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PAKISTAN WATER SUPPLY AND SANITATION SECTOR STUDY

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ASIAN DEVELOPMENT BANK

March 1990

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PAKISTAN

URBAN WATER SUPPLY AND SANITATION SECTOR STUDY

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March 1990

This Sector Study has been prepared by consultants with the assistance of the staff of the Water Supply Division of the Asian Development Bank and in consultation with the Pakistan Government.

ABBREVIATIONS

ADB	-	Asian Development Bank
ADP	-	Annual Development Programme
ADF	-	Asian Development Fund (ADB)
BOD	-	Biochemical Oxygen Demand
BUSTI	-	Basic Urban Services for Katchi Abadis
CDA	-	Capital Development Authority
CDWP	-	Central Development Working Party
DDAC	-	District Development Advisory Committee
DOH	-	Department of Health
ECNEC	-	Executive Committee of the National Economic Council
EPA	-	Environmental Protection Agency
EUAD	-	Environment and Urban Affairs Division (MHW)
FA	-	Federal Area
FATA	-	Federally Administered Tribal Areas
FDA	-	Faisalabad Development Authority
GDP	-	Gross Domestic Product
GOP	-	Government of Pakistan
HD	-	Health Department
HDA	-	Hyderabad Development Authority
HPEPD	-	Housing, Physical and Environmental Planning Department
IBRD	-	International Bank for Reconstruction and Development
IDA	-	International Development Association (World Bank)
IDWSSD	-	International Drinking Water Supply and Sanitation Decade
JICA	-	Japanese International Cooperation Agency
KDA	-	Karachi Development Authority
KMC	-	Karachi Metropolitan Corporation
KSDFP	-	Karachi Special Development Project
KWSB	-	Karachi Water and Sewerage Board
LA	-	Local Authorities
LC	-	Local Council
LDA	-	Lahore Development Authority
MDA	-	Multan Development Authority
LG RDD	-	Local Government and Rural Development Department
MHW	-	Ministry of Housing and Works
MLGRD	-	Ministry of Local Government and Rural Development
MNA	-	Member of National Assembly
MPA	-	Member of Provincial Assembly
MPD	-	Ministry of Planning and Development
NGO	-	Non-Government Organization
NWFP	-	North West Frontier Province
ODA	-	Overseas Development Administration (United Kingdom)
OPP	-	Orangi Pilot Project
PDA	-	Peshawar Development Authority
PDD	-	Planning and Development Department
PEC	-	Pakistan Engineering Council
PHED	-	Public Health Engineering Department
PPHD	-	Physical Planning and Housing Department
PPTA	-	Project Preparation Technical Assistance
PUDP	-	Punjab Urban Development Project

QDA	-	Quetta Development Authority
QMC	-	Quetta Municipal Corporation
RMC	-	Rawalpindi Municipal Corporation
SDO	-	Small Dams Organization
SDF	-	Special Development Programme
UNDP	-	United Nations Development Programme
UNICEF	-	United Nations Children's Educational Fund
UWSSW	-	Urban Water Supply and Sanitation Wing
WAPDA	-	Water and Power Development Authority
WASA	-	Water and Sanitation Agency (Lahore, Faisalabad, Hyderabad, Quetta, Peshawar)
WB	-	World Bank
WHO	-	World Health Organization

TERMS

cm	-	centimeter
cumcd	-	cubic meters per day
cufs	-	cubic feet per second
ft	-	feet, foot
gal	-	gallon(s) (Imperial)
g	-	gram(s)
ha	-	hectare (s)
hr	-	hour
in	-	inch(es)
kg	-	kilogram(s)
km	-	kilometer
lit	-	liter(s)
lpcd	-	liters per capita per day
m	-	meter(s)
mg	-	milligram(s)
mm	-	millimeter
mn	-	million
mgd	-	million gallons per day
ppm	-	parts per million
lb	-	pound(s) in weight
psi	-	pounds per square inch
sec	-	second
sq	-	square
p.a.	-	per annum
gpcd	-	gallon(s) per capita per day
gph	-	gallon(s) per hour
gpd	-	gallon(s) per day

CURRENCY EQUIVALENTS

Currency Unit	=	Rupee (Rs)
Rs1.00	=	\$0.05
\$1.00	=	Rs20.00 (May 1989)

FINANCIAL YEAR

1 July - 30 June

In this Report Rs refers to Pakistani Rupees and \$ to United States Dollars.

FOREWORD

The Bank's emphasis on lending in the water supply and sanitation sector in Pakistan has been in the urban areas. The sectoral coverage has included water supply, sewerage and low-cost sanitation. The Bank-financed water supply and sanitation projects provide for the rehabilitation of existing water supply and sanitation systems, system expansion, and facilities for reducing water losses and improving the environmental sanitation. The Bank also fosters sound institutional development and invariably seeks further improvement in financial management and performance of the executing agencies concerned, including the reduction of non-revenue earning water. The Bank has so far financed four loans in the water supply and sanitation sector with a total amount of \$168.0 million and six technical assistance projects amounting to \$1.3 million.

Anticipating continuing Bank involvement in assisting the water supply and sanitation sector in Pakistan, high priority was given by the Bank to the preparation of a more detailed assessment of future sector demand with a view to determining the potential and possibilities for external financial assistance to the sector and to developing a pipeline of projects.

This sector study, prepared by consultants and Bank staff, is the result of the assessment. Though it was discussed in draft with the Government in December 1989, the study does not necessarily reflect formal Bank or Government views on the sector. In producing the study for wider dissemination, we hope that it will be useful to all interested in the past and future development of Pakistan's urban water supply and sanitation sector.

S. V. S. Juneja
Director
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EXECUTIVE SUMMARY

I. INTRODUCTION

A. Study Background

The Pakistan Urban Water Supply and Sanitation Sector Study was carried out from January to August 1989 by C. Lotti & Associati (Italy) in association with Techno-Consult (Pakistan), working under the direction of the Environment and Urban Affairs Division (EUAD) of the Ministry of Housing and Works. The exercise was supported by a technical assistance grant from the Asian Development Bank (ADB). The objectives of the study were to strengthen the government's efforts in planning and implementing water supply and sanitation in urban areas, to ensure the effectiveness of investment including strengthening of the institutional capabilities of sector agencies, and to establish a long-term plan and a rational framework and program for the Bank's assistance in the development of the sector.

B. Method of Approach

In accomplishing these tasks, the Study Team had numerous meetings with officials of federal and provincial agencies in order to study government policies and ascertain the status of development in the sector. The Team analyzed in-depth the institutional structure for the sector in four large cities. Particular attention was paid to the study of 19 representative growth centers in the four provinces, where the Team inspected public and private water supply and waste disposal facilities and discussed with local officials in detail the procedures used and the problems encountered in operating the facilities. A list of officials met and consulted is presented in Appendix 1.

C. Study Steering Committee

To guide the study, EUAD appointed a Steering Committee of representatives from sector agencies at federal and provincial levels. The Steering Committee met four times, to review the Inception Report, to hear verbal reports on the field visits, and to review the Interim Report. The third meeting of the Steering Committee was held concurrently with the Tripartite Review with representatives of the ADB. Minutes of the Steering Committee meetings are enclosed as Appendix 26.

II. ASSESSMENT OF NEEDS

A. General

Since independence, successive governments have made substantial efforts to extend urban water supply and sanitation services, which now cover respectively about 80 per cent and 52 per cent of the urban population. The urban population ^{1/} accounts for 32 per cent of the total and is growing at the rate of 4.8 per cent per annum. This rate of growth is likely to continue for the foreseeable future, given the country's relatively high birth rate, migration from rural areas in search of employment, continuing growth of the industrial and service sectors, and the growth in personal income. Katchi abadis and slum areas in the cities house about 20 per cent of all urban residents and are of particular concern to the government, because of the dearth of essential services and the poor living condition which breed resentment and social unrest. In the current Five-Year Plan, a large allocation of resources is devoted to programs - including provision of water and sanitation - for katchi abadis. Despite these efforts, however, the rapid growth in urban population growth has surpassed the authorities' capacity to keep pace with the need in coverage, and possibly even more important, the need in quality of service.

B. Water Supply

Nearly all urban centers have piped water supplies, but the service is irregular, ranging from an average of about six hours a day to as little as a few minutes a day in the peripheral areas of many towns. Supply interruptions produce negative pressures in the water mains, and inevitably introduce the danger of contamination from raw sewage, which flow in the street drains adjacent to the water mains. As much as 50 per cent of the water distributed by many public water systems is "non-revenue" water which leaks from the system, is used illegally, or is distributed free to schools, mosques, bazaars and government buildings.

C. Sanitation

Over 70 per cent of urban dwellers use toilets and the remainder use conservancy systems (manual removal of human excreta from domestic premises) or open areas. There are few pit latrines or seepage pits. Traditional street drains, sometimes lined and partially covered, remove household wastewater to natural drainage channels in all towns. Collection and interceptor drains and sewers have been built in parts of some towns and are estimated to serve about half of the urban population. In most towns, a portion of the wastewater, nightsoil and solid wastes is sold to farmers for use in agriculture (in the largest cities only a portion of the wastewater is sold). The methods of

^{1/} The 1981 census defined urban areas as follows: All localities which were either metropolitan corporation, municipal corporation, municipal committee, town committee or cantonment at the time of the census. However, in general, a community with population of at least 5,000 is considered urban.

handling human wastes break all rules of good hygiene, and the problem is becoming more serious as the quantity of wastewater increases and the natural drainage channels become obstructed by improperly planned new roads and buildings.

D. Health

The diseases which are associated with water, filth and the absence of personal, domestic and community hygiene are present in all parts of the country. There is some evidence to indicate that large urban or metropolitan districts may have higher than average morbidity and mortality from these diseases. In fact, nearly 40 per cent of urban mortalities are due to water-borne diseases. There is also some evidence that users of toilets are healthier than non-users of toilets. Available statistics do not show that there has been any noticeable reduction in the incidence of water-borne diseases following the increased coverage with water supply and sanitation systems which has been accomplished since the start of the International Drinking Water Supply and Sanitation Decade in 1980. The continued prevalence of these diseases may be in part due to faulty operation and maintenance of the water and sanitation systems and in part due to food-borne infection. The Consultants believe that more important reasons may be found in the absence of effective measures to: (a) protect the sources of drinking water; (b) monitor the purity of the water which is distributed to the public; and (c) inform the public about the importance of drinking safe and potable water and hygienic disposal of wastes.

E. Present Service Criteria

The Consultants examined the established service criteria and commented on a number of them which they found to be inadequate: (a) water in all towns is supplied intermittently, whereas it should be supplied continuously; (b) the future populations assumed in calculating water supply demand are often underestimated; (c) non-looped distribution systems and small-diameter mains are common, causing low pressure at the periphery; (d) on-site methods for excreta and wastewater disposal are practically unused, whereas they are usually a viable option except in crowded areas; (e) refuse is officially defined as including human excreta and their collection and disposal is often combined (this practice should be eliminated); (f) sanitary landfills are not defined or used, while they should be introduced in all towns; (g) street drains are built primarily to remove household wastewater, which is also sold for irrigating crops including edible vegetables (whereas wastewater should be excluded from open drains, removed in closed sewers, and its use in farming should be restricted); (h) no criteria for sewage treatment were found (whereas where treatment is necessary, e.g., prior to sewage farming, low-cost methods such as waste stabilization ponds should be used); (i) natural stormwater drains are often obstructed and the flow is sometimes channeled into sewers designed for wastewater flows (whereas wastewater disposal plans should always include provisions for removing stormwater and for this reason, natural drains should be rehabilitated and used wherever possible).

III. ASSESSMENT OF DEMAND

A. General

Urban residents value and will pay for the convenience of water supplied under pressure and for the removal of solid and liquid wastes when they create a serious nuisance. Urban authorities consider it essential to invest in improved water supplies and wastes disposal services as means to attract commerce and industry, to raise property values, and to satisfy popular demand. The provincial and central governments place a high value on adequate and pure urban water supplies and on adequate and hygienic wastes disposal as means of improving the economy and general welfare.

B. Existing Targets

The national and provincial targets for increased coverage in 1993 and 2003 which are set out in the Seventh Plan represent the government's perception of the felt needs of the urban population and the level of development required to improve the provision of these basic services. The national water supply targets are: 95 per cent coverage of urban population by 1993 and 100 per cent by 2003; and the sewerage and drainage targets are: 70 per cent of urban population by 1993 and 100 per cent by 2003. To achieve these targets, the Government estimates an investment requirement of at least Rs15.9 billion, which would be 4.5 per cent of the total public sector investment program.

The Consultants believe that the government might be unable to meet its full contribution and to execute this program for a number of reasons: (a) there are likely to be considerable resource constraints and competing pressures on the public sector investment program; (b) in previous plan periods the estimated achievements have invariably been below the targets; (c) the present sector management and organization is inadequate to cope with the indicated rate of implementation, which would be a large increase over the previous plan period; (d) the weakness of local councils' finances needs to be resolved; (e) if the government adheres to its stated objective of full cost recovery without adequate public information and education campaign there may be consumer resistance which will test the political resolve of the authorities; and (f) before being expanded, many existing water supply and drainage systems need extensive repairs and rehabilitation, the cost of which has not been included in the government's estimates.

C. Revised Coverage Targets

In the light of these constraints, the Consultants propose revised coverage targets for the urban population of 87 per cent for water supplies and 63 per cent for sewerage or drainage by 1993. These targets could be achieved under the following key assumptions: (a) the government will actively introduce the Study's recommendations for institutional strengthening, public information and education, training and cost recovery; (b) low-cost technologies will be used where feasible; and (c) sector authorities will maintain and optimize the utilization of existing assets, which may be more cost-effective than new construction in reducing non-revenue water, etc.

IV. SECTOR DEVELOPMENT APPROACH

A. General

The technical strategy for achieving sector targets should be based on principles which are stated as national policy. These principles should include the following: (a) every public water supply system should deliver water 24 hours a day at an adequate pressure; (b) every public wastes disposal system should avoid contact between wastes and people, it should remove wastes from the town area and discharge them in a hygienic and nuisance-free manner; (c) natural surface and ground waters should be effectively controlled and protected from pollution. Each province should evolve and codify policies to guide the development of sector services and the allocation of resources in its cities and towns. Many technical options exist for improving sector systems and their components so that these basic principles can be satisfied, and it is the duty of engineering advisers to propose technologies which can accomplish the desired results at an affordable cost and in a manner acceptable to the users. The Consultants observed that many systems fail to meet these criteria in one respect or another and made suggestions for approaching this problem. The Consultants also observed weaknesses in the technical support systems and suggested strategies for strengthening them.

B. Institutional Structure

The institutional strategy should take into account local perceptions of needs and should emphasize local responsibility for planning and implementing projects. In about 400 communities of more than 5,000 inhabitants which have been classified as urban, the elected local councils are legally responsible for their public water supply and sanitation systems. In the remaining 1,500 communities of more than 5,000 inhabitants which are still classified as rural (and which come under the jurisdiction of union councils grouping several communities), the union councils are nominally responsible for water supply and sanitation. The Bank should consider these larger rural communities to be possibly included in the proposed sector loan "Villages Water Supply and Sanitation Project Integrated Approach, Punjab Province" (see page V.4). The water supply and installations in this latter group of communities are looked after by the Provincial Public Health Engineering Department (PHED) and the villagers themselves make arrangements for sanitation (except in North West Frontier Province-NWFP, where they are covered by a new rural sanitation program assisted by PHED and bilateral aid). In a few large cities, semi-autonomous agencies have been created to handle all water and drainage functions. The local authority is represented in the board of directors of these agencies, but in practice (except in the case of Karachi) the agencies only report to the provincial government and the local councils have no authority over them. In the cantonment areas adjacent to many towns, the water and sanitation services are looked after by the military authorities. The Consultants consider that to satisfy the future water and wastes disposal requirements of such conurbations it will be necessary to consider the cantonment areas together with the towns.

1. Federal Level

At federal level, the sector responsibilities should concentrate on formulating national policies and legislation, assisting in the exchange of technical information inside and outside Pakistan, formulating and publishing planning and design standards, studying national human resource needs and preparing training programs, preparing information materials to promote public interest and support for sector improvements, assisting provincial and local sector agencies to define and select consultant services, and monitoring overall sector performance.

2. Provincial Level

The institutional strategy at provincial level should be to assist and guide local authorities in assuming their legal responsibilities and not, as at present, to "take over" those responsibilities from the local authorities. In order to provide effective support to the local authorities, the provincial line departments should help, if requested and on repayment basis, in planning, financing, staff training, setting standards, resolving inter-urban problems on water rights, monitoring health and water quality, and educating and sensitizing the general public. The provincial departments should coordinate their efforts more effectively than they do at present.

3. Local Level

Local authorities, especially the large ones, have in general been unable to handle effectively the increasingly complex and expensive problems of operating and maintaining their water and sanitation facilities. Because they are elected they are best qualified to make decisions which represent the wishes of the users. The Consultants believe that the institutional strategy at local level should be to create in each town a water and sanitation unit capable to handle the actual and medium-term future needs of the town. They also consider that eventually all the water and sanitation agencies working in a given urban area (including eventually industrial and cantonment areas) should be combined and work under the sole authority of the local council.

C. Financial Aspects

The financial strategy followed at all levels must recognize that the viability of sector programs and sector projects depends upon efficient financial management, appropriate tariff levels maintained by regular tariff increases, and adequate funding. A policy of full cost recovery has been stated in the Sixth and Seventh Five-Year Plans and the Sixth Plan also stated that metering and progressive tariffs would be introduced in all towns to reduce wastage. Unfortunately, due to complex approval procedures, these policies have not yet been effectively implemented in any city.

1. Financial Management

The financial management of urban water and sanitation services should ensure that optimum use is made of existing assets, that proposed investments

are justified, and that user charges are adequate and affordable. These objectives imply the need in each town for an accurate, up-to-date data base of technical and financial information and a suitable management information system. The replacement cost and remaining effective life of pipe systems, pumps and motors need to be determined and recorded. Double-entry accounting procedures need to be introduced so that local authorities will know the real cost of operating their systems and can plan tariff increases and budgets realistically.

2. Tariffs

Systematic and regular tariff increases should be instituted. Infrequent large increases lead to political opposition, delays, cancellations, and increasing financial losses which can result in default on debt obligations, greater reliance on subsidies and a decline in the quality of services provided. The tariff increases must first eliminate the gap between revenues and operating cost and then maintain a satisfactory financial position. In the four major cities which the Consultants studied, increases of between 44 and 376 per cent were needed in 1987-1988 to eliminate the gap between revenues and expenditures for operating the water supply and sanitation services, the most unfavorable position being in Rawalpindi. This, however, has been fully considered in preparing the Rawalpindi Water Supply and Sanitation Project proposed for Bank assistance. In most of the smaller towns the financial position resembles that in Rawalpindi.

