

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9 Region I consisted of Andhra Pradesh,Karnataka,Kerala & Tamil Nadu.
Region II consisted of Gujarat,Madhya Pradesh,Maharashtra & Orissa.
Region III consisted of Punjab, Himachal Pradesh, Haryana, Rajasthan, Uttar Pradesh, Bihar, West Bengal & Sikkim.
See National Institute of Urban Affairs, Research Proposal (P.26).

were Tamil Nadu (Region I), Gujarat (Region II), and the Punjab (Region III). Punjab had the distinction of having the highest per capita income in the country, a dispersed pattern of urbanisation and a developing urban tradition. Along the same lines were Gujarat and Tamil Nadu: higher per capita incomes in comparison with other States as well as higher levels of urbanisation combined with long and stable traditions of local governance. Punjab had, however, to be substituted by Madhya Pradesh for internal reasons. As opposed to the Punjab, Madhya Pradesh had extremely low levels of per capita income and urbanisation. Also, in comparative terms, the State had fragile urban local governments.

18. In terms of the access to safe drinking water and sanitation the achievements and performances of these three States were uneven. In Tamil Nadu, 81 per cent of the total urban population was covered by safe drinking water and basic sanitation. Madhya Pradesh presented the extreme on the lower end, with a population coverage of 72.4 per cent for water supply, and only 5.5 per cent for sanitation. In Gujarat, basic sanitation covered 44 per cent of the urban population.
The basic data with regard to the three States are given in Table 1.

Table 1: Basic Data on Sampled States

States	a] Population 1981 (in millions)			a] Decadal variation of urban population 1971-81	b] Urban population below poverty line 1977-78 (%)	c] Net Product per capita 1981-82 (at current price) (Rs)	d] Access to safe drinking water 1981		d] Access to sanitation 1981	
	Total	Urban	% of urban to total				Urban population served (in millions)	% to total urban	Urban population served (in millions)	% to total urban
Gujarat	34.09	10.60	31.09	41.33	29.05	2,192	9.43	95.0	4.37	44.0
Madhya Pradesh	52.18	10.59	20.30	56.19	48.09	1,241	7.10	72.4	0.54	5.5
Tamil Nadu	48.41	15.95	32.95	28.01	44.79	1,373	12.90	81.0	12.90	81.0
All India	685.19*	159.73*	23.31*	46.41*	38.19	1,758	115.48	77.8	40.03	26.9

Source: a] Final Population Totals, Paper 1 of 1982, Census of India.
b] Sixth Five Year Plan, 1980-85, Planning Commission.
c] Central Statistical Organisation, Planning Commission.
d] National Master Plan for Water Supply and Sanitation.

* Includes Projected figures of Assam.

19. Selection of cities was made on the basis of their population size, population growth rates, and functional specialisation. Diversity rather than homogeneity was the principal consideration in their selection. Of the 9 cities that were selected for detailed studies there were three cities from each population-sized categories class I (over 100,000), class II (50-100,000) and class III (20-50,000). Their population growth rates as well as the functional specialisation were different.[10] These data are given in Table 2 below.

Table 2: The Characteristics of Sampled Cities

Cities	Population: Total	Population: Percent growth rate 1971-81	Functional Specialisation 1971
Tamil Nadu			
Tiruchirapalli	360,045	17.78	Industry-cum-Trade
Villupuram	77,091	27.97	Commerce-cum-Transport
Devakottai	35,684	23.16	Service-cum-Trade and Commerce
Gujarat			
Baroda	734,473	57.38	Industry
Dhoraji	76,556	28.08	Service-cum-primary activities
Kadi	34,595	23.99	Service-cum-Trade and Commerce
Madhya Pradesh			
Bhopal	671,018	125.16	Service
Sehore	52,190	46.37	Service-cum-Industry
Hoshangabad	39,997	48.07	Service

Source: General Population Tables, Census of India, 1981.

10 The demographic data for cities for which only the status reports were prepared are as follows:

Bombay	8,243,405	38.07	Industry
Bangalore	2,628,593	70.61	Industry-cum-Service
Lucknow	916,954	22.38	Service

20. In terms of the gradation of cities by population size, the sampled cities covered a range between a high of 734,473 (Baroda) and a low of 34,595 (Kadi). Population growth rates of cities varied between a low of 17.78 per cent (Tiruchirapalli) and a high of 125.16 per cent (Bhopal). There were three cities with low population growth rates (below 25 per cent), four cities with medium growth rates (25-50 per cent) and two cities with high growth rates (over 50 per cent). The specialisation of cities in terms of their principal functions too varied quite a bit from industry, to service, to commerce and a combination of these in different proportions.

PART TWO

A SYNTHESIS OF SURVEY RESULTS AND FINDINGS

I WATER SUPPLY

II ENVIRONMENTAL SANITATION AND WASTE DISPOSAL

III IMPLICATIONS FOR ACTION AND RESEARCH

I WATER SUPPLY

21. Even though a national programme to provide safe drinking water to India's urban areas was launched in 1954 and progressively larger investments were made for urban water supply schemes in the five year plans, it was the Fourth Five Year Plan (1969-74) which explicitly acknowledged that the provision of safe drinking water combined with proper facilities for disposal of waste constituted the principal environmental control measure against the transmission of water borne diseases.[11] However, neither the Fourth Plan nor its successor (1974-79), offered any fresh initiatives in this regard, except to propose that efforts for the provision of water supply to urban areas should be intensified, and that the spillover schemes should be expeditiously completed.[12]

22. A real thrust to the urban water supply programme was given in the Sixth Five Year Plan (1980-85) which coincided with the declaration of the International Drinking Water Decade Programme. 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

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11 Government of India, Planning Commission, Fourth Five Year Plan 1969-74, New Delhi, 1970.

12 Government of India, Planning Commission, Draft Fifth Five Year Plan 1974-79, p.263.

policies and programmes in an integrated manner.[13]

23. Notwithstanding the importance of water as an essential good for the survival of humankind, the overall situation with regard to urban water supply continued (and continues) to be unsatisfactory. For instance, up to the year 1980, only about 67 per cent of the total urban areas in the country could claim to have municipal (organised) water supply systems, with 33 per cent of the urban areas relying on sources that were "unsafe".[14] As of the year 1981, 22.8 per cent of the total urban population had no access to safe water, posing serious health hazards for the country. Furthermore, the fact that 77 per cent of the urban population had access to water supply sources did not mean that the sources were either safe, or that the quantum of water supplied was commensurate with their needs. The Seventh Five Year Plan 1985-90 notes that these "figures do not reflect properly either the adequacy of the water supplied or the deprivation of the urban poor".[15] What is important to note is that the Seventh Five Year Plan also attributes the inadequacies on the urban water supply front to the shortages in the plan finance resources, and not to managerial or organisational inefficiencies and constraints.