The situation is exacerbated by three other factors: (a) the universally high rate of non-revenue water - mainly water misused because water charges are not related to the quantity used, water distributed free to schools, mosques, public buildings and bazaars and lost through leaks in the system; (b) the generally ineffective control of arrears; and (c) the absence (except in Lahore) of charges for the maintenance of drainage and sewerage and for the collection of solid wastes.

3. Willingness- and Ability-to-Pay

There is a perception among decision makers in Pakistan of a low willingness-to-pay on the part of consumers in urban areas. This perception is reinforced by poor levels of service, regressive tariff structures and poor revenue collection procedures, and a general expectation that provincial and local governments will subsidize the services. In 1988, the average household income in urban areas was Rs3,000, which was 35 per cent higher than the national average. The distribution of incomes was similar in all provinces. The Consultants consider that an average tariff of Rs40 per month would not impose a significant burden on the majority of urban households: for 80 per cent it would constitute less than 3 per cent of income, for 16 per cent it would constitute 3-5 per cent of income and for only 4 per cent it would constitute more than 5 per cent of income. Nevertheless it is recommended that an appropriate tariff structure be prepared for each urban community which satisfied its specific financial objectives, covers the full cost of operation and maintenance, depreciation and interest on debt service, and employs a stepped structure which encourages consumers to economize on the use of water and which reflects their ability to pay.

1. On-Lending of International Loans

The on-lending conditions for international loans are designed to avoid unnecessary distortion in the local capital market and instill financial discipline and commercial awareness into the sector. In order to avoid the need for periodic adjustments (reduction in the required rate of return on net revalued assets in operation) which have occurred in the past, the Consultants recommend that the government should adopt on-lending conditions similar to those in force under current ADB loans to the sector. The incremental funds generated by these on-lending operations should be specifically allocated to support further development of the urban water and sanitation sector, in the form of studies, training and investment projects.

5. Use of Local Capital

The Government should also promote and encourage increased generation of capital funds within the country, which would induce a sense of self-reliance and reduce the foreign debt burden on the sector. The responsible agency in each urban center should set targets to generate a proportion of the capital funds required for future investments. It is believed that an urban authority which becomes fully involved in the financial planning of its water and sanitation services will understand and accept the need for an appropriate tariff structure.

Although successive governments have attached importance to the provision of sector facilities, the main objective appears to have been to maximize coverage at minimum cost regardless of the adequacy of the facilities provided or the quality of the service. The actual investment costs have frequently been underestimated and the costs of rehabilitation have not been allowed for. Moreover, although the proportion of urban population in the country is increasing, the proportion of the sector budget allocated to urban projects in the Provincial Annual Development Programs (ADP) actually decreased from 35.6 per cent in the Fifth Plan period to 27.4 per cent in the Sixth Plan period (this trend was reflected in all regions except NWFP). As already noted (Section B above) the sector allocation which would be needed to achieve the stated targets during the Seventh Plan period would represent a very large increase over the actual allocations for sector investment during the Fifth and Sixth Plan periods, and as a consequence the targets will probably have to be revised downward.

D. Sector and Project Planning and Implementation

The sector planning strategy should focus on satisfying needs as they are perceived at the local level. The majority of towns in Pakistan have public water supply systems and at least elementary drainage systems. To meet increased demands, all of these systems need physical improvements and extensions, better operation and maintenance, and better customer relations. The improvements must be based on the actual and felt needs of the users. As a first step, each town should prepare an outline master plan for upgrading its facilities by stages in order of their urgency. At the same time it should prepare feasibility studies for the proposed first stage schemes. In view of

the dynamic changes taking place every year in land use patterns, in population size and in popularly perceived needs, the master plan as well as the staging of their execution should be frequently reviewed and updated by the municipal authorities in consultation with the residents of the town.

The programming of urban water supply and sanitation projects at the provincial level is at present proceeding in an ad hoc fashion, based on general criteria for selecting towns for urban investment, such as their administrative development, and demonstrated capability and willingness to bear their share of the development responsibility and financial burden of the projects. To rationalize the process, the provincial planning and programming should be based on the plans prepared by each local authority. Also, mechanisms are needed to ensure interdepartmental consultations, sector policies need to be enunciated, and legislation reviewed and updated.

V. PROPOSED ACTION PROGRAM AND INVESTMENT

A. Institutional Structure

1. Federal Level

To translate the federal level institutional strategy into action, the EUAD should: (a) prepare a public information and education program in collaboration with Health and Education Departments; (b) establish a Sector Advisory Panel; (c) initiate the creation of the Pakistan Water Supply and Sanitation Association, bringing together practicing professionals, contractors, manufacturers and teachers; (d) establish a register of qualified consulting firms; and (e) establish a process for certifying and licensing plumbers.

2. Provincial Level

To translate the provincial level institutional strategy into action, the initiative should be taken by the Planning and Development Department (PDD) or by the Physical Planning and Housing Department (PPHD) to convene a provincial Water Supply and Sanitation Advisory Committee. This committee should consist of all departments involved in the sector, PDD, Local Government and Rural Development Department (LGRDD), Public Health Engineering Department (PHED), PPHD, and Health Department (HD) and should aim to: (a) debate and approve a statement of provincial sector policies and strategies; (b) agree on the revised roles of the various departments in the light of the new policy and strategies; and (c) make plans for preparing a provincial sector master plan, which should be based on the plans of local authorities.

3. Local Level

To translate the local level institutional strategy into action, the local councils should be advised and assisted, inter alia: (a) to create an administrative unit with permanent staff for all aspects of water and sanitation operation and maintenance and planning; (b) to set up suitable financial and other registers and accounts; (c) to institute regular surveillance of drinking water quality; and (d) to initiate the preparation of a town sector development plan.

B. Investment Requirements

An indicative estimate has been prepared of the financial resources which will be required to satisfy the amended coverage targets for the period 1988-1993 and for the period 1993-2003. Unit investment costs were derived on the assumption that: (a) appropriate technologies and cost effective solutions will be used; (b) rehabilitation of defective existing structures will be undertaken; (c) non-revenue-water will be reduced through introduction of water charges based on quantities of water used and improved operation and maintenance; (d) the strong participation of the general public and of the private sector will reduce dependence on public sector investments; and (e) effective cost recovery will be instituted. The estimates indicate that Rs15.1 billion (\$770 million) will be required during the period 1988-1993 and Rs70.0 billion (\$3,500 million) will be required in the period 1993-2003. Thirty (30) per cent of the cost would be in foreign exchange. Punjab would account for 53 per cent of the total investment, Sind for 37 per cent, NWFP for 6 per cent, Baluchistan for 3 per cent and Islamabad FA for 1 per cent.

Period	1989 Prices		Current Prices	
	Rs billion	\$ million	Rs billion	\$ million
1988-1993	13.3	665	15.4	770
1993-2003	39.8	1,990	70.0	3,500
Total	53.1	2,655	85.4	4,270

International funding agencies (ADB, the World Bank) and bilateral agencies (the United Kingdom, Netherlands and Japan) are actively supporting urban development in Pakistan. These projects concentrate on the major cities, except for the proposed ADB support to a program for secondary urban centers in NWFP. The total estimated capital investment (external and local) in these projects during the Seventh Plan period is Rs7.8 billion (\$392 million). The projects supported by ADB, WB and UK contain components of institutional strengthening and training.

C. Identified Investment Packages

Several possible investment packages are presented for consideration by the Government and external funding agencies. These include 8 projects in Punjab, 2 in Sind, 2 in NWFP and 1 in Baluchistan. In all, a total of 52 urban centers have been identified. The proposals are based on the following parameters: (a) to support the priorities of the government's urban development strategy which emphasizes the development of medium-sized towns; (b) to reflect the development objectives of the provincial governments; (c) to complement development initiatives which have already commenced with international support; and (d) to target specific centers which are important to balanced provincial development. The packages presented take into account the proposed urban development projects in Punjab, Sind and NWFP.

In order to secure financial support for the proposed investment packages over the next four or five years, the Government must take certain actions: (a) re-examine the Public Sector Investment Program 1988-1993 to determine whether sufficient financial resources can be made available to satisfy the revised coverage targets; (b) prepare instructions and an action plan to ensure phased introduction of full cost recovery in all urban water supply and sanitation services and to eliminate subsidies; (c) take final decision on various financial proposals for the sector set out in the Seventh Five-Year Plan, including the availability of domestic loans at concessional rates, passing on external loans under the same conditions charged by foreign donor agencies, exempt imported machinery and equipment from customs duty, and charge electricity at the same concessional rates applied to irrigation tubewells. In deciding on these proposals the Government should bear in mind the need for financial discipline within the sector and the impact on the real allocation of resources within the economy; (d) prepare a few outline project documents for selected investment packages in order to attract the support of potential international funding agencies; and (e) encourage increased mobilization of local capital resources, including active community participation in low-cost technical solutions particularly among the urban poor.

VI. PROPOSED ROLE OF THE BANK

A. General

The ADB has been active in the urban water supply and sanitation sector since the mid-1970s. Between 1974-1988 the Bank committed \$165.8 million, of which \$164.9 was for project loans in Hyderabad, Faisalabad and Karachi and \$850,000 was for technical assistance projects in Faisalabad, Hyderabad, Rawalpindi and the present sector study. All of ADB's loans to the water/sanitation sector have been on concessionary terms: interest rate 1 per cent p.a., grace period 10 years, repayment period 40 years. These loans are normally on-lent to the agency concerned at an interest rate of 5 per cent p.a. with 5 years grace and a repayment period of 20-25 years.

B. Sector Experiences of the Bank

It is important to highlight previous experience with ADB-financed projects in Hyderabad and Faisalabad. Completion of the Hyderabad project has been delayed by nearly seven years and it is now expected to be completed some time in 1989. The main causes for delay identified by the Bank include: (a) delayed recruitment of consultants; (b) a major cost overrun which required reformulation of the project; (c) delayed government approval of the reformulated project; (d) protracted negotiation between the provincial government and the Hyderabad Development Authority (HDA) on provision of local funds; (e) management shortcomings by the executing agency; (f) poor performance by contractors; and (g) poor financial performance by Hyderabad Water and Sanitation Agency (WASA). Similar problems have plagued the Faisalabad project, which is also seven years behind schedule and is now expected to be completed in 1990.

C. Sector Support and Development

ADB's experience with these two projects is likely to lead to more emphasis in future projects on: (a) political commitment to a financially viable organization which is supported by effective cost recovery; (b) strengthening institutional and financial capabilities; (c) realistic assessment of implementation capacity and construction program; (d) prequalification of contractors and adequate site supervision; and (e) bidding for contracts based on current market rates.

D. Financial Support

There are valid reasons why the Bank should strengthen and expand its support to the urban water and sanitation sector in Pakistan, in view of the rapid growth in urban population, the need to improve and expand water supply and sanitation services, the need to protect public health and environmental quality, the need to raise the living standard of the urban poor, and the need for international agencies like ADB to give constructive support to the Government's development priorities. In this connection, there are a number of areas where the Bank could provide specific support and advice to promote more efficient and effective sector development. These might include preparation of a manual on urban finance, procedures for engaging consultants and contractors, helping organize in-service training courses for engineers, accountants and managers of local governments and line departments, drafting sector legislation, and field studies of methods for cost containment and cost recovery.

E. Proposed Grants and Loans

In line with the estimated investment requirements identified above, the proposed investment packages for possible support by ADB in the urban water supply and sanitation sector are as follows:

1. Possible Project Preparation Technical Assistance (PPTA)

1989/90 \$250,000	PPTA to prepare an integrated water supply and sanitation project for Rawalpindi. 1/
1989/90 \$100,000	PPTA to prepare an integrated water supply and sanitation project in villages in Punjab Province.
1990/91 \$250,000	PPTA to prepare an integrated water supply and sanitation project for five major towns (pop. 100,000 to 300,000) in Punjab Province.

1/ The GOP has requested that, depending on availability of ADB funds, the city of Larkana and the town of Mansehra be included in the PPTA. This will require additional grants funding of \$200,000 for Larkana and \$150,000 for Mansehra. If approved by ADB, the total TA would be \$600,000.

1992/93	\$250,000	PPTA to prepare an integrated water supply and sanitation project for five major towns (pop. 100,000 to 300,000) in Sind Province.
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2. Possible Project and Sector Loans

1990/91	\$50 million	Project loan - Rawalpindi water supply and sanitation project, integrated approach
1990/91	\$50 million	Sector loan - villages water supply and sanitation project, integrated approach, Punjab Province.
1991/92	\$50 million	Project loan - water supply and sanitation project, integrated approach, for five major towns (100,000 to 300,000), Punjab Province
1993/94	\$50-60 million	Project loan - water supply and sanitation project, integrated approach, for five major towns (100,000 to 300,000), Sind Province.

VII. SUMMARY OF RECOMMENDATIONS

A. General

Substantial changes are required in the Government's approach to the development of the urban water supply and sanitation sector at the Federal, Provincial and Local levels. The proposed changes concern the institutional structure, organization and financial management of the sector.

B. Sector Policy

The Consultants consider that the following principles ought to be stated as national policy: (a) the urban local authorities, which are already legally responsible for urban water supply and sanitation should assume, to the extent possible, their responsibilities in practice; (b) every public water supply system should deliver safe water to consumers, and should deliver it 24 hours a day, as far as practicable, at an adequate pressure; (c) all piped water connections, where water is delivered 24 hours a day, should be metered and water should be charged for by measured quantities used in accordance with a stepped tariff structure; (d) every urban water supply and sanitation service should be self-financing, i.e. should cover costs of operation and maintenance, depreciation and debt servicing; (e) every public waste disposal system should avoid contact between wastes and people, and should remove wastes from the town area and discharge them in a hygienic and nuisance-free manner; and (f) natural surface and ground waters should be adequately controlled and protected from pollution. Each province should evolve and codify policy to guide the development of sector services and the allocation of resources to its cities and towns.

C. Institutional Program

1. Proposed Action by Federal Government

The Federal Government policy statement should initiate the strengthening process of the urban water supply and sanitation sector. To strengthen the institutional structure at the federal level the Government should take the following actions (for details, see Chapter IV, page IV.1):

- (i) Strengthen the Environment and Urban Affairs Division (EUAD) to enable it to perform its responsibilities for the urban water supply and sanitation sector by: (a) upgrading the unit (which is performing at present some of these responsibilities) to become the Urban Water Supply and Sanitation Sector Wing (UWSSW); and (b) establishing a Sector Advisory Panel (see Appendix 7).
- (ii) Prepare and initiate a national program of information and education to: (a) promote public awareness of its rights and responsibilities including financial responsibility, for urban water supply and sanitation services; and (b) ensure public support and involvement, through elected local authorities and NGOs, in the development and operation of urban water supply and sanitation facilities.
- (iii) Strengthen the private sector's support for the urban water supply and sanitation sector by: (a) strengthening consulting services (see Appendix 14); (b) strengthening construction services by rationalization of bidding procedures for the Government funded projects (see Appendix 15); and (c) supporting local manufacturers of water supply and sanitation equipment and materials (see Appendix 16).
- (iv) Encourage exchange of experience within the sector by initiating creation of the Pakistan Water Supply and Sanitation Association.
- (v) Initiate action for proper training programs in water supply and sanitation.

2. Proposed Action by Provincial Governments

The proposed institutional arrangements at the provincial level will require the following actions by the Provincial Governments:

- (i) The local authorities already involved in large urban areas in planning, development, and execution of water supply and sanitation schemes, along with their operation and maintenance, should continue to do so. In such urban areas where the local authorities have not yet taken up these responsibilities, it is proposed that while Provincial Governments should continue to plan, develop and execute the schemes, the local authorities should take up the task of operation and maintenance of the facilities. The Provincial Governments should, however, exert all efforts to develop the technical, managerial and financial capabilities of the local authorities until such time that they will also be able to independently plan, develop and execute water supply and sanitation schemes under the supervision and assistance of the Provincial Governments.

- (ii) Reassessment of the role of the FHED and to strengthen these departments to enable them to undertake new responsibilities in the urban water supply and sanitation sector.
- (iii) Prepare and initiate a provincial program of information and education to: (a) promote public awareness of its rights and responsibilities including financial responsibility, for urban water supply and sanitation services; and (b) ensure public support and involvement, through the elected local authorities and NGOs, in the development and operation of urban water supply and sanitation facilities.
- (iv) Examine existing water revenue collection procedures and prepare for handing over these responsibilities to the urban local authorities.
- (v) Initiate the process of certification and licensing of plumbers.

The Provincial Governments should reassess the role of the Public Health Engineering Department and allied institutions which should, in addition to their existing functions, also undertake the following responsibilities:

- (i) Inspection once a year of urban water supply and sanitation facilities and services in all urban centers.
- (ii) Preparation for the inspected local authorities of situation reports based on these inspections with recommendations for necessary action.
- (iii) Preparation of an annual provincial urban water supply and sanitation sector report based on the inspection reports. These reports would include recommendations to Provincial Governments for necessary action to improve the performance of the sector. These reports will also be submitted to the Federal Government for evaluation on a national scale and, if necessary, for review of policies and legal support.
- (iv) Assistance to the local authorities, if needed, in the preparation of terms of reference and scope of work for consulting engineers and in evaluation of the Consultant's recommendations. This service should be provided on a commercial basis.
- (v) Assistance to the sector in the province with public information and education to promote public awareness and involvement.
- (vi) Assistance to the provincial sector agencies, through coordination, with staff development and training.

For the performance of above functions, the Provincial Governments should, as far as possible, ensure that the design and supervision of construction of water supply and sanitation facilities are carried out by qualified and reputed local consultants, thus, reducing and gradually phasing out the involvement in the design and supervision of construction of the Public Health Engineering Departments.

Technical assistance (continued)

3. Proposed Action by Local Government

The proposed institutional arrangements at the local level will require the following actions by urban local authorities:

- (i) Accept responsibilities for water supply and sanitation and inform the people about it in the light of the proposed enforcement of the law by the Government.
- (ii) Reassess their legal responsibilities.
- (iii) Assess their present capabilities to undertake their responsibilities.
- (iv) Prepare, establish and maintain public information and education program to: (a) ensure people's awareness of their responsibilities; (b) ensure their participation in the decision making process for the development of water supply and sanitation facilities; and (c) inform the people on the condition of water supply and sanitation facilities in the town and what needs to be done to improve these services, the need to use safe water for drinking, the need for personal and household hygiene, the need for safe disposal of excreta and wastewater and the need to pay for these services;
- (v) Create an administrative unit with permanent staff, which will be responsible for all aspects of water supply and sanitation, including operation and maintenance and, as far as practicable, also planning. This unit should be responsible only to the council;
- (vi) Establish financial management for water supply and sanitation revenues and expenditures with permanent staff, and set up suitable financial registers and accounts.