24. Like in most countries, the provision of safe and potable water is the principal obligatory function of the urban local governments in India. The Gujarat Municipalities Act, 1963 (Gujarat Act No. 34 of

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13 Government of India, Planning Commission, Sixth Five Year Plan 1980-85 New Delhi.

14 Source: Sixth Five Year Plan, 1980-85, Table 23.6.

15 Government of India, Planning Commission, Seventh Five Year Plan, 1985-90, New Delhi

1964) for instance, 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".[16] Almost similar provisions exist in the Acts of the other States, including those of Tamil Nadu and Madhya Pradesh.[17]

25. In order to enable the municipalities to fulfil their obligatory function such as the provision of safe water, they are vested with specific powers and responsibilities. For example the Gujarat Act, Section 90 provides that "If any municipality supplies water through pipes, it shall take 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".[18]

26. In pursuance of the statutory provision, the responsibilities of the municipal bodies with regard to the water supply sector are wide and include a whole range of issues such as the identification of the sources of raw water, harnessing of those sources for meeting the requirements of the population falling within their jurisdictions, treatment and filteration, distribution of water, and prevention of rates and charges, proper maintenance of the production and distribution

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16 The Gujarat Municipalities Act, 1963, Section 87 C (c).

17 See, The Madras City Municipal Corporation Act, 1919, and the Madhya Pradesh Municipalities Act, 1961.

18 Ibid, also, see Section 175, of the Gujarat Municipalities Act, 1963.

water wastage. Their responsiblities also include fixation of the water lines, as well as taking decisions on the location of public hydrants, standposts and so on.

27. Within the context of this background, we have brought together in this section the principal results and findings of the survey of the urban water supply sector carried out in nine Indian cities. Specifically, only those results that directly impinge on the functioning and performance of the urban local bodies in the discharge of their responsibilities are highlighted here, with details of the survey results given in the city reports.[19] For convenience, the results have been grouped under specific subheads.

A. Extent of Utilisation of the Sources of Raw Water

28. Supply of water to urban areas is basically determined by the sources of water itself - these being the flow sources such as the rivers or streams (surface source), and the undersurface sources which include tubewells, deep borewells, and so forth. Many urban settlements use a combination of the surface and undersurface sources.

29. The cities constituting the sample for this study had access to a variety of sources of raw water which included river (Dhoraji, Tiruchirapalli and Villupuram), dugwells and tubewells (Sehore, Hoshangabad, Kadi and Devakottai), and a combination of river and lake water, tubewells and dugwells (Baroda and Bhopal). The survey noted wide fluctuations in the overall availablility of water in cities which relied wholly on the undersurface sources of raw water.

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19 The source of this section on Water Supply as well as of the next one on Environmental Sanitation and Waste Disposal is the City Study Report.

30. More important than the fluctuations in the availability of water was the fact that the water that was available from various sources was not fully utilised for augmenting the city water supply system. The utilisation ratio of raw water ranged between 52.14 and 86.67 per cent. The utilisation ratio was somewhat better in cities where the raw water sources were either the rivers or lakes (Tiruchirapalli) or a combination of the various sources. Data in this regard may be seen in Table 3 below.

Table 3: Utilisation Ratio of Raw Water

Water Supply	Baroda	Bhopal	Tiruchi-rapalli	Villu-puram	Dhoraji	Sehore	Hoshan-gabad	Devako-ttai	Kadi
Installed capacity (MLD)	133.8	65.25	34.13	4.55	6.00	2.57	3.18	4,000*	2.70
Capacity utilised (MLD)	102.0	53.76	29.58	3.19	4.50	1.34	2.22	2,468*	2.0
Utilisa-tion ratio (per cent)	76.2	82.4	86.7	70.10	75.00	52.1	69.8	61.7	74.1

* Ltrs Per Minute.

31. The survey showed that apart from the supply constraint (e.g.,drying up of wells) which restricted fuller utilisation of the installed capacities, Devakottai being one such case, there were at least three other reasons for comparatively lower utilisation ratios:

(a) Irregular and inadequate supply of electricity,

(b) non-availability of standby pump sets, and

(c) absence of repair facilities for pumps.

32. Absence of repair facilities and the non-availability of standby pump sets were the chief reasons for low utilisation ratio in smaller cities such as Hoshangabad, Devakottai and Kadi.

B. Coverage of Population by Municipal Water Supply Systems

33. The overall performance of urban local governments is best judged by their capacity to provide adequate and safe drinking water to the populations falling within their jurisdiction, irrespective of their income or social status. Larger per capita supplies of fully treated water for every citizen are the obvious characteristics of a well-managed local body.

34. The survey of the nine cities showed that with the exception of Baroda where its entire population was reportedly served by the municipal water supply system, in the remaining cities, parts of the population remained unserved by municipal water. The parts remaining unserved ranged between a high of 54.2 per cent in Villupuram and a low of 8.9 per cent in Hoshangabad.[20] For other cities, this percentage varied between 15 and 22 suggesting the degree to which the population of cities which included larger cities like Bhopal and Tiruchirapalli remained exposed to water related diseases. Table 4 gives relevant data in this regard.

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20 The high utilisation ratio for Hoshangabad is partly explained by the fact that it is located on the banks of river Narmada.

Table 4: Population Covered by Municipal Water Supply

Coverage	Names of Sampled Cities								
	Baroda	Bhopal	Tiruchi-rapalli	Villu-puram	Dhoraji	Sehore	Hoshan-gabad	Devako-ttai	Kadi
Population (total)	734,473	422,329*	362,045	77,091	76,556	52,190	39,997	35,684	34,595
Population served by water supply	734,473	329,740	282,760	35,237	65,000	28,213	36,444	28,280	29,300
Percent of population served to total population	100.0	78.1	78.1	45.7	84.9	54.1	91.1	79.3	84.7

* Includes only the population within the Bhopal Municipal Corporation area.

35. As pointed out earlier, the population served by municipal water supply systems is only one of the many indicators for assessing the performance of urban local bodies. Other related indicators include the adequacy of water (quantity supplied), the safety of water (treatment) and the spatial distribution of water connections. An examination of the survey results shows low per capita availability of water across the case study cities. As would be seen from Table 5, per capita water supply ranged between 42.9 ltrs/day for Sehore and 138.6 ltrs/day for Bhopal. The comparatively larger cities like Baroda, Bhopal and Tiruchirapalli had higher per capita supply of approximately 135 ltrs per day which includes water for non-domestic purposes. In the relatively smaller cities, the non-domestic content in the average per capita was negligible.

Table 5: Average Per Capita Water Supply

Water supply	Names of Sampled Cities								
	Baroda	Bhopal	Tiruchi-rapalli	Villu-puram	Dhoraji	Sehore	Hoshan-gabad	Devako-ttai	Kadi
*Average per capita supply (ltrs per day)	132.1	138.6	134.1	89.4	60.9	42.9	52.9	59.1	61.4
**Average domestic per capita supply (ltrs per day)	100.3	107.4	81.7	89.4	49.4	42.9	52.9	57.3	61.4

* Total quantity of water supplied divided by total population.

** Total quantity of water supply for domestic use divided by total population served.

36. It needs to be pointed out that the average availability of water was significantly lower than the norms laid down by the Zakaria Committee. According to the norms, the average availability should vary between 67.5 ltrs/day for cities in the population range of 20-50,000; 112.5 ltrs/day for cities in the population range of 50-100,000, and 157.5-202.5 ltrs/day for cities in the population range of 100,000 and 1 million. None of the cities come closer to these norms.

37. The water which was supplied through the municipal system apart from being inadequate, was reported to be only partially treated. It was stated earlier that various statutes empower the municipal bodies to make arrangements for treatment of water. The survey, however, showed that facilities for full-scale treatment of water did not exist in any

of the case study cities - not even in larger cities like Baroda, Bhopal and Tiruchirapalli. In Baroda, only a part of the city's water supply was given the requisite treatment. In Bhopal, as against the installed capacity of 65.25 MLD the capacity of the treatment plants was only 42.73 MLD. Liquid chlorine and bleaching powder were reported to be the main modes of treatment of water in Tiruchirapalli, raising doubts about the scientific nature of the treatment. In smaller places like Hoshangabad, tubewell water was pumped directly into the distribution system, and it was not clear whether it was in any way treated before being released for consumption.

38. On the whole, the survey showed that proper treatment of water has so far received little attention on the part of the municipal bodies. In cities where treatment facilities were available, there were claims of shortage of chemicals, filters, sand and pebbles. Absence of technically qualified personnel and inadequate laboratory facilities for periodic analysis of water were responsible for the neglect of this extremely important aspect of the water supply system. The problem was severe in smaller cities where supplies of chemicals and other requirements were irregular and uncoordinated.

39. Table 4 above had shown the percentage of population served by municipal water supply systems for the case study cities. Those were, however, gross averages which masked the extent of intracity disparities which existed both in the case of population served as well as the per capita availability of water. The spatial distribution of population served and per capita supplies are, however, very revealing as may be seen in the following table.

Table 6: Intracity Disparities in the Supply of Water in Selected Cities

Indicators	Name of the Sampled Cities							
	Baroda		Tiruchirapalli		Sehore		Devakottai	
	Low	High	Low	High	Low	High	Low	High
Percent of population served in different zones	100	100	52	96	25	90	64	83
Percapita water availability in different zones (ltrs)	36	310	69	185	32	87	28	75

40. The extent of disparities is evident from the above table, with an extreme case being represented by Sehore where the municipal system reportedly served only 25 per cent of the population in one zone, and 90 per cent in another. Baroda's case is equally revealing which shows that while the municipal system covered the entire population of the city, it supplied only 36 ltrs per capita/day in another. The inequities in the spatial distribution of water are further compounded by the fact that the per capita supply was particularly lower in the zones where the percentage of population served was also small. Detailed analysis which is contained in the city reports also reveals that the per capita supplies were low in the zones inhabited by low-income and economically weaker sections of the population. The dependence of this section of the population on sources other than the municipal sources of water poses a serious threat to the health of the cities.

41. The general conclusion that emerges from the above is that though the provision of water supply is an obligatory function of the municipal bodies, it was not being performed with the seriousness that it deserved. Substantial sections of the population in the case study cities remained unserved by the municipal water supply system; in quantitative and qualitative terms, water was inadequate for those who had access to it, and the principal victims were the economically weaker sections of the population who either did not have access to municipal water supply or received grossly inadequate supplies for meeting their basic requirements.

C. Extent of Water Losses and Leakage

42. One of the universal features of the urban water supply system in developing countries is the quantum of wastage, losses and leakages that occur in the production and distribution of water. This feature appears most disturbing for firstly, the total quantity of water that is available to urban areas happens to be in short supply, and secondly, the resources to augment the city water supply systems are severely limited. Under these circumstances, any loss of water can hardly be justified.

43. While it is known that there are substantial losses and leakages of water, no reliable estimates of the quantities of water that are actually lost are available. Water supply is unmetered in most cities. Also, a very significant proportion of water is supplied through the public standposts, making it extremely difficult to estimate the water losses.

44. In the cities covered by this study the position with regard to the supply of unmetered water as well as its supply through standposts was disconcerting. In Baroda and Tiruchirapalli, the two large cities in the sample, 73 per cent of the total number of connections were unmetered. In Bhopal, another city with over 670,000 population, 43 per cent of the connections were reported to be unmetered. Though the supply in Villupuram was both metered and unmetered more than 50 per cent of the meters were said to be "always out of order".

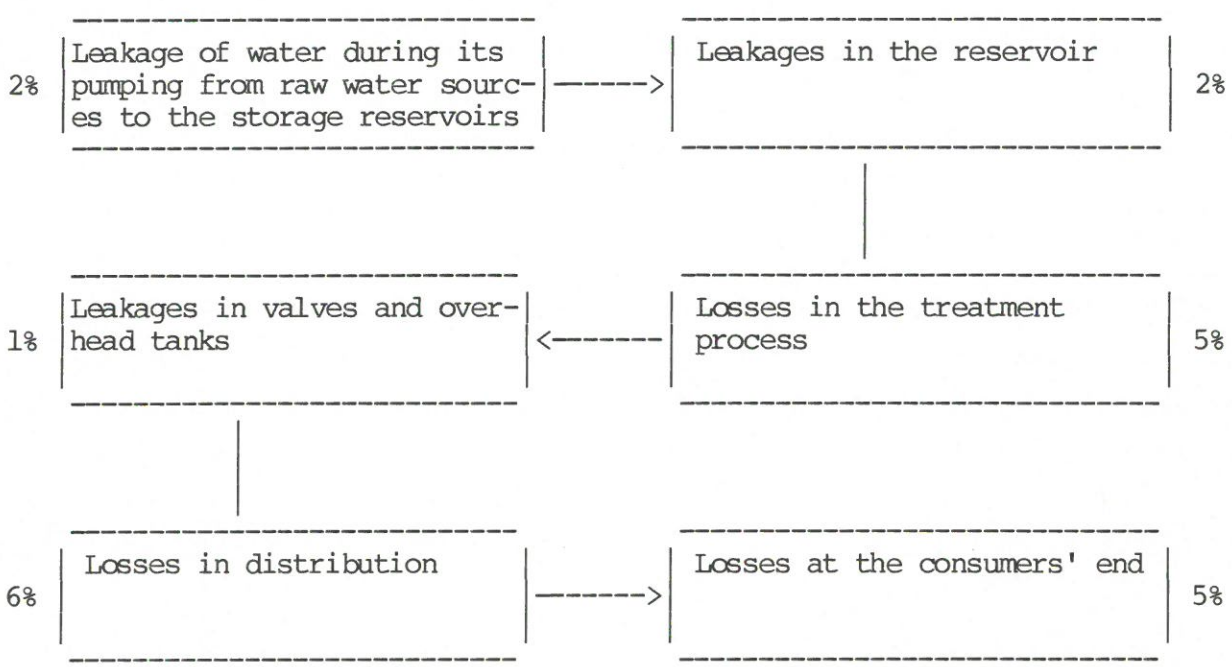
45. Standposts constituted a very important source of water supply to the Indian cities. According to the survey, anywhere between 6-29 per cent of the total water was supplied through the standposts. Table 7 gives the relevant data.