D. Sector Management

The proposed institutional reform of the urban water supply and sanitation sector will require the following action by the Government:

- (i) Encourage and gradually compel urban local authorities to accept and carry out their legal responsibilities for water supply and sanitation by: (a) public information and education; (b) gradual reduction and phasing out of Government subsidies; and (c) introduction of monitoring and control of the local authorities performance in the sector.
- (ii) Prepare instructions and action plan for the introduction of the institutional changes at: (a) federal level; (b) provincial level; and (c) local level.
- (iii) Prepare instructions and action plan for strengthening of: (a) consulting services; (b) construction services; and (c) manufacturing of materials and equipment for the sector. It should be noted that the recommendations (a) and (b) apply also to other sectors of national economy. In planning actions for strengthening the consulting and construction services and the manufacturing sector, the Government ought to explore the possibility of obtaining international and/or bilateral technical assistance.

E. Sector Financing

The proposed investment program and identified investment packages will require the following actions by Government to secure the necessary financial support over the next four or five years:

- (i) Re-examine the Public Sector Investment Program 1988-1993 to determine whether sufficient financial resources can be made available to satisfy the revised coverage targets.
- (ii) Prepare instructions and action plan for the phased introduction of full cost recovery in all urban water supply and sanitation services and to eliminate subsidies.
- (iii) Take final decision on financial proposals for the sector set out in the Seventh Five-Year Plan 1988-1993: (a) domestic loans to be available at concessional rates; (b) external loans to be passed on under the same conditions charged by foreign donor agencies; (c) machinery and equipment to be exempt from custom duty; and (d) electricity to be charged at same concessional rates as applied to irrigation tubewells. In taking a decision on these proposals the Government should bear in mind the need for financial discipline within the sector and the impact on the real allocation of resources within the economy.
- (iv) Prepare outline project documents for selected investment packages in order to attract the support of potential international funding agencies. Well prepared documentation is more likely to attract the necessary support.
- (v) Encourage increased mobilization of local capital resources. This should include active community participation in low-cost technical solutions particularly among the urban poor.

F. Local Sector Support

1. Consulting Services

The Consultants' recommendations are divided under three headings where specific action is required: Government, Consulting Profession itself, and the Asian Development Bank (Appendix 14).

The Government will need to change many practices, procedures and financial terms if there is a real desire to develop a stronger and efficient consulting profession:

- (i) Prepare and adopt comprehensive policy for development of consulting profession in Pakistan.
- (ii) Maintain at both Federal and Provincial levels registration, lists and other relevant information on consultants with experience in water supply and sanitation.

- (iii) Establish standards and uniformity in shortlisting, evaluation, selection and contracting procedures in use of consultants for all public sector projects and studies at Federal, Provincial and Local levels.
- (iv) Prepare guidelines and institute training of Government officials in the appointment and use of consultants.
- (v) Ensure maintenance of remunerative fee rates for professional services; promote fair competition and encourage prompt payment of professional fees.
- (vi) Reduce and gradually eliminate in-house engineering work done by Government departments. Promote use of consulting services from private sector. In addition to providing design and documentation services, the consulting firms should be entrusted with the responsibility for the supervision of construction. While Government departments and agencies have a valuable role to play in advising local authorities, planning, coordination and evaluation of projects, it would be more efficient to contract out actual engineering work to consultants.
- (vii) Consider privatization of publicly-owned or supported consulting companies like NESPAK and PEPAC.
- (viii) Encourage standards of excellence and high performance among the consulting profession
- (ix) Encourage skill and technology transfer among the consulting profession.

The Consulting Profession should:

- (i) Establish a National Association of Consultants or Association of Consulting Engineers to represent and promote the profession, with the following objectives:
 - to define and maintain code of ethics and standards of practice
 - to initiate, promote and conserve the interests and status of the profession
 - to represent the profession in relation with Government and other interested parties
 - to encourage the maintenance and development of technical skills and professional practice
 - to cooperate with other professional bodies both national and international
 - to promote the selection of consultants on the basis of merit; to disseminate technical information concerned with the profession

- to promote awareness among the profession of opportunities with Government, the private sector and international institutions
- to promote training and certification of young engineers
- (ii) Promote attention to professional standards and quality assurance.
- (iii) Pay more attention to improved management and organization in matters of personnel, project control and financial planning.
- (iv) Promote and seek more work with the private sector.
- (v) Organize, through their Association, a national apprenticeship program for training of young graduates in all aspects of engineering including supervision of construction. Such program should involve apprenticeship under selected highly experienced engineers.

The Asian Development Bank should:

- (i) establish register of local consultants with experience and permanent staff acceptable to the lending agency
- (ii) promote increased use of local consultants in fields with relevant expertise
- (iii) promote transfer of technical know-how from foreign to local consultants
- (iv) consider sponsoring of overseas training for members of the consulting profession

2. Construction Services

The Consultants' recommendations for the future development of construction services have been divided under three headings: (a) government; (b) the Construction Industry; and (c) the Asian Development Bank (ADB). While many of the recommendations are based on experience in the water supply and sanitation sector, many of the recommendations also apply throughout the construction industry in general. In order to implement the proposals outlined below, it is recommended that a consultant with expertise in the construction industry should be engaged for four to six months to advise the Government and EUAD (Appendix 15).

The Government should take the initiative in promoting a more vigorous, efficient and financially stable construction industry. The Government's aim should be to improve construction standards and ensure better "value for money":

- (i) Establish standards and uniformity in short-listing, evaluation selection and contracting procedures in use of construction companies for

all public sector projects at Federal, Provincial and Local levels. In engaging construction companies, particular attention should be given to:

- the technical aspects of the work (e.g., experience and skill in water supply and sanitation projects)
 - the financial strength and capabilities of the individual companies
 - a review of the contractor's capacity in relation to his current and future commitments
- (ii) Review and set guidelines on contracts; payment procedures; escalation clauses; enforcement of contractual obligations; supervision of construction; etc.
- (iii) Maintain registration lists and other relevant information on construction companies with water supply and sanitation experience at Federal and Provincial levels. These should be regularly updated and include more detailed information on work experience, project size and financial strength.
- (iv) Abolish use of fixed Schedule of Rates and encourage construction companies to bid at realistic market rates. Initiate establishing by the private sector, under the supervision of the Federal Bureau of Statistics, of the monthly indexes of construction costs of labor and materials for the use in the rate escalation clauses of the construction contracts.
- (v) Promote use of consultants in assessing and ranking contractors' bids. Greater emphasis should be placed on the technical, managerial and financial capabilities of individual firms.
- (vi) Promote increased use of consulting engineers to carry out detailed supervision of construction works.
- (vii) Encourage the larger construction companies to associate with foreign companies to promote the transfer of technology in terms of:
(a) project management and organization; (b) costing and project accounting; (c) scheduling; (d) quality control; (e) ordering and procurement; (f) utilization of machinery and equipment; etc.
- (viii) Encourage improved quality control in the supply of local materials and equipment.
- (ix) Prepare guidelines and institute training of Government officials and consulting engineering in the appointment and use of construction companies.

The Construction Industry should:

- (i) Establish a National Contractors Association to represent and promote the construction industry.

- (ii) Encourage improved standards of construction.
- (iii) Emphasize the importance of improved management and organization in project control, supervision of construction and financial planning.
- (iv) Establish formal contacts with foreign construction companies to promote the transfer of technology.
- (v) Promote increased use of modern machinery and equipment, particularly in larger construction projects.

The Asian Development Bank, as one of the leading foreign development agencies involved in the urban water supply and sanitation sector, the ADB should use its influence to encourage the Government and the Construction Industry to initiate the changes outlined above in order to promote greater efficiency and improved standards of construction.

3. Locally Manufactured Materials and Equipment

The Consultants recommend that even the sales tax should be removed to encourage local manufacturers to compete for the internationally financed projects. This recommendation is made to encourage the introduction of metering in the urban water supplies in Pakistan to enable the control of consumption from piped connections and to facilitate collection of revenue (Appendix 16).

The procurement specifications for water supply and sanitation in Pakistan should be updated to take into account new materials, equipment and techniques which are coming into use in other parts of the world. At the same time strict use of procurement specifications as tools to prevent wastage of public funds should be insisted upon, and check by regular tests in approved laboratories (Appendix 16).

Meters should be installed only in areas where there is a 24-hour supply at adequate pressure (Appendix 16).

G. Large Rural Communities

The Consultants recommend that the rural communities with populations over 5,000 people, which already have, or wish to have, piped water supply facilities, should be allowed to and encouraged to have a town council, thus, to become urban. Metered piped water supplies and sewerage facilities will be necessary only in the densely populated areas of these centers (Appendix 5).

H. Community Participation

The experiences of the Orangi Pilot Project (OPP) in Karachi demonstrate that if suitably mobilized, motivated and technically supported, communities can learn to build, finance and manage services. Five important components should be emphasized for application elsewhere in the sector:

- (i) Social investigation to identify suitable forms of community organization to manage small-scale projects.
- (ii) Social mobilization to establish a community organization.

- (iii) Continuing research and development into appropriate and affordable technical solutions with the active involvement of the local community.
- (iv) Training in basic technical and management skills.
- (v) Effective and continuing dialogue with community organizations.

Provincial Governments and Local Authorities staff and other NGOs should be exposed to the OPP experiences through field visits and exchange of views.

I. Affordability and Acceptance

The Consultants assessed the affordability of water supply and sanitation services within the range of three to five per cent of the household income. The results of these assessments indicate the following:

- (i) Three per cent assumption - 28 per cent of the urban households would be able to afford user charges of more than Rs100 per month; 32 per cent Rs60 to 80 per month; and 37 per cent Rs20 to 40 per month. The weighted average tariff is estimated at Rs67 per month.
- (ii) Five per cent assumption - 60 per cent of urban households would be able to afford user charges of more than Rs100 per month; 32 per cent Rs60 to Rs80 per month; and eight per cent Rs20 to Rs40 per month. The weighted average tariff is estimated at Rs100 per month.

There is no significant variation between the four provinces. The results of the assessment also illustrate importance of using stepped tariff structure which relate use of water to ability to pay. The survey in Karachi and other evidence indicate that urban households are willing to pay much higher user charges than at present. However, considerable improvements in the service would be required, coupled with effective consumer education, for realistic charges based on a stepped tariff structure and adequate revenue collection.

J. Training

The Consultants recommend that serious attention should be paid by the Government for action to improve the literacy rate of the population.

The universities and their staff should become more actively involved in the identification and solution of the environmental problems in the big cities. To be able to do that the universities should be provided with improved facilities, conditions and motivation. There is a need to maintain discipline at the universities.

K. Public Health

Improved water supply and sanitation facilities should be considered as part of public health campaign to reduce the incidence of water-borne and sanitation-related diseases (Appendix 17). Complimentary inputs are required if the full impact is to be achieved, and these are:

- (i) A public health education program to improve levels of personal hygiene and standards of food preparation.

- (ii) Continued monitoring and surveillance of water quality and environmental impact
- (iii) Close monitoring of public health levels through the collection of statistics at regular visits by a controlling agency. This would enable the Government to check that health measures were effective and also to be in a position to cope with an outbreak of diseases.

L. Water Resources

Recommendations of the Consultants (Appendix 18) for strengthening water resources management are:

- (i) rational water management, quantitative and qualitative, is needed for both surface and ground water throughout the country;
- (ii) laws, rules and regulations relating to water should be reviewed and updated, to ensure that they are realistic and suitable to the conditions existing in the country;
- (iii) water resources development plans should be prepared, including sea water intrusion control;
- (iv) water and wastewater treatment plants should be built and correctly operated in urban areas where they are needed; the drinking water supplied in all towns should be monitored on a daily basis for chlorine residual and for bacteriological purity;
- (v) water conservation should be emphasized in the country;
- (vi) federal and provincial authorities should extend their cooperation in the exploration of water resources and enforcement of laws to avoid that domestic and industrial wastes are discharged without adequate treatment;
- (vii) the intergovernmental agencies to agree on joint policies and approaches so as to encourage the bilateral and international agencies' participation;
- (viii) to avoid salinization, the withdrawal of groundwater from wells should be regulated according to the measured specific yield. Planning for water management practice should be done at the regional level. Geological conditions, salt strata, rock depth of fresh water and stagnant water should be determined and made known to the water users of the area.

M. Water Pollution Control

The Consultants' recommendations for the strengthening environmental impact assessment procedures, including policy, procedure and institutional requirements (Appendix 19) are:

- (i) a policy and a realistic strategy for action should be formulated and put in action to prevent further deterioration of the environment of the country;
- (ii) the policy should define priorities for controlling pollution of the environment and specifically water pollution;

- (iii) top priority should be given to the management of hazardous wastes, including their identification, collection, treatment and disposal;
- (iv) a thorough environmental impact assessment should be carried out at the initial (study) stage and at the detailed (project) stage before granting permission for a project;
- (v) laws and regulations should be enforced gradually to the acceptable limit;
- (vi) compliance with the laws and regulations should be checked by periodic physical monitoring of project sites; adequate funds should be budgeted for monitoring activities;
- (vii) up-to-date operational data and effluent monitoring data should be available at the time of studies, discussion and decisions concerning projects;
- (viii) within the Government, efforts should be made to foster cooperation and establish joint responsibility among the agencies concerned with the sector;
- (ix) in particular, cooperation in policy making and in project formulation is essential between agencies concerned with conservation and agencies concerned with development;
- (x) Provincial Environmental Protection Agency (PEPA) should be staffed with technically qualified professionals, and supported by facilities for investigation and research;
- (xi) the provincial agencies should be autonomous for planning and implementation and have a full authority to exercise their power;
- (xii) the interest and cooperation of the private sector should be ensured;
- (xiii) the support of non-governmental organizations, educational and other local and regional institutions should be fostered;
- (xiv) technical exchange is desirable between institutions concerned with research and the dissemination of information;
- (xv) criteria should be established for defining program priorities, based on the significance and the degree of reversibility of specific environmental problems;
- (xvi) public awareness programs on environmental subjects through TV and radio should be increased;
- (xvii) the support of industrialists should be invoked in the environmental awareness program. They should arrange discussion workshops and seminars, emphasizing that the organizer is the owner of the industry himself; and
- (xviii) an annual report on the state of the environment in the country should be published.

I. INTRODUCTION

A. Background

1. The Urban Water Supply and Sanitation Sector Study is financed under a technical assistance grant from the Asian Development Bank (ADB) to the Federal Government of Pakistan. C. Lotti and Associati (Italy) in association with Techno-Consult (Pakistan) were commissioned to carry out the Study. A Consultancy Contract between the ADB and C. Lotti and Associati was signed on 13 September 1988 in Manila. The project starting date was scheduled for October 1988, but this was postponed due to the sudden death of the former President of Pakistan on 17 August 1988 and the national election which took place on 18th November 1988.

2. The Consultants' work in Pakistan commenced on 9 January 1989 in the offices of the Executing Agency, the Environment and Urban Affairs Division (EUAD), within the Ministry of Housing and Works (MHW).

B. Study Objectives and Terms of Reference

3. The main objectives of the Study are: to strengthen the Government's efforts in planning and implementation of water supply and sanitation in urban areas, to ensure the effectiveness of investment including strengthening of the institutional capabilities of sector agencies and to establish a long-term plan and a rational framework and program for Bank's assistance for the development of the sector.

4. The Scope of Work for the Study covers four main areas:

- (i) sectoral development framework
- (ii) action plan for institutional and financial strengthening
- (iii) measures and strategies for strengthening of local sectoral support
- (iv) long-term plan and program for external assistance

The Terms of Reference (TOR) is presented in Appendix 27.

C. Method of Approach

5. The method of approach has basically followed the outline set out in the Consultants' technical proposal (June 1988). The Study Team was divided into three working groups.

6. Two groups visited the four provinces (Group II - Punjab and NWFP and Group I - Sind and Baluchistan) for data collection, physical inspections and detailed discussions with departments of the Provincial Governments, notably Physical Planning and Housing Department (PPHD) and Public Health Engineering Department (PHED) plus four or five representative urban centers in each province. The urban centers were selected after discussions with EUAD and the

7. The third group concentrated on the general institutional and financial issues of the sector, plus more in-depth reviews of the institutional financial aspects of the principal water supply and sanitation agencies and departments in Karachi, Lahore, Islamabad and Rawalpindi.

8. The Study Team prepared a number of questionnaires which were used to collect basic data and as a checklist for the city visits. The questionnaires prepared were as follows:

- Q.1 - Information on provincial organizations (checklist used by the Study Teams).
- Q.2 - General and sector information on towns (copies of this questionnaire were sent to the four provinces by EUAD for distribution to the 384 urban centers listed in the 1981 Population Census).
- Q.3 - Information on technical, institutional and financial aspects of water and sanitation operations in each of the towns visited by the Study Teams (checklist used by the Study Teams).
- Q.4 - Pakistani consulting firms (questionnaire mailed to 87 firms).
- Q.5 - Pakistani contractors and manufacturers of materials and equipment.

At the time of preparing the Final Report, only one of the urban centers (Hyderabad) had returned Questionnaire Q.2.

9. In addition to the site investigations, a substantial number of reports and documents were collected by EUAD and the team members. A comprehensive bibliography is presented in Appendix 28.

10. The Consultants also benefited from detailed discussions with and advice from the Study Steering Committee which was convened by EUAD on 1st March, 4th April, 20th May, 6th June and 19th July 1989. These meetings were attended by representatives of Federal and Provincial Governments, plus line agencies and organizations operating in the sector. Appendix 26 contains minutes of these meetings and a list of participants.

D. Report Layout

11. The Final Report presents to the Government of Pakistan and ADB the findings, conclusions and recommendations of the Sector Study. Comments and suggestions by the Government of Pakistan and ADB on the Draft Final Report have been incorporated in this Final Report.

12. The Final Report is composed of three volumes: Volume 1 is the Main Report; Volume 2 includes all Appendixes; and Volume 3 includes the field visit reports which provide a review of provincial structures and organizations involved in the sector and of the representative urban centers which were visited. The Main Report is presented in five main sections:

I. Introduction

II. Need and Demand Assessment - identifies the needs and future requirements in the urban water supply and sanitation sector.

- III. Sector Development Approach - outlines what needs to be done to achieve the targets.
- IV. Proposed Action Program and Investment - highlights specific actions which will be required by Federal, Provincial and Local Governments, and by the water and sanitation agencies to develop the sector. It also outlines proposed priority projects.
- V. Proposed Role of the Bank - recommends an outline strategy by which ADB can assist the Government in future sector development.

E. Acknowledgements

13. During the course of the study, the Consultants received valuable assistance and support from a large number of senior officials of Federal, Provincial and Local Governments, representatives of non-governmental organizations (NGOs), the private sector, international agencies and diplomatic missions stationed in Islamabad and Karachi. The assistance of all those consulted is gratefully acknowledged. A comprehensive list of all persons contacted is presented in Appendix 1. The Consultants would like to acknowledge the continuous and effective support and assistance provided to the Study by the officials and staff of EUAD, particularly:

Mr. Shahjehan S. Karim	-	Additional Secretary EUAD and Chairman of the Study Steering Committee
Mr. Iftikhar Ahmad	-	Study Director
Mr. Muhammad Humayun Khan	-	Assistant Study Director

F. The Study Team

14. Expatriate and local experts and counterpart staff who have participated in the preparation of the Sector Study are listed below:

Mr. Peter Wallum	-	Project Economist/Mission Leader - ADB
Mr. Rodolfo A. Giusto	-	Study Coordinator - C. Lotti & Associati
Mr. Boleslaw J. Kukielka	-	Team Leader/Inst. Exp. - C. Lotti & Associati
Mr. Mahmood S. Suleiman	-	Sanitary/Envir. Expert - C. Lotti & Associati
Mr. Prescott Stevens	-	Sanitary/Envir. Expert - C. Lotti & Associati
Mr. Malcolm T. Summerfield	-	Financial/Mgt. Expert - C. Lotti & Associati
Dr. H. Pasha	-	Economist - Techno-Consult
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Mr. Syed J. Shah	-	Sanitary/WS Engineer - Techno-Consult
Mr. Saeed A. Khan	-	Water Supply Engineer - Techno-Consult
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Mr. Muhammad Bashir	-	Administrative Officer - EUAD
Mr. A. Hafiz	-	Secretary/Typist - EUAD
Mr. Shabir Hussain Shah	-	Copier Operator - EUAD
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Mr. Naib Qasid	-	Assistant - EUAD

II. NEED AND DEMAND ASSESSMENT

A. General

15. Since independence, successive Federal and Provincial Governments have made substantial efforts to develop water supply and sanitation services in the urban areas of Pakistan. However, increasing urbanization is putting a severe strain on existing urban infrastructure and services, particularly in the provision of an adequate and reliable supply of potable water and the collection and hygienic removal of excreta and wastewater. Evidence of this strain is the fact that many urban water supply and sewerage systems which have been installed or upgraded in the last few years to satisfy a 10-year demand horizon, are reported to be already operating at full capacity or over-capacity. The situation is exacerbated by institutional problems, lack of community involvement and participation, inadequate maintenance, poor organization and inadequate financial management within the sector. The needs and demands of the sector are assessed in the following sections in terms of the historic situation and projections to 1993 and 2003.

B. Population Growth and Urban Development

16. Pakistan has a population of about 105 million (1988) which is growing at 3.1 per cent per annum. The urban population of 33.5 million (1988) accounts for 32 per cent of the national total and is growing at the much higher rate of 4.8 per cent per annum. This rate of growth is likely to continue for the foreseeable future given the country's relatively high birth rate, migration from rural areas in search of employment, the continuing growth of the industrial and service sectors, and growth in personal income.

17. The division of urban population by province with projections to the year 2003 are summarized in Table 2. In 1988, the division by province was as follows: Punjab-55 per cent; Sind-34 per cent; NWFP-7 per cent; Baluchistan-3 per cent; and Islamabad F.A.-1 per cent. Current urban growth rates (1981-1988) range from 4.2 per cent per annum in Baluchistan to 4.9 per cent per annum in Punjab. Total urban population is projected to grow to 42.3 million in 1993 (35 per cent of national population) and 61 million (40 per cent) in 2003 at growth rate of 4.8 per cent per annum and 3.7 per cent per annum, respectively. Thus in the 15 years from 1988 to 2003 the urban population is projected to nearly double.

Table 2. Urban Population by Province 1981-2003

Province	Population (million)				Growth Rates (% p.a.)		
	Census		Estimates Projections		1981-1988	1988-1993	1993-2003
	1981	1988	1993	2003			
Punjab	13.0	18.5	23.5	34.0	4.9	4.9	3.8
Sind	8.2	11.5	14.5	20.8	4.7	4.7	3.7
NWFP	1.7	2.3	2.8	4.1	4.4	4.5	3.5
Baluchistan	0.7	0.9	1.1	1.6	4.2	4.5	3.5
Islamabad F.A.	0.2	0.3	0.4	0.5	4.6	4.6	3.5
Total	23.8	35.5	42.3	61.0	4.8	4.8	3.7

Source: EUAD, 1989.

18. The growth in urban population has far exceeded the provision of basic urban services and infrastructure, including water supply and sanitation facilities. If these problems are not addressed in practical and realistic terms, then economic growth may be constrained and living conditions will continue to deteriorate.

19. Katchi abadis ^{1/} and slum areas in the urban centers are of particular concern to the Government because of the dearth of essential services and the poor living conditions which breed resentment and social unrest as well as poor health. Current estimates indicate a total of 2,322 katchi abadis accommodating a population of about 6 million or nearly 20 per cent of the urban population, as presented in Table 3. A high proportion of the katchi abadis population is concentrated in large cities like Karachi (2.6 to 3 million), Lahore (300,000 to 400,000) and Hyderabad (250,000 to 300,000). The continual influx of population from the rural areas is exacerbating the problem.

Table 3. Katchi Abadis in Pakistan by Province 1988

Province	Nos.	Area (000 ha)	Population (million)	Proportion of Total Urban Population	
				%	(%)
Punjab	902	3.8	1.6	26.7	8.6
Sind	1,300	10.5	3.8	63.3	33.0
NWFP ^{a/}	55	1.1	0.3	5.0	13.0
Baluchistan	65	2.0	0.3	5.0	33.3
Total	2,322	17.4	6.0	100.0	17.9

Note: ^{a/} In a strict sense, there are no katchi abadis in NWFP. The residents of slum areas have property rights to the land.

Source: EUAD, 1989.

20. The Government is well aware of the problems, but effective action is constrained by lack of adequate financial resources and an effective means of delivering services which will alleviate the poor living conditions. In order to confront this situation, the Seventh Five-Year Plan 1988-1993 has allocated a total of Rs10.8 billion to improve housing and basic infrastructure (including water supply and sanitation) in 2,040 katchi abadis. It is anticipated that actual implementation will be as follows:

- (i) Katchi Abadis Development Councils will formulate policy at national and provincial levels.

^{1/} An area occupied for residential purposes without proper authorization, and/or where housing or infrastructure conditions are substandard to the extent that the health of the inhabitants is endangered.

- (ii) Katchi abadis will be grouped in project area committees for implementation. Extension wings at project area level and research cells in the municipal bodies will be set up to carry out research and recommend low-cost solutions.
- (iii) Public sector efforts will be supplemented by community-based non-government organizations (NGO).

21. It remains to be seen whether this strategy will be effective. Community participation at all stages will be essential if the program is to reflect the real wishes and priorities of the target communities. The theme of community participation, particularly among the urban poor, is reiterated elsewhere in this report.

C. Water Supply

1. General Information

22. Nearly all urban centers in Pakistan have piped water supply systems. However, the service is generally poor and inadequate. Water supply is irregular, with availability ranging only from an average of about six hours per day down to as little as one-two hours, often at reduced pressures. Supply interruptions produce negative pressures leading to the risk of water contamination from raw sewage and a danger to public health. This problem is compounded by the absence of regular surveillance of drinking water quality. Water shortage causes hardship, inconvenience and frustration which sometimes flares into social unrest. Non-revenue-water is reported to be high, varying from 40 to 60 per cent in most urban centers. This is due to a variety of factors: (a) poor construction standards; (b) inadequate maintenance; (c) illegal connections and associated damage to the system; (d) wasteful use by consumers; (e) lack of demand control through metering and appropriate tariffs; (f) "free" water connections to schools, mosques, public buildings and public standpipes; and (g) poor collection of tariffs.

23. Information on service coverage is available from two main sources:

- (i) 1980 Housing Census - provides the most comprehensive information for all urban centers in Pakistan. The next Housing Census is scheduled to take place in 1990. The results will provide the most accurate measure of the real progress made in the 1980s.
- (ii) Provincial authorities (i.e., Public Health Engineering Department-PHED and Physical Planning and Housing Department-PPHD) also prepare interim estimates which are based on staff assessments. These estimates are used at the provincial and federal level for planning purposes. It appears that some of these figures may well be over-estimates of the actual situation and should be treated with some caution.

2. 1980 Housing Census

24. Table 4 summarizes the service levels of household water supply in urban areas by province in 1980. The national total shows that 58 per cent of housing units were served by piped water supply (38 per cent with house connections and 20 per cent from standpipes), while 40 per cent relied on handpumps and wells and 2 per cent on surface water sources.

Table 4. Water Supply Coverage in Urban Areas in 1980
(per cent of households)

Source	Punjab	Sind	NWFP	Baluchistan	Islamabad F.A.	All Urban
Piped Supply	43	80	58	69	71	58
- Inside	35	43	34	37	63	38
- Outside	8	37	24	32	8	20
Handpumps	50	15	4	-	-	33
Wells	6	2	35	22	26	7
Surface a/	3	3	3	9	3	2

Note: a/ Ponds, springs, rivers, streams, etc.

Source: 1980 Housing Census, Population Census Organization, May 1982.

25. The provincial figures indicate that urban households in Sind (80 per cent), Baluchistan (69 per cent) and Islamabad F.A. (71 per cent) had the highest access to a piped water supply system, although a significant proportion were only served by standpipes. Urban centers in Punjab had the lowest pipe supply coverage (43 per cent). Handpumps were significant in Punjab (50 per cent) and to a lesser extent in Sind (15 per cent). Wells were an important source of water supply in NWFP (35 per cent), Baluchistan (22 per cent) and Islamabad F.A. (26 per cent). The provincial figures conceal considerable variations between different urban centers in each province. These differences have been analyzed and tabulated in Appendix 4.

3. 1988 Coverage Estimates

26. The government defines coverage in terms of reasonable access to a public piped water system through house connections or public standpipes (generally, at a distance of not more than 200 m). Estimates for 1988 have been based on four principal sources: Provincial PHEDs; Physical Planning and Housing Section in the Ministry of Planning and Development; recent consultancy studies; and the Consultants' own investigations. The results should be treated as indicative only because much of the information is based on "best estimates". Indeed the figures may overestimate the actual position because of the inadequate and intermittent service in most urban centers.

27. The indicative estimates are summarized in Table 5. These show that coverage rose from 58 per cent in 1980 to an estimated 80 per cent in 1988, implying that 26.6 million out of a total urban population of 33.5 million had access to a piped water system. According to the figures, the biggest improvement was registered in Punjab (43 per cent to 75 per cent) and NWFP (58 per cent to 81 per cent). Modest gains were registered in Sind and Baluchistan.

Table 5. Indicative Estimate of Urban Water Supply Coverage by Province in 1988

Province	1981		1988 Estimates		
	Population (million)	Coverage 1980 Housing Census (%)	Urban Population (million)	Population Coverage	Coverage (%)
Punjab	13.0	13	18.5	13.9	75
Sind	8.2	80	11.5	9.8	85
NWFP	1.7	58	2.3	1.9	81
Baluchistan	0.7	69	0.9	0.7	80
Islamabad F.A.	0.2	71	0.3	0.3	90
Total	23.8	58	33.5	26.6	79

Source: Estimates of Study Team based on available information, 1989. Figures may overstate actual service level.

D. Sanitation

1. General Information

28. Urban wastewater disposal facilities in Pakistan can be divided into three principal categories: (a) conventional water-borne sewerage systems; (b) discharge either direct or through septic tank into open drains; and (c) on site disposal (pit latrines, seepage pits, etc.).

29. Many of the large towns and cities have water-borne sewerage networks which serve a proportion of the population. Most of these systems are inadequate and overloaded in relation to the population they were designed to serve. The main shortcomings are: (a) inadequate design and construction standards; b) inadequate maintenance and cleaning; (c) discharge of raw sewage into fields for irrigating vegetables and other crops, thus creating a significant health risk and increasing environmental pollution; and (d) disposal of solid wastes into sewers due to lack of effective solid wastes disposal and lack of public education. Only a few cities have sewage treatment facilities, which are often overloaded and poorly maintained. None of the urban centers in Pakistan comply with the draft effluent standards laid down in the Environmental Protection Ordinance 1983 (discussed further in Appendix 19).

30. Concrete open drains are still the predominant form of wastewater collection in most towns and cities in Pakistan. Most of these drains are poorly maintained and frequently blocked with refuse and street sweepings which are not promptly removed by the local authorities. Some drain sections are covered, but the covers are often broken or poorly positioned.

31. On-site disposal of human excreta, mainly pit latrines, is hardly used and should be one of the most important forms of sanitation in urban areas, particularly among the urban poor (e.g., in the katchi abadis and slum areas).

32. Special mention should be made of the small-bore sewerage system which has been developed in the low-income district of Orangi in Karachi. This has been constructed on a lane-by-lane basis with residents funding and maintaining the facility themselves. Community preparation, technical support, advice and basic health education are provided by an independently financed NGO which is permanently based within the community. Besides the tertiary (lane) sewers, householders in blocks of Orangi have also financed secondary sewers to connect to the nearest principal nullahs or stream beds. In 1989, it is estimated that about 55 per cent of the population of Orangi (approximately 800,000) are served by these small bore sewers, which are well maintained by the users.

33. The two most important reasons for providing adequate urban sanitation facilities are to reduce risks to public health and minimize environmental pollution. On both counts all urban centers in Pakistan are exposed to a medium/high degree of risk. This situation is exacerbated by poor maintenance of existing facilities, inadequate public health education, lack of enforcement of environmental control legislation, increasing urbanization, and investment in potable water supplies which are not matched by expansion of suitable sewerage facilities.

2. 1980 Housing Census

34. The 1980 Housing Census and information from provincial sources provide indicators of sanitation coverage. The 1980 Housing Census presents information on sanitation coverage in terms of access to toilet facilities. The distribution by type of facility is summarized in Table 6. In 1980, 25 per cent of urban households in Pakistan had flush toilets (22 per cent separate, i.e., inside the house or within the compound; and 3 per cent shared), 48 per cent had latrines without flush and 27 per cent had no toilet facilities at all.

Table 6. Sanitation Coverage in Urban Areas by Province in 1980
(per cent of households)

Toilet Facility	Punjab	Sind	NWFP	Baluchistan	Islamabad F.A.	All Urban
Flush	17	40	12	11	63	25
- Inside	15	36	11	10	60	22
- Shared	2	4	1	1	3	3
Latrines	49	44	55	63	1	48
- Inside	42	38	49	54	1	41
- Shared	7	6	6	9	-	7
None	34	16	33	26	36	27
Total	100	100	100	100	100	100

Source: 1980 Housing Census, Population Census Organization, May 1982.

35. The provincial distribution shows that Sind (40 per cent) and Islamabad F.A. (63 per cent) had the highest proportion of housing units served with flush toilet facilities. Latrines (without flush) were predominant in all four provinces with the exception of Islamabad F.A. Finally, about one-third of households had no sanitation facilities, with the exception of Sind (18 per cent). Variations between different urban centers within each province is presented in Appendix 4.

3. 1988 Coverage Estimates

36. In terms of urban sanitation coverage, the Government's definition includes only conventional sewerage systems and the concrete surface drains which are designed to convey wastewater away from the central urban areas. The Physical Planning and Housing Section of the Ministry of Planning and Development estimates that service coverage under this definition has increased from 48 per cent of the urban population in 1983 or 52 per cent in 1988, i.e., covering a population of 17.4 million. The provincial breakdown of this estimate is difficult to determine because of the paucity of reliable data and the problems of identifying what proportion of the urban population is served by the open drainage systems. Based on the partial data available to the Consultants, the site visits and other reports, indicative estimates have been prepared for 1988. These are presented in Table 7 (see also Appendix 4). The estimates in Table 7 indicate that Punjab had 50 to 55 per cent coverage, Sind 55 to 60 per cent, NWFP 35 to 40 per cent, and Baluchistan 30 to 35 per cent.

Table 7. Indicative Estimate of Urban Sewerage and Drainage Coverage by Province in 1988

Province	Urban Population (million)	Population Coverage	Coverage (%)
Punjab	18.5	9.2-10.2	50-55
Sind	11.5	6.3- 6.9	55-60
NWFP	2.3	0.8- 0.9	35-40
Baluchistan	0.9	0.30	30-35
Islamabad F.A.	0.3	0.25	85-90
Total	33.5	17.4	52

Sources: (i) Estimates of Study Team based on partial information, 1989
(ii) PP&H Section, Ministry of Planning and Development, 1989.

4. Public Health

37. The diseases which are associated with water and filth and the absence of personal, domestic and community hygiene are present in all parts of the country, in urban and rural areas. Whether urban and rural residents are more severely affected is not easy to determine because the morbidity and mortality data reported by district hospitals and other local sources do not generally distinguish between urban and rural patients. Some local medical

officers have pointed out, however, that rural outpatients are usually treated in rural health centers and that the hospital outpatients data therefore relate mainly to urban residents. It may be that large urban or metropolitan districts have higher than average incidence of these diseases. Evidence of this is found in the figures reported in 1981 from one province (Punjab) which showed significantly higher morbidity and mortality from these diseases in the districts having largest urban centers.

38. The proportion of urban residents who have access to piped water systems and who have toilets in their house is relatively high. The health benefits of these facilities is taken for granted and has not been clearly demonstrated. Data from the 1982-1983 National Health Survey records the level of general morbidity (i.e., sickness reported by the residents who were questioned) among users and non-users of piped water and among users and non-users of toilets. These data show that in both urban and rural areas the users of toilets were healthier than non-users of toilets. With respect to drinking water, the users of piped water were healthier than the users of other sources in Baluchistan and NWFP, while it is surprising to note that in Punjab and Sind, the users of piped water were less healthy than users of non-piped water (Health Survey 1982-1983).