Table 7: Quantum of Water Distribution Through Standposts

Quantum of water	Baroda	Bhopal	Tiruchi-rapalli	Villu-puram	Dhoraji	Sehore	Hoshan-gabad	Devako-ttai	Kadi
Water supplied through stand-posts (MLD)	11.80	3.38	5.12	0.19	0.33	0.35	0.25	0.21	0.12
Percent of water supplied through stand-posts to total quantity supplied	16.0	10.9	22.2	6.0	10.3	28.9	12.9	12.9	6.7

46. Both the unmetered connections and the water supplied through standposts are the main points of water wastage in the sampled cities.

In addition, however, there are losses and leakages at various stages at which the leakages occur with estimates of losses drawn from the survey reports of the case study cities.



47. These are, however, very crude estimates and, in all probability underestimations. These do not include, for example, the most important source of leakage which happens to be the amount of water drawn through unauthorised and illegal connections. The discussions held in the case study cities placed the total loss of water at anywhere between 30-40 per cent of the total water available for supply.

48. The surveys showed a relative unpreparedness on the part of the municipal bodies to prevent or to even minimize the water losses. The technical capacities and equipment to detect losses in the distribution system were found to be either non-existent or inadequate. The distribution pipes were old and leaking, resulting in both inadequacies in the supply of water and the loss of revenues for the city administrations.

D. Maintenance of the Water Supply System

49. Proper and regular maintenance of the water supply systems is an integral part of the multifarious duties of the municipal bodies. To assist the municipal bodies, the Government of India has formulated a MANUAL ON WATER SUPPLY AND TREATEMENT[21] which lays down guidelines as to how the systems might be maintained. The guidelines include:

a. Keeping a set of plans giving details of the layout and position of the production and distribution lines of water;

b. establishing a systematic plan of daily operations including an operations schedule for machinery and equipment;

c. keeping data and record on all equipments - their condition, when repaired and replaced and so on;

d. maintenance of records on the analysis of water collected at various points; and

e. listing safety measures that are necessary for proper maintenance of the system.

50. It is significant to note that none of the cities surveyed fulfilled any of the guidelines laid down in the manual. Thus, there were no layout maps of the distribution lines. Nor were there any records of the manner in which the machinery and equipment had been functioning, or of the preventive steps that had been taken to keep the machinery in proper condition. This aspect of the management of water supply systems was among the weakest link in the entire chain of the water production and distribution process. The main reason cited by the municipal bodies for the neglect of this aspect was the lack of adequate trained staff.

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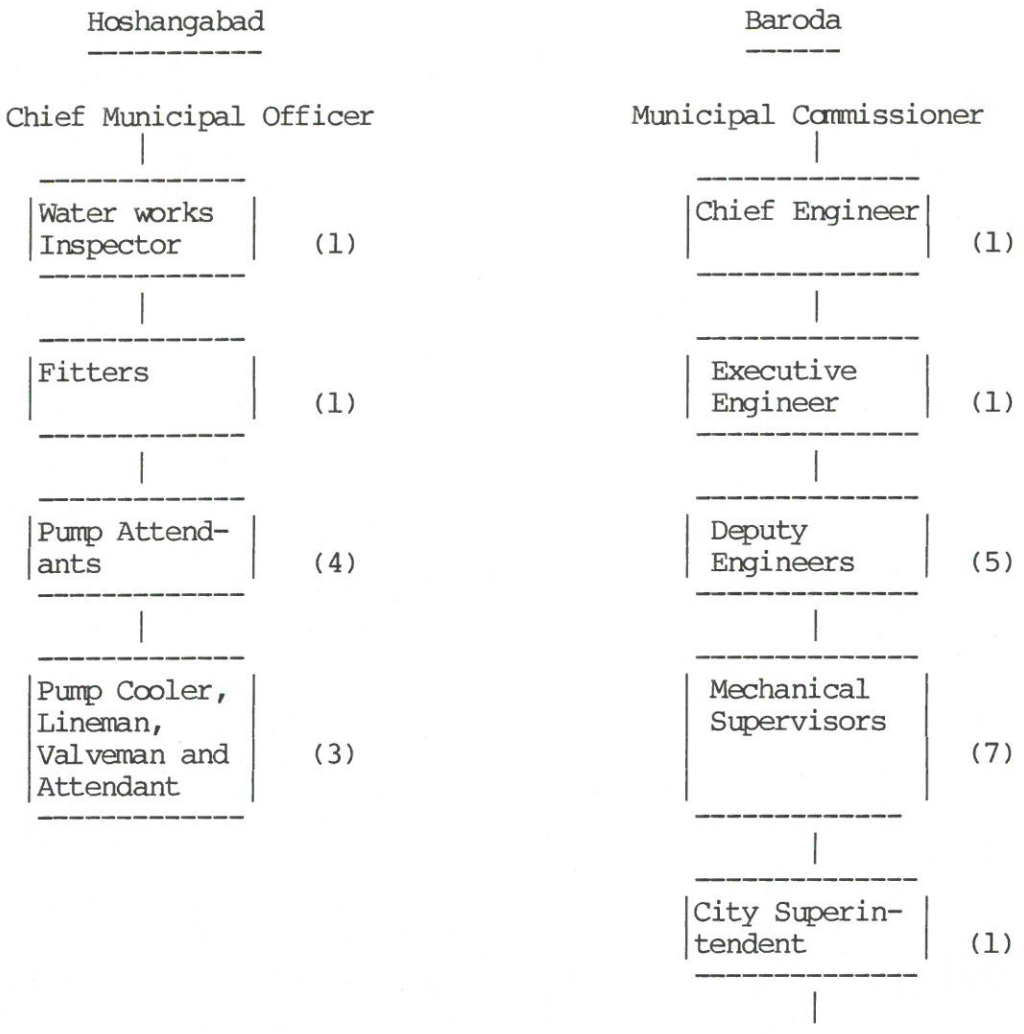
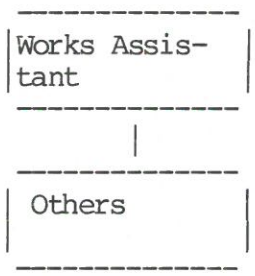
21 Government of India, Ministry of Urban Development, New Delhi, 1976.