39. Countrywide morbidity and mortality due to water-borne and water-related diseases is high. Nearly 40 per cent of all urban mortalities are due to water-borne diseases. Available statistics do not show that any significant reduction in these rates has occurred following the increased coverage with public water supply and sanitation systems that has been accomplished since the start of the International Drinking Water Supply and Sanitation Decade (IDWSSD) in 1980. The Consultants consider that the continued prevalence of water-borne diseases in Pakistani towns is not only due to incomplete coverage by public water supply and sewerage facilities, but is also due to the inadequate repair and maintenance of the facilities and incorrect usage. Inadequate operation and maintenance is due in part to the weakness of municipal technical services. Even more significant may be the absence of effective measures to: (a) inform the public - including school children and public officials - about the importance of clean drinking water and hygienic waste disposal, and support their household and community efforts to improve matters; (b) protect drinking water sources; (c) disinfect drinking water supplies; and (d) monitor the purity of the water which is distributed to the public. The public health authorities at local, provincial and national levels need to exert their authority to organize and institutionalize such measures.

F. Established Service Criteria and Comments

1. Availability of Water

40. In all towns, water is supplied intermittently. It is a custom in most towns to make water available three times a day for a total of about six hours.

Comment: The aim should be that water be available to all consumers 24 hours a day at adequate pressure.

2. System Capacity

41. Most urban water supply systems are designed to produce a nominal quantity of 30 to 10 gallons per capita per day (gpcd) for the estimated population 20 years in the future, including non-revenue-water. The design population is usually underestimated. Well production is calculated on the rated capacity of pumps which is generally higher than the actual capacity. On the other hand, the pumps are designed to operate only a part of the day. Non-revenue water accounts for up to 60 per cent of water produced. The Consultants estimated that schemes were apparently able to produce 15 to 20 gpcd, including allowance for non-revenue-water, for about 10 years after construction.

Comment: In households with piped water connections, which are served by sewerage or open drains (about 22 per cent of households in the 1980 Housing Census), it is desirable for health reasons that water used for domestic and household consumption and hygiene should reach about 20 gpcd. In households with piped water connections, but without provision for wastewater disposal, it is unlikely to exceed 10 gpcd (about 16 per cent in 1980). For households served by standpipes or other sources from which water has to be carried, water consumption is not likely to exceed 5 gpcd. The latter applied to about 62 per cent of the urban population in 1980.

3. Minimum Pressure

42. The distribution systems are designed to maintain 30 feet minimum pressure to consumers. Since the distribution systems are seldom looped and utilize small diameter mains at the town periphery, the normal extensions of distribution systems result in low pressures after only a few years.

Comment: Systems should be designed to ensure availability of water at adequate pressure.

4. Water Tariff

43. In most of the large cities water rates are based on house or plot size, or property value. All other urban centers in Pakistan charge a flat rate of Rs6 to 25 (\$0.3 to \$1.25) per month.

Comment: Water supplied through a piped connection should be metered and charged for according to the quantity used. Water consumption above 20 gpcd should be considered a luxury and should be charged according to a progressive tariff.

5. On-Site Excreta and Wastewater Disposal

44. On-site disposal is practically unused in urban areas of Pakistan. Some officials consider it unsuitable and unacceptable. There are no criteria controlling on-site disposal.

Comment: On-site disposal could be adopted as an appropriate cost-effective solution in areas where soil conditions are suitable, where population density allows it and where people do not use wells. On-site disposal is a practical means of reducing investment and maintenance costs, as well as the present hazards of uncontrolled excreta and wastewater disposal.

6. Solid Wastes and Nightsoil Disposal

45. Refuse is defined as including human excreta in existing legislation, but there are no specific regulations to control collection and disposal. Towns handle the collection and disposal of both refuse and human excreta in the same way and they are frequently mixed.

Comment: Excreta should be officially excluded from municipal solid wastes. Procedures should be optimized and standardized for separate collection and hygienic disposal of both municipal solid wastes and nightsoil, including the designation and proper operation of sanitary landfills.

7. Public Sewage Collection and Disposal

46. There are no established criteria governing the discharge of household excreta and wastewater. Typically, street drains are designed to carry household sewage to collector drains or sewers, and sewers are designed to carry sewage for direct discharge to a natural watercourse or in some cases a treatment plant. The disposal works are designed to screen out debris, collect the wastewater for a short time, and pump it to adjacent streams or to fields for farming.

Comment: Standards should be established to exclude the flow of sewage from open drains in the new systems and phase it out in old systems. The use of untreated sewage in farming should be restricted.

8. Sewage Treatment

47. There are no established standards and practically no operating treatment works, except in Karachi and Islamabad.

Comment: Where treatment is required, simple systems like waste stabilization ponds should be considered.

9. Stormwater Drainage

48. There are no regulations governing the disposal of stormwater. Natural stormwater drainage in most towns have been obstructed by unplanned urban development. The resulting stormwater collections are allowed to remain or are channeled into street drains and sewers, which are not dimensioned for stormwater flows, causing frequent overflows.

Comment: Standards should be established for stormwater collection and disposal, which will avoid serious or continued flooding of urban areas.

G. Future Demand and Coverage Targets

49. The Seventh Five-Year Plan 1988-1993 and Perspective Plan 1988-2003 sets out clearly the targets for the urban water supply and sanitation for the next 15 years. The targets are:

- (i) Water Supply - coverage to be increased from an estimated 80 per cent in 1988 to 95 per cent by 1993, with 100 per cent coverage in metropolitan and secondary cities and about 70 per cent in other urban centers. By the year 2003, coverage is targeted at 100 per cent.
- (ii) Sewerage/Drainage - coverage to be increased from an estimated 52 per cent in 1988 to 70 per cent by 1993, with 100 per cent coverage in metropolitan and secondary cities and about 50 per cent coverage in all other urban centers. The target for the year 2003 is 100 per cent coverage.

50. The provincial distribution of these targets is summarized in Table 8. In the period 1988-1993, the urban population covered is projected to increase by 13.6 million for water supply and 12.4 million for sewerage/ drainage. Over the following 10 years (1993-2003), a further 20.8 million will need to be served with potable water and 31.2 million with sewerage/ drainage. The approximate provincial distribution of the additional and present unserved population to be covered for both water supply and sewerage/drainage is: Punjab-58 per cent, Sind-32 per cent, NWFP-6 per cent, Baluchistan-3 per cent, and Islamabad F.A.-1 per cent.

51. The targets presented in Table 8 represent the Government's perception of the felt needs of the urban population and the level of development required to improve the provision of basic services. The Government has estimated the cost of the program for the Seventh Five-Year Plan 1988-1993 at Rs15.9 billion (\$795 million), of which water supply accounts for Rs8 billion (\$400 million), or 50.3 per cent and sewerage/drainage for Rs7.9 billion (\$395 million) or 49.7 per cent. ^{1/} There is unofficial concern that these sums may underestimate the real investment requirements and that Government may be unable to meet its full contribution because of resource constraints and competing pressures on the public sector investment program, which has been set at Rs350 billion (\$17.5 billion) in the Seventh Plan. There are also a number of other constraining factors which suggest that the physical targets should be modified to provide more manageable objectives.

^{1/} These investments which correspond to \$29.41 per capita for water supply and \$31.85 per capita for sanitation are too low compared with Bank estimates, at 1985 prices, of \$40-80 per capita for both urban water supply and sanitation projects.

These factors are:

- (i) In previous Five-Year Plans, the estimated achievement in urban coverage has been consistently below the plan target:

	Fifth Plan 1978-1983 (%)	Sixth Plan 1983-1988 (%)
Water Supply		
- Target	81.5	90
- Achievement	77	80
Sewerage/Drainage		
- Target	51	60
- Achievement	48	52

The under-performance has been due to implementation delays and cost overruns.

- (ii) Within the sector, the present management and organization structure is inadequate to cope with the rate of implementation which would be required. This is particularly so at the provincial level (e.g., PHEDs) where the current emphasis is focused on the rural sub-sector.
- (iii) The high cost, besides creating funding problems at the Federal and Provincial levels, would also impose considerable strain on local government finances. Most municipal corporations and town committees do not generate sufficient resources to finance the local project component. This problem will not be fully resolved in the short term.
- (iv) Inadequate cost recovery has created serious funding problems within the sector. If the Government adheres to its stated objective of full cost recovery, there may well be some initial consumer resistance which will test the political resolve of the authorities. For the urban poor, there is also a need for effective low-cost solutions which they are able to afford.

52. The financing constraints within the sector are exacerbated by the fact that many urban water supply and sewerage systems are in a poor state of repair and require considerable rehabilitation to bring them back to a reasonable standard of efficiency.

Table 8. Official Coverage Targets - Urban Water Supply and Sewerage/Drainage 1993 and 2003

	Punjab	Sind	NWFP	Baluchistan	Islamabad F.a.	Total
<u>Urban Population (million)</u>						
1988	18.5	11.5	2.3	0.9	0.3	33.5
1993	23.5	14.4	2.8	1.1	0.1	42.9
2003	34.0	20.8	4.1	1.6	0.5	61.0
<u>Water Supply Coverage (%)</u>						
1988	75	85	81	80	90	80
1993	95	96	93	91	100	95
2003	100	100	100	100	100	100
<u>Additional Population Covered (million)</u>						
1988-1993	8.5	4.0	0.7	0.3	0.1	13.6
1993-2003	11.6	7.0	1.5	0.6	0.1	20.8
Total	20.1	11.0	2.2	0.9	0.2	34.4
<u>Sewerage/Drainage Coverage (%)</u>						
1988	50	60	35	30	90	52
1993	64	82	68	75	100	70
2003	100	100	100	100	100	100
<u>Additional Population Covered (million)</u>						
1988-1993	5.8	4.9	1.0	0.6	0.1	12.4
1993-2003	19.1	9.0	2.2	0.8	0.1	31.2
Total	24.9	13.9	3.2	1.4	0.2	43.6

Sources: (i) Seventh Five-Year Plan 1988-1993 and Perspective Plan 1988-2003, Planning Commission, 1988.
(ii) Study estimates, 1989.

53. In the light of these constraints, a revised set of targets has been prepared which could be achieved under the following key assumptions:

- (i) The Government will actively introduce the Study's recommendations for institutional strengthening, training, and full cost recovery;

- (ii) Greater emphasis will be given to low-cost solutions, particularly for the urban poor. These may include: supply of water through community standpipes instead of house connections for those urban areas where metered house connections can only be a long-term target; self-help sanitation/sewerage solutions, e.g., sanitary on-site disposal or small bore sewerage systems connecting to the main network - similar to the Orangi area in Karachi.
- (iii) Water and sewerage authorities/departments in all urban centers of Pakistan will improve the maintenance of existing assets to secure reasonable increase in efficiency and performance. Improved utilization of existing assets may be more cost effective than new construction, e.g., reduction in percentage of non-revenue-water and systematic clearing of sewers and drains.
- (iv) Effective steps will be taken to promote community participation and public education within the sector.

54. The proposed revised targets are illustrated in Table 9. For the target year of 1993, water supply coverage has been reduced from 95 per cent to 87 per cent and sewerage/drainage from 70 per cent to 63 per cent. The additional population to be covered is therefore reduced for the Seventh Plan period: water supply from 13.6 million to 10.2 million; and sewerage/drainage from 12.4 to 9.3 million. The investment implications of these revised coverage targets are, for the five-year period (1988-1993), that investment cost for urban water supply and sewerage would amount to Rs13.3 billion (\$665 million) at 1989 constant prices (for details see Section IV.C).

Table 9. Revised Coverage Targets - Urban Water Supply and Sewerage/Drainage 1993 and 2003

	Punjab	Sind	NWFP	Baluchistan	Islamabad F.A.	Total
<u>Urban Population (million)</u>						
	18.5	11.5	2.3	0.9	0.3	33.5
1993	23.5	14.4	2.8	1.1	0.4	42.3
2003	34.0	20.8	4.1	1.6	0.5	61.0
<u>Water Supply Coverage (%)</u>						
1988	75	85	81	80	90	80
1993	85	90	86	85	95	87
2003	100	100	100	100	100	100
<u>Additional Population Covered (million)</u>						
1988-1993	6.1	3.2	0.6	0.2	0.1	10.2
1993-2003	14.0	7.8	1.6	0.7	0.1	24.2
Total	20.1	11.0	2.2	0.9	0.2	34.4

Sewerage/Drainage Coverage (%)

1988	50	60	35	30	90	52
1993	60	70	55	55	95	63
2003	100	100	100	100	100	100

Additional Population Covered (million)

1988-1993	1.9	3.2	0.7	0.1	0.1	9.3
1993-2003	20.0	10.7	2.5	1.0	0.1	34.3
Total	21.9	13.9	3.2	1.1	0.2	12.6

Sources: (i) Seventh Five-Year Plan 1988-1993 and Perspective Plan 1989-2003, Planning Commission, 1988.
(ii) Study Estimates, 1989.

III. SECTOR DEVELOPMENT APPROACH

A. General

55. Substantial changes are required in the Government's approach to the development of the urban water supply and sanitation sector at the Federal, Provincial and Local levels. The proposed changes concern the institutional structure, organization and financial management of the sector. There is also a need for sustained political commitment to a realistic sector policy which emphasizes efficiency and cost-effective performance. The Government is well aware of the steps which need to be taken, but a concerted effort is required to implement them. The Consultants' proposals are laid out in the sections below.

B. Sector Policy Framework

56. Certain principles relating to urban water and sanitation ought to be stated as national policy. The Consultants consider that these principles should include: (a) the elected urban local authorities, which are already legally responsible for urban water supply and sanitation should assume their responsibilities in practice to the extent possible; (b) every public water supply system should deliver safe water to consumers, and should deliver it, as far as practicable, 24 hours a day at an adequate pressure; (c) all piped water connections, where water is delivered 24 hours a day, should be metered and water should be charged for by measured quantities used in accordance with stepped tariff; (d) every urban water supply and sanitation service should be self-financing, i.e., should cover costs of operation and maintenance, depreciation and debt servicing; (e) every public waste disposal system should avoid contact between wastes and people and should remove wastes from the town area and discharge them in a hygienic and nuisance-free manner; and (f) natural surface and ground waters should be adequately controlled and protected from pollution. Each province should evolve and codify a policy to guide the development of sector services and the allocation of resources to cities and towns.

C. Institutional Structure

1. Institutional Arrangements at Federal Level

57. At the federal level, the urban water supply and sanitation sector's responsibilities and activities should include the support - through the provincial government - to the local authorities which are responsible for the provision of water supply and sanitation services in the urban areas. More specifically: (a) preparation of national policies for the sector; (b) enactment of the necessary laws; (c) collection of information necessary for the formulation of policies; (d) assistance to the sector in the exchange of experiences; (e) assistance to the sector agencies with staff training and development through coordination; (f) assistance to the sector with public information and education to promote public awareness of its responsibilities and public involvement; (g) assistance in promoting the standardization of materials, equipment and methods employed in the sector; (h) assistance to the sector agencies in the selection of supporting services, i.e., consulting services, contractors and manufacturers with experience in the sector; (i) monitoring of sector performance; and (j) preparation of a national annual report about the state of the sector based on the provincial reports.

58. The Environment and Urban Affairs Division (EUAD) of the Ministry of Housing and Works which is already handling some of these responsibilities should be strengthened and equipped to perform the modified responsibilities. At present, the unit of EUAD dealing with the urban water supply and sanitation sector does not even have a name. The Consultants propose that it should be called the Urban Water Supply and Sanitation Wing (UWSSW) and should consist of about 6-8 professionals. To avoid unnecessary bureaucracy, the UWSSW, entrusted with these responsibilities, should be strengthened by the creation of a Sector Advisory Panel (the Panel) comprising of prominent national experts. Details of the Panel and qualifications and experience expected from its members are given in paras. 40 to 42 of Appendix 7. The Panel, working in honorary capacity - only with a reimbursement of expenses - would provide, when necessary, advice to the UWSSW on matters relating to national sector policies and to institutional, technical and financial aspects.

2. Institutional Arrangements at Provincial Level

59. The main responsibilities for the sector at the provincial level should be: (a) control of the performance of urban local authorities concerning water supply and sanitation; and (b) support to local authorities. These responsibilities, which are discussed in greater detail in Appendix 7 paras. 31 to 37, should also include:

- (i) establishment in the province of sector policy and legislation;
- (ii) assistance to the sector in the province with public information and education to promote public awareness and involvement;
- (iii) monitoring of sector performance in the province including annual inspection of all local authorities' water supply and sanitation facilities and services;
- (iv) assistance to local authorities, if needed, in the preparation of terms of reference and scope of work for hiring of consulting services;
- (v) assistance to local authorities and their agencies for staff development and training;
- (vi) collection of statistics relating to urban water supply and sanitation in the province, preparation of annual summaries of these statistics for use at federal level and preparation of an annual report about the state of the sector in the province; and
- (vii) using development plans prepared by the local authorities to prepare a provincial development plan for water supply and sanitation.

60. In the light of the legal responsibilities and recommended growing involvement of local authorities in their water supply and sanitation, the Provincial Governments should reassess their own role in the sector which should gradually shift from direct participation in planning, design and operation and maintenance to support and assistance to urban local authorities.

61. The Public Health Engineering Department(s) (PHED) should be strengthened to undertake the additional responsibilities for the urban water supply and sanitation sector. The Consultants consider that the PHEDs, in addition to their responsibilities for the rural sector, could perform most of the provincial level responsibilities for the urban sector. These responsibilities should include: (a) inspection, once a year, of urban water supply and sanitation facilities and services in all urban centers; (b) preparation for the inspected local authorities of the situation reports based on these inspections, with recommendations for necessary action; (c) preparation of the annual provincial urban water supply and sanitation sector report based on the inspection reports. The provincial reports, which will include recommendations to the Provincial Governments for the necessary action and assistance to improve performance of the sector, will be submitted to the Federal Government for evaluation of the situation on the national scale and, if necessary, for review of policies and legal support; and (d) assistance to the local authorities, if needed, in the preparation of the terms of reference and scope of work for consulting engineers and in evaluation of the Consultant's recommendations. Some of these services should be provided on commercial basis. The staff necessary for the performance of these responsibilities could be obtained by gradually phasing out the PHED's engineering activities, which should be carried out, as far as practicable, by consulting firms.

62. In line with the recommendations that the urban local authorities should be responsible for water supply and sanitation in their areas (see subsection Local below), the Consultants recommend that the semi-autonomous Water Supply and Sanitation Agencies (WASAs), of Lahore, Hyderabad, Faisalabad, Multan, Quetta and Peshawar should become the property and responsibility of their respective local authorities. The local authority, as the owner, should appoint all the directors to the Board of Directors of WASA who will ensure that the policies and objectives of the council are carried out by the management. However, the management of WASAs will have to be free, within the law and council's by-laws, to operate effectively in order to achieve the stated policies and objectives of the elected local authority. The implementation of this recommendation will ensure people's participation, through their elected representatives: (a) in the decision-making process about development and operation of their water supply and sanitation facilities; and (b) in sharing responsibilities for these facilities, including financial responsibilities.

3. Institutional Arrangements at Local Level

63. Local authorities are responsible, in law, for water supply and sanitation in their areas. Under the 1979 Local Authorities Ordinances, all local authorities are elected. There are about 400 urban centers in Pakistan, with towns and cities ranging in size from 5,000 to about seven million people. Local authorities can be metropolitan or municipal corporations in the cities, municipal committees in the intermediate towns, and town committees in smaller towns. A number of urban centers contain areas called cantonments, which are not under the jurisdiction of the local authorities because of military presence in these areas. The cantonments, which may have as much as 40 per cent of the town population, are under federal jurisdiction through the Ministry of Defense, even if a substantial portion of the population is civilian. In these areas, responsibility for water supply and sanitation rests with the Cantonment authorities.

61. As already said, in some large cities, certain functions of local authorities placed under the jurisdiction of Development Authorities, or Water and Sanitation Agencies (WASAs), which are responsible to the Provincial Governments: Islamabad, the capital city, has a unique urban management system responsible directly to the Federal Government.

65. All the cities and towns have one common problem of inadequate and unsafe water supply and sanitation. The condition of water supply and sanitation is a particularly sensitive issue and causes great hardship to the majority of the urban population.

66. Although local authorities are responsible for water supply and sanitation, with the exception of cities with WASAs, in reality they are incapable at present of fulfilling these responsibilities. There are many and complex reasons for this situation, some of which are compounded by institutional shortcomings and by inability to levy adequate taxes, with the exception of tax called octroi. ^{1/} The financial difficulties of urban local authorities can be explained by the imbalance in revenues and expenditures between different levels of government as shown in Table 7.1 of Appendix 7. The imbalances are partly alleviated by revenue and capital grants from the Federal to the Provincial Governments and from the Provincial Governments to local authorities. This system actually contributes to disinclination of the local authorities from performing their responsibilities. Uncertainties of transfer of resources from one level to another also affect financial planning and management, accountability and efficiency.

67. Also, as a result of their financial difficulties, local authorities cannot provide favorable working conditions to attract and maintain the required professional staff. The problem is generally solved by the Provincial Governments which make available to the local authorities some professional staff from the Provincial Local Services. These officers are paid by local authorities which, however, have no jurisdiction over them.

68. The urban local authorities should be encouraged and assisted, inter alia, to: (a) create an administrative unit with permanent staff responsible for all aspects of water supply and sanitation, including operation and maintenance; and (b) set up suitable financial registers and accounts and establish financial management for water supply and sanitation revenues and expenditures. Detailed proposals to strengthen local authorities are discussed in Appendix 7 paras. 38 and 39.

69. Because local authorities are elected, they are best qualified to represent the users of water supply and sanitation services. The development of the urban water supply and sanitation sector should, therefore, commence by strengthening local authorities to enable them to carry out their legal responsibilities. This requires a political decision at the highest level, which may have to be followed up by review and, if necessary, by amendment of existing laws, rules and regulations.

^{1/} A levy on all commodities brought into the municipal limits, whose collection is the responsibility of the Town Committee.

D. Financial Aspects

1. General

70. Financial aspects are a crucial component in the development of efficient and effective urban water supply and sanitation services in metropolitan cities (like Karachi and Lahore) and in small urban communities (like Liaquatpur in Punjab and Dahdar in Baluchistan) as well. Financial proposals for the development of the sector have been divided under three main headings:

- (i) Financial Management and Planning
- (ii) Cost Recovery and Tariffs
- (iii) Financing

71. The conclusions are drawn from the Team's knowledge of the sector in Pakistan and the detailed investigations carried out in the four provinces and the four major cities.

72. It must be stated at the outset that financial discipline and viability within the sector will depend on efficient financial management, appropriate tariff levels and adequate funding. This will require a real sustained political commitment at the federal, provincial and local levels, particularly on the question of regular adequate tariff increases. Without this commitment, urban water supply and sanitation services will continue to lurch from one financial crisis to the next.

73. In this context, it is worth quoting several important policy issues which are stated in the Seventh Five Year Plan 1988-1993, as follows:

"Full recovery of capital and operation and maintenance cost will be made through levy of user charges in order to eliminate subsidies and enable the project to pay for itself. In order to enable the concerned agencies to implement and operate the system efficiently, reduce the burden of payment of loans as well as keep user charges within reasonable limits, the capital costs of projects needs to be minimized. For this purpose, the following measures will be considered:

- (i) Domestic loans for water supply and sewerage projects will be available at concessional rates;
- (ii) External loans will be passed to the executing agencies by Federal Government at the same rate as actually charges by foreign donor agencies;
- (iii) Machineries/equipment/plant required for the projects will be exempt from customs duty; and
- (iv) Electrical power for operating water supply/drainage systems will be charged at the same concessional rate as applicable to irrigation tubewells."

74. Similar statements of policy were made in the Sixth Five-Year Plan 1983-1988. The Sixth Plan also stated that:

"Metering of supplies to be introduced in all cities to discourage wastage and tariff so regulated as to provide for progressively increasing rates for higher consumption of water."

75. These statements indicate that the Federal Government has a clear understanding of the financial problems facing the sector. However, the general policy objective of instilling greater financial discipline in the sector has not been effectively implemented.

2. Financial Management and Planning

76. Greater emphasis should be placed on improved financial management and planning to ensure that optimum use is made of existing assets, proposed new investments are fully justified, and user charges are adequate and affordable. Effective financial planning depends on an accurate financial and technical data base incorporated into a suitable management information system.

77. The Government should set specific financial targets and objectives for agencies and local government institutions operating in the sector. The targets should specify that agencies should produce revenues sufficient to permit full cost recovery (including operation and maintenance costs, depreciation and debt service in excess of depreciation). At present, only semi-autonomous agencies like WASA Lahore, have such financial targets laid down in their legislation. These are often complemented by specific financial covenants in loan agreements with international lending agencies like ADB and the World Bank. It should be noted that even in these cases, most of the financial targets are not being satisfied. The introduction of financial performance targets will require specific legislation to amend the appropriate sections of Provincial Local Government Ordinances. However, the introduction of such amendments will only be effective if there is a real political will at all levels of Government to support and enforce the performance targets.

78. There is a need for improved accounting and financial management systems. Sector institutions in Karachi, Lahore, Hyderabad and Faisalabad have or are continuing to receive international support in the form of studies and training to introduce double-entry commercial accounting and appropriate financial management systems. The rest of the sector, including Rawalpindi, Islamabad and all the other cities and towns throughout Pakistan, continue to operate a single-entry accounting system which is not conducive to adequate financial control nor the production of realistic balance sheets and revenue-expenditure statements. It is recommended that the Government should commission a consultancy study to prepare an accounting manual and financial management system which would treat water supply and sewerage/sanitation operations as a separate cost center. This should be supported by a series of training seminars at provincial and divisional levels to instruct accounting officers in the use of the manual and related systems. The results would provide local authorities with the real costs of operating their systems and assist them in financial planning and calculation of appropriate tariff levels.

79. More attention should be given to realistic financial planning both in terms of annual budgeting and future investment programming. This planning process would determine the tariff levels required in relation to a predetermined maintenance and investment program that will provide an improved service to a the local urban community. The plans should be conceived as dynamic and not static instruments, with annual monitoring and updating to take account of the latest changes. These proposals will also require a substantial improvement in the reliability and accuracy of information on the physical and financial operation of existing water supply and sewerage services. At present, most urban communities are constrained by the financial limitations of their annual budget and their provincial Annual Development Programme (ADP). If water and sewerage services become more financially self-sustaining, as proposed, then more realistic financial planning should be possible.

3. Cost Recovery and Tariffs

80. Cost recovery is one of the crucial issues in the development of efficient urban water supply and sanitation services. This fact is recognized at all levels of Government. The basic principle of cost recovery has been clearly set out in the Seventh Five-Year Plan 1988-1993 and the Sixth Five-Year Plan 1983-1988. However, none of the relevant political authorities at the Federal, Provincial or Local levels have shown the willingness or commitment to achieve this objective in the short or medium term. In the large urban areas with semi-autonomous agencies, applications for tariff increases are subject to final approval by their Board of Directors, the local municipal/metropolitan corporations and the Provincial Government. The political influences at each stage often result in postponement, reduction and/or cancellation of proposed tariff increases. This leads to increasing financial losses which can result in default on debt obligations, greater reliance on subsidies and a decline on the service provided. Table 10 illustrates the tariff increases required to cover all annual operating costs (including depreciation and interest charges) in four major cities from 1984 to 1988. In Karachi and Lahore, the required increases have ranged between 40 and 60 per cent.

81. The situation is more critical in Rawalpindi and Islamabad where tariff increases of more than 200 per cent would be required to cover direct operating cost alone (excluding depreciation and interest payments, both of which are not properly recorded under the existing accounting system).

Table 10. Tariff Increases Required to Cover Annual Operating Costs
Water and Sewerage Services in Selected Cities
(per cent)

City	1984/85	1985/86	1986/87	1987/88
Karachi a/	53	44	41	65
Lahore a/	18	41	54	44
Rawalpindi b/	221	428	274	376
Islamabad b/	312	252	343	171

Note: a/ Includes depreciation and interest charges
b/ Excludes depreciation and interest charges

Source: EUAD, 1989.

82. The financial position in Rawalpindi and Islamabad is duplicated in most urban centers throughout Pakistan. Therefore, local and provincial governments have to provide the necessary subsidies to cover the shortfall.

83. The situation is exacerbated by three other factors:

- (i) Collection of arrears - there is little or no control over the collection of arrears, with the exception of KWSB (Karachi) and WASA (Lahore) where a concerted effort is being made. There is an urgent need for accurate records and rigorous pursuit of outstanding bills through an active disconnection program and legal enforcement.
- (ii) Non-revenue water ^{1/} - water losses are a serious problem in urban water supply systems throughout Pakistan. Accurate figures are not available, but it appears that losses of 50 per cent and more are not uncommon. This represents a substantial financial loss both in terms of the additional operating costs which have to be expended and the lost revenue. Few of the sector agencies seem to be fully aware of this situation or of the need to formulate an action plan to reduce these losses. The issue should be addressed through adoption of simple leak detection programs, well planned repair and replacement schedules, bulk water metering of production sources, of main service areas and of major consumers, plus improved maintenance and construction standards. This will require a sustained program over a number of years with target losses of say 20 to 25 per cent. It should be remembered that effective loss reduction will also be a saving in future investment costs. Education of the public towards repair of leaking plumbing facilities, economic use of water, reporting of burst water mains, etc., which are all facets of loss reduction, must be pursued more rigorously.
- (iii) Sewerage charges - sewerage services suffer from inadequate financing. In most urban areas there are no specific sewerage charges. Sewerage can impose high operating costs (particularly in terms of depreciation and debt service charges) and often accounts for a large proportion of the financial deficit of water and sewerage operations in the urban sector. WASA Lahore instituted a specific sewerage charge in February 1988 and KWSB (Karachi) is expected to follow suit in 1990. Both are or will be levied as a surcharge on the water rates. The problem of sewage disposal and environmental pollution will accelerate with increasing urbanization. Therefore, the Government (Federal, Provincial and Local) should actively consider instituting sewerage charges in all urban centers throughout Pakistan as part of the process of making the sector financially self-sufficient.

84. Water tariff systems vary in the urban sector. In the larger cities, particularly those with semi-autonomous agencies, a stepped tariff structure is used for unmetered connections based on annual rental values (Lahore),

^{1/} Non-revenue water also includes water distributed free to schools, mosques, and public standpipes.

connection size (Rawalpindi) and ground floor or plot size (Karachi and Islamabad). Metered connections are generally charged on a flat rate basis by consumer category, ranging from a minimum of Rs3.6 per 1,000 gallons in Islamabad to a maximum of Rs11.3 per 1,000 gallons in Lahore. In most of the other urban areas, water rates are levied on a simple flat rate basis of: Punjab Rs6 to 25 per household per month; Sind Rs6 to 20 per household per month; NWFP Rs25 per household per month; and Baluchistan Rs5 to 20 per household per month.

Table 11. Current Water Rates in Selected Urban Centers

Urban Center	Date of Last Tariff Increase	Domestic		Metered Connections by 1989 (%)
		Unmetered (Rs/month)	Metered (Rs/1,000 gal)	
<u>Punjab</u>				
Lahore	Feb 1988	19 to 60 a/	6 to 11.3	18
Rawalpindi	Dec 1980	12.5 to 133 b/	5	3
Other Centers		6 to 20 c/	none	none
<u>Sind</u>				
Karachi	Oct 1985	7.5 to 187 d/e/	5.5 to 9	none
Hyderabad		24 to 80 b/	5 to 8	
Other Centers		6 to 20 c/		
<u>NWFP</u>				
Peshawar		25 c/		none
Other Centers		25 c/	none	none
<u>Baluchistan</u>				
Quetta		5 to 15 b/	none	none
Other Centers		5 to 20 c/	none	none
<u>Islamabad</u>	Apr 1988	18 to 72 d/e/	3.6 to 6	57

Notes: a/ Based on the annual rental value of the property.
 b/ By size of connection.
 c/ Flat Rate.
 d/ Based on the ground floor area of the property.
 e/ Based on the plot size of the property.

Source: EUAD, 1989.

85. Willingness- and ability-to-pay are important factors in the setting of urban water and sewerage tariffs. There is a perception among decision makers in Pakistan of a low willingness-to-pay on the part of consumers in urban areas. This perception is reinforced by:

- (i) general expectation that provincial and local government will subsidize the services;
- (ii) poor revenue collection procedures;
- (iii) poor level of service, which results in low alternative and often more expensive water sources; and
- (iv) regressive tariff structures which result in low income households having to pay more per unit of water consumed.

86. In 1988, average household income in urban areas in Pakistan is estimated at about Rs3,000 (\$150) per month, which is about 35 per cent above the national average. Table 12 indicates the distribution of urban household income by province. The figures indicate that between 20 and 33 per cent of households are below the official poverty line of Rs1,500 (\$75) per month. A further 36 to 45 per cent are in the middle income group of Rs1,501 to Rs3,000 (\$74 to \$150) per month; while those with more than Rs3,000 (\$150) per month range from 25 to 32 per cent of all urban households. There are no significant variations in the provincial distributions, although Punjab and Baluchistan have a higher proportion of households below Rs1,500 (\$75) per month.

Table 12. Estimated Urban Household Income Distribution by Provinces 1988

Income Group (Rs per month/Household)	Punjab	Sind	NWFP	Baluchistan	All Urban
Lower (below Rs1,500)	32	22	25	35	28
Lower Middle (Rs1,501 to 3,000)	43	46	43	35	44
Upper Middle (Rs3,001 to 4,500)	13	17	17	15	15
Upper (above Rs4,500)	12	15	15	15	13
Total	100	100	100	100	100

Source: Study estimates based on Household Income and Expenditure Survey 1984/85, Federal Bureau of Statistics (see Appendix 10).

87. Indicators of ability-to-pay have been prepared for a range of combined user charges (water and sewerage) as a proportion of household income. Table 13 summarizes the distribution of households for combined average tariffs of Rs40 to 80 per month. An average tariff Rs40 per month would not impose a significant burden on the majority of urban households: for approximately 80 per cent of households, it would constitute less than 3 per cent of income; and for only 3 per cent of household would it account for more than 5 per cent of income. On the other hand, an average tariff of Rs80 would account for more than 5 per cent of income in about 20 per cent of all urban households.

Table 13. Distribution of Urban Households-Average Monthly Water and Sewerage Tariff as Proportion of Household Income 1988

Per cent of Monthly Household Income	Punjab	Sind	NWFP	Baluchistan	All Urban
<u>Tariff of Rs40 per month</u>					
Less than 3%	79	89	84	77	82
3% to 5%	14	10	13	17	11
Above 5%	7	1	3	6	7
Total	100	100	100	100	100
<u>Tariff of Rs60 per month</u>					
Less than 3%	55	67	56	52	60
3% to 5%	35	28	20	36	32
Above 5%	10	5	14	12	8
Total	100	100	100	100	100
<u>Tariff of Rs80 per month</u>					
Less than 3%	36	49	47	40	41
3% to 5%	43	40	38	37	42
Above 5%	21	11	15	23	17
Total	100	100	100	100	100

98. International funding agencies, like the ADB, generally apply a "rule of thumb" measure whereby, "water and sewerage charges should account for no more than 3 to 5 per cent of household income". While such measures are useful as broad indicators, they can be misleading and do not necessarily reflect the consumers' real willingness-to-pay for improved service. It is recommended that appropriate tariff structures for water and sewerage should be prepared for each urban community, which:

- (i) satisfy specific financial objectives;
- (ii) cover the cost of annual operations and maintenance, depreciation and interest charges on debt service; and
- (iii) employ a stepped tariff structure which encourages consumers to economize on their use of the service and reflects their ability-to-pay.

89. More attention should be given to adequate cost recovery and service improvements. This will fulfill three prime objectives:

- (i) to provide the consumer with reliable and adequate water and sewerage services which he/she is willing and able to afford;

- (ii) to promote an efficient and financially viable sector; and
- (iii) to eliminate the need for subsidies from the hard pressed budgets of local and provincial governments.

4. Financing

90. The source and conditions of capital funding for new works and rehabilitation are important topics which have a direct impact on tariffs and the financial viability of the sector. There are three principal sources of capital finance:

- (i) International - multilateral and bilateral agencies allocate capital funds for specific projects to the Government of Pakistan on concessional lending terms or on a grant basis.
- (ii) Government - the provincial and federal government channel capital funds through the Annual Development Programme (ADP) as a loan or a grant.
- (iii) Internal cash generation - small sums may be generated internally by the semi-autonomous agencies and local government bodies.

91. International funds have been concentrated almost exclusively on large projects in the major cities (Karachi, Lahore, Hyderabad, Faisalabad and Quetta). The ADB and World Bank (through the IDA) lend to the Government of Pakistan (GOP) on concessional terms which are passed on under the same conditions to the Provincial Governments who then on-lend on harder terms to the executing agency. The conditions under current loans with the two banks are summarized in Table 14.

Table 14. Current ADB and World Bank Loan Conditions

	Interest Rate (% p.a.)	Grace Period (years)	Repayment Period (years)
<u>ADB</u>			
To GOP	1	10	35-40
Onlending	5	5-7	25
<u>World Bank (IDA)</u>			
To GOP	1	10	40
Onlending	11	6	25

Source: ADB, World Bank, 1989.