51. Data on the staff, and their qualifications and levels were obtained during the survey but these turned out to be insufficient for drawing any conclusions. For instance, in Baroda, the water works department consisted of sixteen engineers and junior engineers, supported by a number of fitters, pump attendants and others. Hoshangabad, a small city in comparison, had a total staff complement of thirty seven out of which only six staff members had technical qualifications.

52. Illustrations of the staff complement in these cities are given below:





53. Apart from the differencs in the size of the staff complement, their qualifications, responsibilities and pay scales were also different, making it difficult to compare how well a particular structure performed in relation to others.

II ENVIRONMENTAL SANITATION AND WASTE DISPOSAL

54. Parallel to the case of water supply, the municipal bodies in India are wholly responsible for the collection and disposal of waste and for maintaining proper environmental sanitation in areas within their jurisdiction. Statutory provision exist for the municipal bodies to carry out these responsibilities. For instance, the Gujarat Municipalities Act, 1963 lays down that it shall be the duty of every municipality to make reasonable and adequate provision for --

> "cleansing public streets, places and sewers, and all spaces, not being private property, which are open to the enjoyment of the public --- [87 (f)]
>
> disposing of night soil and rubbish and, if so required by the State government, preparation of compost manure from such night soil and rubbish [87 (h)]"

55. The Act also empowers the municipalities to construct drains and maintain control over them. It also vests them with powers to require owners of the properties to keep drains etc. in proper order. Clauses 160 (1) and (2), 161 (1), 168 (1) and 183 (1a to g) are important for reference in this regard. Statutes of the other two States have identical provisions.[24]

56. The waste itself for whose collection and proper treatment and disposal the municipalities are responsible is of various types. It includes (a) domestic waste, (b) waste generated by commercial and office establishments, (c) institutional waste, (d) waste and rubbish on the roads and streets, and (e) waste from industries. Normally, waste generated by industrial establishments because of its special nature is treated and disposed of by the industries themselves.

57. As provided for in the analytical framework, the study examined the efficiency and performance level of the urban local bodies in fulfilling the various tasks involved in the disposal of solid waste and maintenance of environmental sanitation. Data were collected on the amount of waste generation, the arrangements and their adequacy for collection of waste, and the transportation of waste to disposal and treatment plants and centres. Data were also collected on the deployment and adequacy of manpower for waste collection, transportation, treatment and so on. The following summarises the main findings and results, grouped under specific subheads.

A. Waste Generation

58. Waste generated per capita is usually a factor of city function,

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24 Ibid.

and often of city size. As the function of a city undergoes a change, there is a corresponding change in the quantities of waste, caused esentially by the generation of non-domestic wastes. City size also affects the quantity of waste generated. The survey of the nine cities substantiated this general trend, as may be seen in Table 8.

Table 8: Quantity of Waste Generated

Quantities	Name of the Sampled Cities								
	Baroda	Bhopal	Tiruchi-rapalli	Villu-puram	Dhoraji	Sehore	Hoshan-gabad	Deva-kottai	Kadi
Quantity of waste (tons)	220	269	100	17.9	21.3	12	12	8.92	11
Per capita quantity of waste (grams)	299.5	400.9	277.7	232.9	278.7	229.9	300.0	249.9	317.9

59. As would be noted, the maximum amount of waste per capita, 400.9 grams/day, was registered for - Bhopal, a city with over 670,000 population and dotted with a fair measure of industry. In the case of other cities, the degree of variation in the amount of waste generated was not significant, particularly in view of the difficulties implicit in its estimation. Kadi's figure of 317.9 grams/day, however, seemed to be on the high side, considering both the size of the city as well as its functional specialisation.

B. Waste Collection and Transportation

60. Waste and refuse collection requires a series of interrelated steps which include, first of all, a reckoning of the amount of waste

likely to be generated in the different zones of the city, the number of dustbins from which the waste has to be collected, and their spatial placement within the city. Considerable organisational effort is needed for the entire exercise.

61. As indicated, the survey of the sanitation sector was designed to collect data on the extent to which the collection was adequately and efficiently carried out in the case study cities, that is, on the amount of waste generated, a count of the number of dustbins in relation to requirements (a function of waste generation), the utilisation rate of the dustbins, the staff deployment and so on. These were extremely important sets of data as the general impression seemed to be that if the municipal bodies were unable to maintain proper sanitation it was because they were inadequately equipped with the necessary infrastructure to deal with the magnitude of the tasks involved. Data on these aspects are given in the subsequent tables.

62. Table 9 gives data on the capacity of the dustbins in relation to the amount of waste generated.

Table 9: Capacity of the Dustbins

	Name of the Sampled Cities								
Capacities	Baroda	Bhopal	Tiruchi-rapalli	Villu-puram	Dhoraji	Sehore	Hoshan-gabad	Deva-kottai	Kadi
Installed capacity of dustbins (tons)	165.0	155.4	139.4	15.6	18.0	20.0	5.0	5.4	7.5
Capacity of dustbins as percentage of total waste generated	57.8	75.0	149.4	86.9	84.3	85.8	41.7	60.5	68.2

63. The survey showed that the overall capacity available in the case study cities for collection of waste was, by and large, commensurate with the amount of waste generated. The capacity was not in any way inadequate, except perhaps in Hoshangabad, where it was reported to be 41.7 per cent of the total waste generated. If waste and street refuse are collected tiwce a day as indeed was the case in all the case study cities, then the capacities, in fact, were in excess of the amount of waste generated. Tiruchirapalli was a special case where the installed capacity of the dustbins was far in excess of the waste generated. The survey showed no capacity constraints for this task.

64. What is significant to point out in this regard is that the installed capacity of dustbins was not being fully utilised. Waste collected from the dustbins constituted anywhere between 60-86 per cent of the total waste generated. In Dhoraji, the rate of waste collection was a bare 60 per cent. Even in the two largest cities of the sample, the collection rate was 73.2 per cent for Baroda and 61.9 per cent for Bhopal.