92. The on-lending conditions are designed to avoid unnecessary distortions in the local capital market, and to instill more financial discipline and commercial awareness into the sector. However, in the case of WASA Lahore, the exacting World Bank conditions coupled with the Provincial Government's unwillingness to permit adequate regular tariff increases, led to a series of financial crises. These were resolved temporarily by successive reductions in the rate of return on net revalued assets in operation from 8 per cent to 3.5 per cent and more recently (1988) by converting 15 per cent of outstanding Government loans into equity. In order to avoid these periodic adjustments and inject some stability into the situation, it is recommended that the Government should adopt on-lending conditions similar to those in force under current ADB loans to the sector. These conditions have the merit of recognizing the socio-economic importance of improved water supply and sanitation services in achieving net improvements in urban living standards, particularly of the urban poor; while at the same time encouraging the authorities to accept real responsibility for efficient financial management. The incremental funds generated by these on-lending operations should be specifically allocated to support further sector development (i.e., studies, projects, trainings, etc.) within each province.

93. The Government should also promote and encourage increased generation of capital funds within the country. This would instill a greater sense of self-reliance and reduce the foreign debt burden on the sector. The responsible agencies in each urban center should set targets to generate a proportion of the capital funds required for future capital investment projects. In Karachi and Lahore the target is 20 per cent. If urban communities become more identified with their own water supply and sewerage services, and having increasing confidence in improved service delivery, then it is likely that they would be willing to contribute to further investment through an appropriate tariff structure.

E. Budgetary Allocations

94. Successive governments have attached considerable importance to the provision of adequate water supply and sanitation facilities to both the urban and rural population in Pakistan. The main objective has been to maximize coverage at minimum cost regardless of the quality of service and the real adequacy of the facilities to cope with the target populations. It appears that actual investment costs have been underestimated and service coverage overestimated. This situation has led to increasing frustration and some social unrest. Investment allocations to the urban water supply and sanitation sector in the Fifth and Sixth Plan periods accounted for 1.6 per cent and 1.1 per cent, respectively, of total planned public sector investment.

95. Planned investment in urban water supply and sanitation over successive national plans is summarized in Table 15. The percentage allocation of the public sector investment program has remained more or less stable at between 1.1 and 1.6 per cent over the last 20 years. The combined per capita costs for both water supply and sanitation also appear to be an underestimate in terms of the additional population to be served: Fifth Plan Rs182 per capita and Sixth Plan Rs201 per capita. Preliminary figures indicate that actual sector investment during the Sixth Plan (1983-1988) was between Rs3.5 and 4.5 billion (10 to 40 per cent higher) and the estimated additional population covered was 6 million in water supply and 4.5 million in sewerage (35 per cent lower).

Table 15. Public Sector Investment in Urban Water Supply and Sanitation - National Plan Allocations

National Plan	Planned Investment		Planned Additional Population Served	
	UWSS (billion)	% Total Investment	Water Supply	Sanitation
			(million)	
First 1955-1960	0.23	1.7	n.a	n.a
Second 1960-1965	0.18	1.7	0.8	0.4
Third 1965-1970	0.09	0.7	1.6	0.8
Non-Plan Period 1970-1978	1.19	1.6	10.3	6.0
Fifth 1978-1983	2.38	1.6	7.5	5.6
Sixth 1983-1988	3.21	1.1	9.0	7.0

Source: Sixth Five Year Plan 1983-1988, Planning Commission, Oct. 1983.

96. Analysis of actual investment expenditures under the Provincial Annual Development Programme (ADP) during the Fifth and Sixth Plans clearly indicates that allocation of available investment funds has shifted in favor of the rural areas. Table 16 summarizes the consolidated figures by province. The urban share of investment in the water supply and sanitation sector declined from 35.9 per cent in the period 1978-1983 to 27.4 per cent in 1983-1988. This trend was reflected in all provinces with the exception of NWFP where the share rose slightly. Punjab and Sind had the highest level of expenditure reflecting the on-going investment in the four largest cities of Karachi, Lahore, Faisalabad and Hyderabad. The proportion of total ADP allocations to the sector remained more or less stable between the two periods.

Table 16. ADP - Actual Capital Expenditure by Province 1972-1988
(Rs million)

	Punjab	Sind	NWFP	Baluchistan a/	Total
<u>Fifth Plan 1972-1983</u>					
Total ADP	12,607	5,351	1,118	n.a.	22,076
Water Supply & Sanitation	825	433	399	n.a.	1,657
- Urban	303	239	53	n.a.	595
- Rural	522	194	316	n.a.	1,032
Urban as % of:					
- WSS	36.7	55.2	13.2	n.a.	35.0
- Total ADP	2.4	4.5	1.3	n.a.	2.7
<u>Sixth Plan 1983-1988</u>					
Total ADP	26,144	10,524	8,528	n.a.	45,196
Water Supply & Sanitation	2,448	1,150	743	n.a.	4,341
- Urban	551	511	129	n.a.	1,191
- Rural	1,897	639	614	n.a.	3,150
Urban as % of:					
- WSS	22.5	44.4	17.4	n.a.	
- Total ADP	2.1	4.9	1.5	n.a.	2.6

Note: a/ Sectoral breakdown is not available because up until mid-1987 the Provincial Irrigation Department was responsible for the execution of urban water supply schemes.

Source: EUAD, 1989.

97. The Seventh Five-Year Plan 1988-1993 lays down extremely ambitious targets to be attained by 1993. The additional urban population to be served is: 13.6 million for water supply to achieve a target coverage of 95 per cent (100 per cent coverage in the metropolitan and secondary cities and 70 per cent in all other urban areas); and 12.4 million for sewerage to achieve a target coverage of 70 per cent (100 per cent coverage in the metropolitan and secondary cities and 50 per cent in all other urban centers). The Planning Commission estimates the total capital requirements at Rs15.9 billion (December 1987) to accomplish these targets of which Rs8.0 billion (50.3 per cent) is allocated to water supply and Rs7.9 billion (49.7 per cent) to sewerage. These imply an average investment cost of Rs590 per capita for water supply and Rs640 per

capita for sewerage, both of which appear to be under-estimates. It is envisaged that nine major cities (Karachi, Lahore, Multan, Faisalabad, Gujranwala, Hyderabad, Rawalpindi, Peshawar and Quetta) will absorb Rs9.9 billion (62 per cent) and the remaining Rs6 billion (38 per cent) will be allocated among all other urban centers throughout Pakistan. The plan allocated Rs8 billion (50 per cent) from ADP and the balance to be provided by local bodies from their own resources. However, due to resource constraints, there appears to be a significant shortfall in available funds from Government sources. The Government's initial allocation is only Rs4.5 billion (Rs2.5 billion in the normal ADP and Rs2 billion under the Special Development Programme). This means that the Government's ambitious targets should be modified as suggested in Section III.G.

F. Organization and Personnel Development

1. Organization of Water Supply and Sanitation Facilities

98. Organization of water supply and sanitation services needs substantial improvements to enable the local authorities to achieve their objectives of reliable safe water supply at the least cost for the consumers.

99. An efficient organization should be based on the operating instructions of the facilities. In many cases these instructions are either not available any more or are outdated. The authorities should commission consulting engineers experienced in this type of work to prepare comprehensive operating instructions for all the facilities as well as for the whole water supply or sanitation system.

100. A detailed program of preventive maintenance for the whole system, with annual, quarterly, monthly and daily schedules of preventive maintenance should also be prepared, at least initially, by consulting engineers.

101. Once the operating instructions and schedules of preventive maintenance are available, the post and job descriptions should be prepared for all the posts necessary to ensure adequate staffing of the facilities. This could also be done by consulting firms specialized in organization and management aspects.

102. Level of experience, education and training and aptitudes of the available staff members should then be checked and compared with the post descriptions. The staff members will be trained for the new duties, while those not suitable for the new posts may have to be transferred to other duties within the authorities. The initial on-the-job training could be provided by consulting engineers under financing of international or bilateral assistance programs. The training, however, will have to be a continuous process in collaboration with existing training centers including those of large water supply and sanitation agencies, such as WASAs and KWSB.

103. The principles outlined above may apply to all local organizations irrespective of their size. They also apply to management, including financial management.

104. The local authorities should employ new staff members strictly in accordance with the requirements of post descriptions.

2. Training of Water Supply and Sanitation Personnel

105. Training should correspond to the specific requirement of a particular post, which should be based on the post and job descriptions. The training centers should receive details of these requirements to prepare appropriate training courses. The effectiveness of the training should be evaluated by reviewing the staff performance on their daily job.

106. At present, the Karachi Water and Sewerage Board (KWSB) is establishing a training center for its staff. The KWSB should be encouraged to make its training facilities available to other local authorities on a commercial basis. The Lahore WASA also has a small training center, which needs development. Once properly improved, this training center could also provide training services to other local authorities. The British training assistance to the Lahore WASA is discussed in Appendix 24.

3. Training in Support of the Sector

107. There is an urgent need to establish certification and licensing of plumbers. This is discussed in other part of the report. It will be necessary for the vocational training institutions to start preparing plumbers for Government plumber certificate tests.

108. The sub-professional and professional requirements of urban water supply and sanitation sector, both technological and management, are discussed in Appendix 12.

G. Sector and Project Planning and Implementation

109. The majority of towns in Pakistan have public water supply systems and, at least, elementary drainage systems. To meet present and future demands, all of these systems must be improved and developed in terms of: (a) physical installations; (b) methods of operation and maintenance; and (c) organizational, institutional and financial capabilities. Improvements should be based upon actual and felt needs of the residents and should be integrated with other urban development measures.

110. As a first step, each town should assess the situation and prepare a water supply and sanitation master plan for upgrading its facilities by stages, in order of their urgency. These should be related to the local urban master plan. Then, feasibility studies should be prepared for the proposed first stage schemes. In view of the dynamic changes which are taking place every year in land use patterns, population growth and popular perception of needs, the water supply and sanitation master plans, as well as their staging, should be regularly reviewed and updated by the municipal authorities in consultation with the residents of the town. It is noted by the Consultants that some towns are acquiring and reserving land for future wastewater treatment plants. Since most towns will require sewage treatment at some time in the future, it would be prudent to reserve appropriate land areas in line with the town's urban master plan and the water supply and sanitation plan.

111. Although sufficient engineering manpower is available in Pakistan, there is a lack of skilled staff capable to cope with the growing needs of the urban water supply and sanitation sector. To solve this problem, the Consultants recommend the strengthening and greater utilization of private consulting services, as further discussed in detail in Appendix 15. In preparing the feasibility studies, the following steps should be followed: (a) careful identification of the water and sanitation needs in each town; (b) technical and economic evaluation of all reasonable options for meeting the needs; (c) selection of the preferred option and preparation of the detailed plan; (d) identification of the technical and financial assistance required by provincial governments and external donors for project implementation; and (e) review and approval of the plan by the local authorities.

112. In order to provide technical and financial assistance to local authorities for water supply and sanitation projects, provincial governments should assume that the proposed schemes are technically, financially and socially feasible. In addition, the provincial governments should give priority to: (a) towns with administrative importance, such as division and district headquarters; (b) towns with large population concentrations; (c) towns with potential for industrial development; (d) towns where the need is great; and (e) towns which demonstrated strong capability and willingness to bear their share of responsibility and financial burden in undertaking the development projects.

113. At present, the programming of urban water supply and sanitation projects is proceeding in an ad hoc fashion, without the preparation of provincial sector development plans, and even without regular consultations at provincial level between the departments and agencies responsible for policy and execution of programs. To rationalize the process, mechanisms for interdepartmental consultation need to be created, sector policies need to be determined, and province-wide sector programs and master plans need to be prepared.

H. Legislation

114. The laws establish that responsibilities for water supply and sanitation in the urban areas belong to local urban authorities (a list of these laws is given in Appendix 8). However, for a variety of reasons, urban local authorities do not fulfill these responsibilities well, or do not fulfill them at all, expecting the Government to deal with water supply and sanitation. As a result, the consumers and users are not fully involved in the decision-making process of the development and in the operation and financing of urban water supply and sanitation facilities and services. The urban population, which is suffering from the effects of inadequacies of water supply and sanitation services, should be well informed that the local elected authorities are responsible to develop and operate water supply and sanitation services.

115. However, there is a need for a review of legal aspects related to the urban water supply and sanitation sector. The objective of this review is to identify any element in the existing laws which may improve the involvement of local authorities in the sector. This review should be undertaken in collaboration with water supply and sanitation specialist.

and discuss with the legislatures the best descriptions.

116. The urban water supply and sanitation facilities in cantonments (urban areas under the control of military authorities, but which contain large civilian populations) should be integrated, as much as possible, with water supplies and sanitation of the urban local authorities. There is a need for legal basis for such integration.

117. In reviewing the local authority acts, some anomalies, such as those which allow disposal of excreta into solid waste dumps should be removed from these acts.

I. Technical Support

118. The rehabilitation and development of the urban water supply and sanitation sector will require substantial review and improvement of the existing project implementation process in order to remove and correct the following weaknesses and deficiencies: (a) inadequate and inappropriate designs; (b) poor construction standards; (c) poor quality control of locally manufactured materials; (d) inadequate supervision of works during construction; and (e) incorrect operation, maintenance and repair of constructed works. These factors result in wasteful use of scarce investment resources. For example, the Consultants have observed some comparatively new water transmission and distribution mains which will need to be replaced in the near future. This means that the quality of engineering support for the sector, particularly the quality of supervision of works during construction must be improved.

119. The Public Health Engineering Departments (PHED) of the Provincial Governments provide planning, designs, supervision of construction and often operation and maintenance services for rural and urban water supply systems. A number of PHED field engineers encountered by the Study Team were well informed about the urban schemes for which they are responsible, and about conventional water and sanitation design principles. However, there were some evidence of lack of understanding of water treatment processes. As other government departments, these organizations are subject to budgetary and staff limitations and are controlled by various rules and regulations. The design offices visited by the Team lacked basic drawing instruments and have no funds to procure them. These departments, as all other government bodies, experience a continuous staff turn-over. Lack of continuity of service in each post creates serious problems. There is an urgent need to reassess the role of these very important departments in the development of urban water supply and sanitation. The proposed revisions of the PHEDs' role in the urban water supply and sanitation sector is discussed in greater detail in Appendix 7 paras. 36 and 37. Similar problems affect the technical role of the supervisory engineers in the Local Government and Rural Development Departments (LGRDDs). In addition, because of the lack of intermediate echelons, they cannot effectively guide and assist the hundreds of municipal engineers and sub-engineers who work in towns under the nominal control of the LGRDD. The proposal for the local authorities to have their own permanent staff is discussed in Appendix 7 para. 39.

120. Consulting engineering and management services are available in Pakistan. With a few exceptions, these are private firms whose services are, at present, underutilized. A few Government-owned consulting firms are given

preference over private firms in the allocation of Government projects. Moreover, a lot of engineering work is carried out by the Government departments. All internationally funded projects are handled by foreign consulting firms in association with local firms. It is not surprising, therefore, that the private national consulting industry is relatively weak. The Government should ensure a fair competition among all consulting firms. In the future, there will be much greater demand in the urban water supply and sanitation sector for engineering services and the Government should strengthen the private consulting firms by greater utilization of their services. The improvement of the quality of consulting services in the sector should be achieved by greater utilization of consulting engineers and by training of engineers. The training should be conducted at two levels: one, for new graduates, by organizing engineering apprenticeship; and the other, for specialists, by conducting training of short duration, incorporating practical work, visiting international experts, in collaboration with the national academic institutions. The strengthening of the consulting services is discussed in Appendix 14.

121. The national construction industry implements the bulk of the development projects funded by the Government. Quality of these works cost overruns and time schedules are the main problems which determine wastage of investments and financial difficulties for the construction firms. There are a number of reasons for this situation. The first one is the tendering procedure by the Government of using outdated schedules of rates which should be abandoned. The tenderers should be allowed to enter their own rates in the bills of quantities prepared for the project. Because of inflation, it is necessary to introduce a simple mechanism for the adjustment of contract rates in longer contracts, if necessary. There is a need for a weekly index of prices of materials used in the construction and of labor rates. It may be appropriate to have such indexes for different provinces. The publication of such weekly indexes should be undertaken commercially. The strengthening of the construction services is discussed in greater detail in Appendix 15.

122. There is a need for independent professional supervision of works during construction. Such supervision should be entrusted to firms of consulting engineers.

123. Related to the aspects considered above is the demand for the gradual reduction of the Government agencies from the design and supervision of construction of water supply and waste disposal schemes, which should be contracted to private consulting firms. All Government agencies should use consulting firms for most of their engineering needs.

124. Another very important engineering aspect for the sector is the need to improve basic plumbing skills by certification of plumbers. The certification should be carried out by Provincial Governments after a strict practical test, which may have to be renewed if and when new materials become available. Plumbing works should be restricted by law to licensed plumbers and licenses should only be released to certified plumbers. This would reduce illegal and unsafe plumbing practices.

J. Community Participation

125. People have to be informed and educated about: (a) the need to use safe water supply and sanitation; (b) their importance to health; (c) who is responsible for providing water supply and sanitation; (d) the present difficulties and how these difficulties can be resolved; and (e) how and why these services have to be paid for by the users.

126. There are indications that people realize that something rather substantial has to be done to improve water supply and sanitation in their towns. The Consultants in their contacts with urban population during the field visits, were often informed that even people who belong to low-income groups would be ready to accept higher charges and metering if this will improve the water service.

127. The improvements can be implemented only by those who are responsible for water supply and sanitation services in the urban areas, i.e., the local authorities themselves. Since local councils are now elected, the electorate - the users of water supply and sanitation services, should exert the pressure for the necessary action on the councillors. So, the people should make a demand for their councillors to press the council for action.

128. Public information and education programs should be prepared. These programs should be implemented through the formal education system, i.e., schools, radio, press, TV and through the NGOs. The programs need to be prepared professionally. It is necessary to establish clear objectives for these programs and to determine the most effective way to achieve these objectives.

K. Technology

129. Many technical options exist for improving urban water supply and sanitation systems and their elements. It is the duty of engineering advisers and consultants to propose technologies which will accomplish the desired result at an affordable cost and in a manner acceptable to the users. Most of the systems inspected by the Study Team failed to meet these criteria in one respect or another.

130. A public water supply system should employ technology which provides safe water to users 24 hours a day at adequate pressure. Some water supply systems deficiencies which were noted are the following:

- (i) All systems lack effective elements to restrict and measure quantities of water used; consequently, virtually no system is capable of ensuring 24-hour service to the users.
- (ii) Small diameter mains are often laid at the present town periphery which results in low pressure when additional connections are made and prevents easy extension of mains as the town grows.
- (iii) Looped configurations of mains are seldom used, which would improve the pressure and be more flexible for future extensions.
- (iv) Simple effective solution such as chlorination units, are not in use.