65. In absolute terms, the non-collection of waste from the dustbins projects a frightening scenario. In Table 10 below are given some figures of the waste which remains uncollected from the dustbins.

Table 10: Quantity of Waste Collected

Quantities	Name of the Sampled Cities								
	Baroda	Bhopal	Tiruchi-rapalli	Villu-puram	Dhoraji	Sehore	Hoshan-gabad	Deva-kottai	Kadi
Quantity of waste collected (tons)	161	166.4	83.3	10.8	12.8	17.8	10.2	5.84	9.5
Quantity of waste collected as percentage of total waste generated	73.2	61.9	83.0	60.1	60.0	76.4	84.6	65.5	86.4
Quantity of waste not collected (tons)	59	102.6	16.7	40	8.5	5.5	1.8	34.6	1.5

66. Table 10 shows that in Baroda, approximately 59 tons of waste are left uncollected every day while the same is as high as 102.6 tons in Bhopal. Even in smaller cities such as Kadi (1.5 tons), Hoshangabad (1.8 tons) and Sehore (5.5 tons), these amounts of waste can cause serious health hazards. In Tiruchirapalli where the installed capacity of the dustbins was in excess of the total amount of waste generated approximately 16 tons of waste were reportedly left uncollected on the streets.

67. As pointed out earlier, there was no constraint of dustbin capacity in any of the cities. This was, however, the overall position, and did not imply that the spatial distribution of dustbins within the cities was compatible with the distribution of population and their requirements. Data collected from the respective cities show that the

distribution of dustbins was unbalanced, and had little to do with the way the population was distributed within the cities. An example will illustrate this point.

Table 11: Distribution of Dustbins in Relation to Population (Tiruchirapalli)

Sanitary Division No.	Population	Total waste generation (Kg.)	Number of dustbins	Waste per dustbin (Kg.)
I	14,126	3913	50	78
VI	21,604	5984	52	115
VIII	23,683	6560	60	109
X	15,827	4384	90	49
XV	15,314	4242	20	212
XIX	16,345	4528	90	50

68. The case of Tiruchirapalli a typical example that shows the unequal distribution of dustbins in relation to population and waste generation. This explains in part why in certain zones and divisions, large quantitites of waste remained uncollected (inadequate number of dustbins in relation to the amount of waste generated -- division XV above) and why in others, there was underutilisation of the installed capacities of dustbins (division X and XIX).

69. A deeper probe into the question of maldistribution of dustbins showed that apart from the inadequate consideration to this subject by the municipal bodies, the communities themselves shared the responsibility for this situation. The survey revealed strong public

resistance to the location of dustbins in the vicinity of their houses as, according to the communities,

(a) the municipal bodies paid little attention to proper collection of waste from the dustbins, with substantial quantities of waste remaining uncollected and eventually becoming a source of insanitary condition;

(b) the collections were very irregular and also untimely;

(c) the dustbins attracted stray animals into the area;

(d) the dustbins attracted "garbage pickers" who also constituted a source of nuisance for the neighbourhood; and

(e) the dustbins were in poor condition.

70. How was the waste thus collected transported to the disposal or dumping grounds? Were the transportation facilities at the command of the municipal bodies adequate? This study examined these questions as well, and collected data on the mode of transportation of the waste, number of vehicles available, and their adequacy.

71. It is important to point out that as in the case of the dustbins, there was no shortage of vehicles for transportation of waste. The capacity of the vehicles (with and without motors) was reported to be adequate for handling the amount of waste that was being generated in each of the cities surveyed. Table 12 contains this data.

Table 12: Capacity Available for Transportation of Waste

Capacities	Name of the Sampled Cities								
	Baroda	Bhopal	Tiruchi-rapalli	Villu-puram	Dhoraji	Sehore	Hoshan-gabad	Deva-kottai	Kadi
Carrying capacity of vehicles (tons)	270	303	165	27	24	18	12	7	11
Capacity utilised (tons)	110	113	117	8.7	12	12	8	6	7
Per cent of capacity utilised to carrying capacity	40.7	37.3	70.9	32.2	50	66.7	66.7	85.7	63.6

72. It needs to be pointed out that each vehicle makes several trips for the transportation of waste, and it is in this sense that the carrying capacity of the vehicles was either equal to or in excess of the quantity of waste generated. In Devakottai, the capacity utilisation rate was 85.7 per cent with only one scheduled trip. In other cities too, there were no capacity constraints for transporting the waste. Even in Baroda and Bhopal, only about 40 per cent of the carrying capacity of the vehicles was in effective use.

73. Low utilisation rate of the vehicles was explained largely in terms of the small number of vehicles in actual operation. Over 50 per cent of the vehicles were reported to be out of order in almost every city. An analysis of the reason for such a high breakdown rate showed that:

(a) the vehicles had aged - a significant proportion of them having been acquired over seven years ago;

(b) the nature of the work itself entailed very heavy wear and tear; and

(c) repair workshop facilities were inadequate, particularly in the relatively small cities.

74. The survey showed that the smaller cities relied for repairs on privately run workshops which had limited capacities to undertake repair and maintenance work. It was reported that mechanical vehicles for purposes of refuse transportation often proved to be liabilities in smaller cities and remained out of operation for a greater part of the year.

C. Deployment of Staff

75. Waste and refuse collection was reported to be essentially manual, operated by a fleet of sanitary workers. According to the general norms, the number of the sanitary workers for each city depends on the physical population size, and to some extent, on the size and physico-geographic condition of the cities. Their deployment within the cities was also to be governed by factors such as population density, refuse generated, and the types of roads to be cleaned. The survey, however, showed that none of these considerations was used in their deployment with the result that their workloads varied, and consequently the overall performance of the staff meant for this job remained at low levels. Some data on the workload are given in Table 13.

Table 13: Variation in Work Load Per Sanitary Worker

Work Load	Baroda	Bhopal	Tiruchi-rapalli	Villu-puram	Dhoraji	Sehore	Hoshan-gabad	Deva-kottai	Kadi
Work load measured in terms of waste collected per worker (kg)	137.5	194	314	359	232	227	101	241	138

78. The average work load ranged between a high of 359 kg/per worker for Villupuram, and low of 101 kg per worker in Hoshangabad. In larger cities such as Baroda and Bhopal, it was less than 200 kg/worker. Within each city too wide variations in workload were noted, pointing towards the need to formulate workload norms as well as rationalisation in the deployment of staff.

79. The survey revealed substantial shortages in the staff strength for waste collection. According to the Report of the Committee on Urban Wastes,[25] there should be on an average, 2.80 persons per 1,000 population for purposes of waste collection. In the cities covered by the study, the actual deployment of staff was much lower than the norms. The difference was the highest in the case of Tiruchirapalli. In smaller local bodies too, the sections responsible for refuse collection and disposal were said to be understaffed, with the result that extension of this basic service to the periphery of cities was becoming increasingly difficult. The municipal bodies attributed the shortage of staff to essentially to the financial constraints.

22 Government of India, The Report of the Committee on Urban Wastes, puts the staff requirement at 2.8 persons per 1,000 Population.

80. The municipal bodies reported a very large number of problems in proper deployment of staff for maintaining environmental sanitation in the cities. Important among these were:

(a) In view of the socio-economic circumstances, the cadre of the sanitary workers formed a strong pressure group in the cities, with considerable local support from one or the other political party. In view of the politicisation of the cadre, there was indiscipline and a high degree of unwillingness on the part of the sanitary workers to discharge their functions effectively. To enforce work discipline or to bring any kind of work ethic was found to be difficult, resulting in poor collection and disposal services.

(b) The equipment for refuse collection supplied to the sanitary workers was obsolete. In most cases, the wheel-barrows were defective and needed replacement. The obsolete and defective equipment adversely affected the efficiency of the sanitary workers.

(c) Due to the emerging socio-economic scene in the country, the municipal bodies were facing serious problems in the recruitment of sanitary workers.

III IMPLICATIONS FOR ACTION AND RESEARCH

81. This study is among the very first in the country that has attempted to analyse, and probe into the management and organisational aspects of the urban basic services. Apart from generating a volume of data, it has enabled us to better understand as to what ails the urban local bodies, and why are they not effective and efficient when it comes to the provision and delivery of even the basic services such as water supply, and environmental sanitation and waste disposal. The study has also shown, though tentatively, areas for action as well as for further explorations.

82. A few conclusions emerge so forcefully from this study that even at the cost of repetition, those need to be restated at the outset of this section. The first of the many conclusions was that a noticeably large section of the population in every case study city was reported to be without any access to safe water supply. Many reportedly remained unserved by the municipal water supply systems. What was most striking in this connection was that the water that was available to the urban local bodies for distribution to the city was not put to efficient use. The installed capacities were uniformly underutilised. In every city surveyed, this phenomenon persisted; only the percentages varied.

83. Furthermore, the study revealed substantial water losses and leakages. Though the study failed to produce precise quantitative estimates of the total water losses in the production and distribution process, the fact that there were losses and unaccounted water of the order of 30-40 per cent of the total available capacity reflected a rather low level of performance of the urban local bodies. The existence of underutilised capacity and water losses and leakages would normally seem unjustified, but these appeared to be even more so when water supply was not available to a section of the population and was inadequate for others.

84. Two: The question of unmetered supply is another one that emerged as an important issue for detailed examination. It was not clear from the survey whether metering of the supply which would inevitably entail heavy capital costs and also increase the operational costs would be able to offset the lossess that the urban local bodies may incur due to wastage resulting from the unmetered supply. The urban local bodies seemed to hold the view that metering of the water supply

would increase the costs disproportionately. The study clearly underlined the need to undertake specific studies on the economics of the two types of systems.

85. Three: The study revealed no sensitivity on the part of the urban local bodies to properly "market" the water supply services. They had no access to data on the type of consumers, their income status, their requirements of water, price and demand elasticities, and the types of tarrif they could possibly levy in order to recoup the cost of production and distribution of water. The revenues generated by the water supply sector bore little relationship to the cost of water production and distribution.

86. Four: Inadequate utilisation of the available facilities and infrastructure was a characteristic not only of the water supply but also of the environmental sanitation sector. The survey revealed no supply constraints as was often contended, of either the dust bins for waste collection purposes or the trucks, lorries and other types of vehicles for transportation of wastes. At the same time, the survey showed inefficiencies in waste collection: almost 30 per cent of the waste remained uncollected, and was left scattered on the roads and streets. There was a large difference between the amount of waste generated and waste deposited, in every surveyed city.

87. Five: Adequacy or otherwise of the staff available for carrying out the various tasks involved in the provision of the two services proved difficult to analyse and interpret. What emerged from the data was the unequal distribution of staff as well as unequal work loads within the cities indicating the need to rationalise the staff

deployment policies and prescription of norms for work distribution.

88. Six: The survey revealed quite unambiguously that the people and the communities were no less responsible for the mismanagement in the provision and delivery of the services. Wastes and leakages occurred in significant proportion at their end. People did not want the dustbins located close to their houses. These are issues that indicated the need to involve the people in the management of services without which the delivery processes appear unlikely to become efficient.

89. The cumulative effect of the inefficiencies is evidently very disturbing. Almost 30-40 per cent of the installed capacities of water leak out every day on streets, roads and lanes. Almost about the same percentage of waste that the urban areas generate remain uncollected from the streets. Together these constitute the biggest environmental challange for the India's urban areas.

90. As urbanisation proceeds apace with India expecting to have by the year 2001 over 310 million people in its numerous urban settlements, such issues can neither be bypassed nor placed low on the agenda of development priorities. The Seventh Five Year Plan 1985-90 recognises the importance of urban local bodies in economic development and has called for their "revitalisation". Every avenue that can enable the urban areas to improve their performance has therefore to be explored and experimented with.

91. This study indicates action on at least four fronts:

(1) ACTION TO BRING ABOUT A CHANGE IN THE ORIENTATION OF URBAN LOCAL BODIES TOWARDS MAINTENANCE OF EXISTING FACILITIES AND INFRASTRUCTURE - The obsession of urban local bodies with capital works and improvements needs to be substituted by greater concern for maintenance and efficient utilisation of existing facilities and infrastructure.

(2) ACTION TO REPLACE THE TODAY'S LACKADAISICAL ATTITUDE BY A FIRM COMMITMENT TO TRAINING AND RETRAINING OF THE STAFF OF THE URBAN LOCAL BODIES.

(3) ACTION TO GENERATE INFORMATION, GENERAL, FINANCIAL AND TECHNICAL TO ENABLE THE URBAN LOCAL BODIES LOCATE AREAS OF INEFFICIENCIES.

(4) ACTION TO INVOLVE THE PEOPLE IN THE DELIVERY PROCESS OF THE SERVICES.

92. How to manage the delivery of urban services is a comparatively new discipline. It would call for on a continuous basis fresh initiatives and experimentations to deal with the complex urban problems.

PART THREE

APPENDICES

ANNEX TABLE 1

URBAN AREAS AND URBAN POPULATION

Size class	Number of settlements	Population	
		1981 (million)	Growth rate 1971-81
All Classes	3,294	157.7	46.24
Class I (100,000 and more)	218	95.3	54.19
Class II (50-100,000)	260	18.2	58.73
Class III (20-50,000)	744	22.6	31.15
Class IV (10-20,000)	1,060	15.0	27.78
Class V (5-10,000)	758	5.7	18.36
Class VI (Less than 5,000)	254	0.9	64.24

Source: General Population Tables, Part II(A) (A-4)
Census of India, 1981.

ANNEX TABLE 2(A)

BASIC DATA ON WATER SUPPLY

Name of the town	Population	Installed capacity (IN MLD)	Existing capacity (IN MLD)	Total quantity of water supplied (IN MLD)	Quantity of water supplied for domestic use (IN MLD)	Population served by domestic supply
1. Baroda	7,34,473	133.80	102.00	97.50	73.69	7,34,473
2. Bhopal (MC)	4,22,329 *	65.25	53.76	45.70	35.40	3,29,740
3. Tiruchira-palli	3,60,919	56.88	48.23	44.60	28.23	2,82,760
4. Villupuram	77,091	4.55	3.19	3.18	3.15	35,237
5. Dhoraji	76,556	6.00	4.50	4.50	3.21	65,000
6. Sehore	52,141	2.57	1.34	1.21	1.21	28,213
7. Hoshangabad	39,997	3.18	2.22	1.93	1.93	36,444
8. Devakottai	35,684	4000 ** (LPM)	2468 ** (LPM)	1.62	1.62	28,280
9. Kadi	35,294	2.70	2.00	1.80	1.80	29,300

* Includes only the population in Bhopal Municipal Corporation Area.

** Litres per minute.

ANNEX TABLE 2(B)

INCOME AND EXPENDITURE (Water Supply)

(Rs. in lakhs)

Name of the town	Year	Income from water supply (Rs.)	Per cent variation	Expenditure on water supply (Rs.)	Per cent variation
1. Baroda	1979-80	82.62		84.37	
	1981-82	77.76	(-) 5.88	130.28	(+) 54.42
2. Bhopal	1979-80	25.70		81.70	
	1981-82	31.70	(+) 23.35	110.30	(+) 35.01
3. Tiruchira-palli	1979-80	30.68		18.96	
	1981-82	38.24	(+) 24.64	19.75	(+) 4.17
4. Villupuram	1979-80	6.86		0.98	
	1981-82	7.84	(+) 14.29	2.94	(+)200.00
5. Dhoraji	1979-80	3.61		3.51	
	1981-82	3.83	(+) 6.09	6.63	(+) 88.89
6. Sehore	1979-80	1.37		1.37	
	1981-82	1.69	(+) 23.36	2.61	(+) 90.51
7. Hoshangabad	1979-80	1.23		2.21	
	1981-82	1.21	(-) 1.63	2.10	(-) 4.98
8. Devakottai	1979-80	2.91		0.95	
	1981-82	3.23	(+) 11.00	1.10	(+) 15.79
9. Kadi	1979-80	0.56		1.59	
	1981-82	1.32	(+)135.71	2.36	(+) 48.43

ANNEX TABLE 3(A)

BASIC DATA ON ENVIRONMENTAL SANITATION AND WASTE DISPOSAL

Name of the town	Population	Total waste generated (in tons)	Capacity of dustbins/ collection centres (in kgs.)	Waste transported to waste collected (in %)	Actual work load per worker (in kgs.)
1. Baroda	7,34,473	220.00	5,000	68.3	137.56
2. Bhopal (MC)	4,22,329 *	269.00	300	68.0	194.00
3. Tiruchirapalli	3,60,919	100.00	100	100.0	314.00
4. Villupuram	77,091	18.00	100	80.6	359.00
5. Dhoraji	76,556	21.34	1,000	92.3	227.00
6. Sehore	52,141	23.30	400	66.7	232.00
7. Hoshangabad	39,997	12.00	100	80.0	101.00
8. Devakottai	35,684	8.92	100	87.0	241.00
9. Kadi	35,294	11.00	500	73.7	138.00

* Includes only the population in Bhopal Municipal Corporation Area.

ANNEX TABLE 3(B)

INCOME AND EXPENDITURE (Environmental, Sanitation & Waste Disposal)

(Rs. in lakhs)

Name of the town	Year	Income from sanitation (Rs.)	Per cent variation	Expenditure on sanitation (Rs.)	Per cent variation
1. Baroda	1979-80	56.80		67.70	
	1981-82	70.51	(+) 24.13	92.86	(+) 37.16
2. Bhopal	1979-80	2.00		57.30	
	1981-82	3.90	(+) 95.00	83.40	(+) 45.55
3. Villupuram	1979-80	2.69		5.58	
4. Sehore	1979-80	0.07		4.37	
	1981-82	0.22	(+) 214.29	6.10	(+) 39.59
5. Hoshangabad	1979-80	1.17		3.29	
	1981-82	1.70	(+) 45.30	6.42	(+) 95.14
6. Devakottai	1979-80	0.67		4.50	
	1981-82	0.85	(+) 26.87	5.67	(+) 26.00
7. Kadi	1979-80	0.25		4.09	
	1981-82	0.11	(-) 56.00	5.77	(+) 41.08

OTHER PUBLICATIONS PREPARED UNDER THIS CONTRACT

CITY SURVEY REPORTS
(Water Supply, and Environmental Sanitation and Waste Disposal)

BARODA
BHOPAL
TIRUCHIRAPALLI
VILLUPURAM
DHORAJI
SEHORE
HOSHANGABAD
DEVAKOTTAI
KADI

CITY STATUS REPORTS
(Water Supply, and Environmental Sanitation and Waste Disposal)

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PUBLICATIONS OF RELATED INTEREST

1. A STUDY OF THE FINANCIAL RESOURCES OF URBAN LOCAL BODIES IN INDIA (1983).

Sponsored by the Eighth Finance Commission and the Ministry of Urban Development, this study has made an assessment of the gap between municipal revenues and expenditure. The study covered over 40 per cent of the urban local bodies in India.

2. ORGANISATION FOR URBAN PLANNING AND DEVELOPMENT (1983)

The structure and functions of the urban local bodies and development authorities have been examined in this report. It has suggested changes in the organisational structure of the urban local bodies so as to make them more responsive to the changing needs of society. The study was sponsored by the Ministry of Urban Development and the Overseas Development Ministry of U.K.

Orders for the above and other publications of the Institute may be placed with the Director, National Institute of Urban Affairs, 11, Nyaya Marg, Chanakyapuri, New Delhi - 110021 (India).