131. A public wastewater disposal system should employ technology which removes and discharges wastewater while preventing contact with humans. Some deficiencies in excreta and wastewater disposal systems which were noted by the Consultants are the following:

- (i) On-site disposal technologies such as pit latrines and seepage pits are unused in most towns of Pakistan. Such systems which should be technically feasible in many towns would substantially reduce public wastewater disposal costs. They should be considered as a technological option, whenever possible, if acceptable to the communities..
- (ii) Most urban wastewater is transported, collected and discharged in open channels from house outlets to fields surrounding the town where it is used to irrigate crops including edible vegetables. This form of wastewater disposal causes serious nuisance and breaks all rules of hygienic wastes disposal. In cases where on-site disposal of wastewater is technically unfeasible (due to impermeable soil, high density of population or dangerous wastes such as hospital wastes), household wastewater should be transported, collected and discharged only in closed sewers.
- (iii) The need for treating wastewater before its disposal should be determined on a town-by-town basis depending upon a study of the importance of protecting the receiving surface waters, the value of the effluent for irrigation, etc. If needed, wastewater treatment should be accomplished by a simple, inexpensive system such as a waste stabilization pond or on oxidation channel.

132. A stormwater drainage system should employ technology which ensures the rapid removal and discharge of all stormwater in the town area, with the exception of occasional very large storms. Some deficiencies in stormwater disposal systems which were noted are the following:

- (i) Some natural drainage channels and traditional town drains have become incapable of carrying the augmented stormwater flows which have resulted from increased "waterproofing" of the town surface and other effects of urbanization. This causes the formation of ponds within the town limits, with concurrent nuisance and danger of breeding anopheline mosquitoes. In solving the stormwater drainage problem, towns should adopt straightforward solutions and avoid needless cost. Construction in drainage channels should be avoided, if possible. Usually, the natural drainage channels can be rehabilitated and improved by straightening and lining so that they can carry the additional flows which result from urbanization processes.
- (ii) Where the natural or traditional drainage channels must be abandoned, new drainage canals or subsurface drains for handling the flow must be designed following normal practice.

Some high level of pollution may occur in the town area if the stormwater is not properly treated before discharge.

Some high level of pollution may occur in the town area if the stormwater is not properly treated before discharge.

- (iii) The Consultants noted in some towns that instead of rehabilitating the natural stormwater drains, the authorities decided to channel the stormwater into underground drains, which results in flooding of streets after every major rainstorm. It should be pointed out that in areas which have only seasonal rainstorms, it is usually not economic to design underground drains to carry stormwater,

133. A solid waste management system should employ technology which avoids insect and rodent harborage and other nuisances by ensuring that wastes are confined at source and during transport, and that they are confined, compacted and covered at disposal site. Some deficiencies in solid wastes management systems which the Study Team noted are the following:

- (i) Wastes are not confined at source but are placed by householders loose in the street. The use of individual or collective metal or plastic refuse containers or disposable plastic sacks should be tried, coupled with a suitable campaign to promote public concern and cooperation.
- (ii) Wastes are not discharged at designated landfill sites and are not confined, compacted and covered at the discharge points. Every town should designate, prepare, equip (with a bulldozer or similar equipment) and operate one or more sanitary landfills.
- (iii) Very few urban areas are free of litter in the streets, and yet most towns spend more than half on their operation and maintenance budget (water and sanitation) to pay the salary of sweepers. Solid wastes collection and transport should be systematized and optimized in each town.

L. Private Sector

134. The private sector makes a significant contribution to the urban water supply and sanitation sector in two ways:

- (i) provision of inputs which support the planning, construction and operation of the sector's facilities; and
- (ii) non-government organizations (NGOs), which are actively involved in the sector, particularly in basic sanitation for poor urban areas.

135. The inputs from the private sector cover: manufacturers of equipment and construction materials, construction contractors, consulting engineering companies, well drilling companies, plus local artisans, plumbers and masons. The private sector must play a more active role in the development of the sector which will require active encouragement and specific action to be taken by the Government.

136. Local manufacturers produce most of the construction materials (e.g., cement, pipes, gate valves, penstocks, etc.) and a range of the machinery and equipment (e.g., electrical pumps, plumbing equipment, water meters, etc.) for the sector (see Appendixes 14, 15 and 16). However, quality can be variable, ranging from poor to excellent. Much depends on the price paid, quality control procedures and enforcement of standards by the client. The size of the manufacturing units range from small-scale enterprises producing concrete pipes to larger firms producing asbestos cement/PVC pipes or electric pumps, some under foreign license or with expatriate supervision. In many cases, the emphasis has largely been on affordable and simple designs which have sometimes proved less durable because of inadequate quality control and poor construction standards. A strong case exists for strict enforcement of quality control procedures and licensing of approved manufacturer of pipes, pumps and other equipment.

137. Construction contractors working on urban water supply and sanitation projects come from both the public and private sectors in Pakistan. Adequate capacity appears to exist among civil engineering contractors to cope with large and small-scale projects in the sector but construction standards are generally poor leading to inadequate operational performance and a shortened life for new assets. It is recommended that the Government should address this issue as a matter of urgency. Appendix 15 reviews some of the main problems which relate to the performance of contractors within the sector and outlines specific measures to improve the situation. These measures should include the following:

- (i) establish standards and uniformity in shortlisting, evaluation, selection and contracting procedures in the use of construction companies;
- (ii) abolish use of fixed government Schedule of Rates and encourage construction companies to bid at realistic market rates;
- (iii) promote increased use of consulting engineers to carry out detailed supervision of construction works;
- (iv) establish a National Contractors Association to represent and promote the construction industry; and
- (v) encourage improved standards of construction.

138. The consulting profession in Pakistan is operated by the private sector, with the exception of two of the largest firms which are publicly owned. There are about 30 firms with some recognized experience in the water supply and sanitation field, of which about 13 have worked on medium- to large-scale projects supported by the Government and/or international funding agencies. Appendix 14 reviews the current position of the consulting services in Pakistan and examines ways in which their effective contribution can be enhanced, particularly in the field of urban water supply and sanitation. It is recommended that positive action should be taken on:

- (i) policy for the development of the consulting profession;
- (ii) maintain up-to-date register of consultants at Federal and Provincial levels;

- (iii) establish uniform standards in the use of consultants;
- (iv) train Government officials in use of consultants;
- (v) maintain remunerative fee rates; and
- (vi) reduce in-house engineering work and supervision done by Government departments and promote use of consulting services from the private sector.

These developments and others outlined in Appendix 14 will encourage and promote a more vigorous consulting profession in the private sector and lead to a more efficient use of technical and manpower resources within the sector.

139. NGOs in the urban sector are mainly working in Katchi Abadis in the larger cities. The two most prominent NGOs are Basic Urban Services for Katchi Abadis (BUSTI) and the Orangi Pilot Project (OPP) which are both promoting low cost sanitation in Karachi with heavy emphasis on community participation and self-help with minimal support from local governments. Appendix 6 reviews the operations and methods of both projects. In addition, there are thousands of unregistered community organizations concerned with the provision of selected services on a self-help basis - for example, in the Katchi Abadis of Karachi, there are more than 500 social welfare organizations and almost 300 sports clubs. Besides supporting the development of community water supplies and sanitation, NGOs also support important parallel programs in public health education, primary health care, and women's education - all of which are important factors in securing the real benefits of improved water supply and sanitation facilities.

140. The private sector already plays a largely supporting role to the public sector in the provision of urban water supply and sanitation services. It is recommended that the Government should pursue a more open policy to encourage an increased contribution from the private sector which would lead to increased efficiency in service delivery, be more cost-effective and less onerous on public finances. Specific recommendations have already been made concerning local manufacturers, construction companies and consultants in paras. 136, 137 and 138 above. In poor urban areas (e.g., katchi abadis), increased efforts should be made to replicate the success of NGOs like the Orangi Pilot Project without over-zealous bureaucratic interference which would stifle local initiative. Finally, the Government should examine the possibility of inviting the private sector to run certain operations under contract, e.g., water and sewage treatment plants; maintenance and repair facilities; distribution of bills and collection of revenue (similar to the system used in collecting octroi); and a number of others. These are discrete operations which could be more effectively run by the private sector.

IV. PROPOSED ACTION PROGRAM AND INVESTMENT

A. General

141. This chapter outlines the proposed action and program for institutional development, the indicative investment requirements to satisfy the revised targets, the identified investment packages for consideration by the Government and international funding agencies, and an action plan for sector management and financing.

B. Institutional Program

1. Proposed Action by Federal Government

142. The Federal Government policy statement should initiate the strengthening process of the urban water supply and sanitation sector. This policy statement should include principles which are listed in para. 56 of Section III. The Environment and Urban Affairs Division (EUAD) should obtain acceptance of these principles by the Federal Government and then ensure their release as the Government policy statement.

143. The proposed institutional arrangements, which were discussed in para. 58 above, will require the following action by the Government at the federal level:

- (i) Strengthen the Environment and Urban Affairs Division (EUAD) to perform its responsibilities for the urban water supply and sanitation sector by: (a) upgrading the unit, which is dealing at present with some of these responsibilities, to become the Urban Water Supply and Sanitation Wing (UWSSW); and (b) establishing a Sector Advisory Panel. Details of these proposals are included in Appendix 7.
- (ii) Prepare and initiate a national program of information and education to: (a) promote public awareness of its rights and responsibilities, including financial responsibility, for urban water supply and sanitation services; and (b) ensure public support and involvement, through the elected local authorities and NGOs, in the development and operation of urban water supply and sanitation facilities. This is discussed in detail in para. 144 below.
- (iii) Strengthen private sector's support for the urban water supply and sanitation sector by: (a) strengthening consulting services (as discussed in Appendix 14); (b) strengthening construction services by rationalization of bidding procedures for the Government-funded projects (as discussed in Appendix 15); and (c) supporting local manufacturers of water supply and sanitation equipment and materials (as discussed in Appendix 16).

- (iv) Encourage exchange of experience within the sector by initiating creation of the Pakistan Water Supply and Sanitation Association.
- (v) Initiate action for proper training programs in water supply and sanitation.

144. The UWSSW should prepare as one of the most important programs, the public information and education program about the sector. The objectives of this program can be summarized as follows: to inform and educate the people about the need to use safe water supply and sanitation, their importance to health, who is responsible for providing water supply and sanitation, about present water supply difficulties, how these difficulties can be resolved, that people have to participate by taking interest through their local representatives and that these services have to be paid for by the users. The design of these programs, both short-term and long-term, should be undertaken in collaboration with the Federal Ministries of Information and Broadcasting, Education and Health, Special Education and Social Welfare. The implementation of the program should commence as soon as possible. Foreign technical assistance could be considered for the preparation of this program.

145. One of the priority tasks for the UWSSW will be to establish the Sector Advisory Panel. The objectives and composition of this Panel are discussed in the Supplement to Appendix 7. It should be stressed that members of the Panel should serve in a voluntary capacity and should only receive reimbursement of expenses.

146. The UWSSW should initiate formation of the Pakistan Water Supply and Sanitation Association, which would group all those interested in the sector, i.e., practicing professionals, contractors, manufacturers of materials and equipment, teachers and local authorities responsible for urban water supply and sanitation services. The Association should provide a forum for the exchange of experiences, should organize an annual Water Supply and Sanitation Conference and should publish a journal. The Association will have to be self-financing. The UWSSW should invite the universities, leading contractors and manufacturers to initiate the formation of the Association with the aim of organizing the first National Conference. The UWSSW could help to promote and arrange the conference, subject to budgetary considerations.

147. In the process of strengthening consulting services, the UWSSW should open and maintain a register of the consulting firms practicing in the sector. The consultants should be invited initially, through the advertisement in the press, to submit a list of the water supply and sanitation projects carried out by them during the last five years, with the addresses of the clients. The brief description of the projects should include a list of major components. The objective of the register is to provide the names of consultants with working experience in the sector to those interested in obtaining services from consultants. At the end of each calendar year, the consultants should update the register with the works undertaken during that year. After the creation of the register, the UWSSW should inform all urban local authorities, through the Provincial Governments, about the existence of the register. With experience, this register could serve as a form of pre-qualification of consulting firms for service in the sector.

148. The UNSSW should initiate appropriate actions to prepare and carry out training programs (short- and long-term trainings including short-term overseas trainings and on-the-job trainings) in all aspects of water supply and sanitation as may be required to develop the human resources of the sector.

149. A list and description of other responsibilities of the federal sector unit is given in Appendix 7 and will not be repeated here.

2. Proposed Action By Provincial Governments

150. The proposed institutional arrangements at the provincial level, which were described in paras. 64 to 67 above, will require the following action by the Provincial Governments:

- (i) The local authorities already involved in large urban areas in planning, development, and execution of water supply and sanitation schemes, along with their operation and maintenance, should continue to do so. In such urban areas where the local authorities have not yet taken up these responsibilities, it is proposed that while Provincial Governments should continue to plan, develop and execute the schemes, the local authorities should take up the task of operation and maintenance of the facilities. The Provincial Governments should, however, exert all efforts to develop the technical, managerial and financial capabilities of the local authorities until such time that they will also be able to independently plan, develop and execute water supply and sanitation schemes under the control and assistance of Provincial Governments.
- (ii) Reassess of the role of PHED and strengthen these departments to enable them to undertake new responsibilities in the urban water supply and sanitation sector.
- (iii) Prepare and initiate a provincial program of information and education to: (a) promote public awareness of its rights and responsibilities including financial responsibility, for urban water supply and sanitation services; and (b) ensure public support and involvement, through the elected local authorities and NGOs, in the development and operation of urban water supply and sanitation facilities.
- (iv) Examine existing water revenue collection procedures and prepare for handing over these responsibilities to the urban local authorities.
- (v) Initiate, as a matter of urgency, the process of certification and licensing of plumbers. The scheme of certification of plumbers should probably be carried out by the Labor and Manpower Departments. The licensing of plumbers to practice in a particular urban center should be done by the urban local authority responsible for the water supply in that center.

151. The provincial level responsibilities for the urban water supply and sanitation sector should involve the control of performance and support of urban local authorities responsibilities for water supplies and sanitation.

152. To control sector performance in the province, the Provincial Governments should carry out annual inspections of all local authorities' water supply and sanitation facilities and services through the Public Health Engineering Departments. At present, these departments are undertaking planning, engineering, supervision of construction and even operation and maintenance of these facilities. The Provincial Governments should reassess the role of these departments and allied institutions in urban water supply and sanitation. They should, in addition to their existing functions, also undertake the following responsibilities:

- (i) Inspection, once a year, of urban water supply and sanitation facilities and services in all urban centers.
- (ii) Preparation, for the inspected local authorities, of the situation reports based on these inspections with recommendations for necessary action.
- (iii) preparation of an annual provincial urban water supply and sanitation sector report based on the inspection reports. These reports would include recommendations to Provincial Governments for necessary action to improve the performance of the sector. These reports will also be submitted to the Federal Government for evaluation on a national scale and, if necessary, for review of policies and legal support.
- (iv) Assistance to the local authorities, should it be needed, in the preparation of terms of reference and scope of work for consulting engineers and in evaluation of the consultant's recommendations. These services should be provided on a commercial basis.
- (v) Assistance to the sector in the province with public information and education to promote public awareness and involvement.
- (vi) Assistance to the provincial sector agencies, through coordination, with staff development and training.

153. For the performance of above functions, the Provincial Governments should, as far as possible, ensure that the design and supervision of construction of water supply and sanitation facilities are carried out by qualified and reputed local consultants, thus, phasing out the involvement in the design and supervision of construction of the Public Health Engineering Departments.

3. Proposed Action by Local Government

154. The proposed institutional arrangements at the local level described in paras. 63 to 69 above, will require the following actions by the urban local authorities:

- (i) In the light of the proposed enforcement of the law by the Government, become aware of and accept responsibilities for water supply and sanitation, and inform people about it.
- (ii) Reassess their legal responsibilities.
- (iii) Assess their present capabilities to undertake their responsibilities.
- (iv) Prepare, establish and maintain public information and education program to: (a) ensure people awareness of their responsibilities; (b) ensure their participation in the decision making process in the development of the water supply and sanitation facilities; (c) inform the people about the state and problems of water supply and sanitation facilities in the town and what should be done to improve these services; and (d) educate the people on the need to use safe water for drinking, the need for personal and household hygiene, the need for safe disposal of excreta and wastewater and the need to pay for these services;
- (v) Create an administrative unit with permanent staff responsible for all aspects of water supply and sanitation, including operation and maintenance and, as far as practicable, also planning. This unit should be responsible only to the council; and
- (vi) Establish financial management for water supply and sanitation revenues and expenditures and set up suitable financial registers and accounts.

155. The urban local authorities, the elected bodies, are not only responsible and have authority in law for water supply and sanitation in their areas but are also best placed to carry out these responsibilities. This is because they are in close contact with the people whose active support and participation are necessary. Ultimately, it is the users who will have to meet the cost of the water supply and sanitation services and it is right that they have to be informed and consulted about whatever is being done, or is planned, for their water supply and sanitation facilities. Therefore, the local authority is to become aware of and accept its responsibilities and inform the people about it.

156. There are bound to be certain aspects of the above-mentioned responsibilities which will not be clear. These aspects should be identified by the local authority and should be discussed and resolved with the Provincial Government.

157. As one of its first tasks, the local authority should establish a permanent unit responsible for all aspects of water supply and sanitation. This unit should have permanent staff employed by and responsible only to the council. The size of this unit and qualifications of its staff members will depend on the size of the town and on the complexity of the facilities to be handled. The local authority may have to employ a firm of consultants to investigate the problem and to advise the council.

158. The local authorities should target as their objective a 24-hour a day water supply at adequate pressure. Using services of consulting engineers, they should evaluate the current needs for the rehabilitation and development of the existing water supply facilities in order to achieve 24-hour supply at adequate pressure, including leak detection and repairs, and for expansion of these services to those households which do not benefit from them yet. They should establish a program to inform the people on the need to prevent wasteful use of water and on the best way to achieve it.

159. The local authorities should establish and maintain records of all properties in the town, with town plans (initially, if necessary with hand-made sketches), including type of water supply and sanitation facilities used at each property.

160. In urban areas where shallow wells are used or can be developed as sources of water supply, where population density allows and where the danger of contamination with excreta and wastewater does not exist, the local authorities should ensure that such sources are protected, have handpumps and produce safe water.

161. The local authorities should encourage the use of the on-site excreta and wastewater disposal in those areas of the town where population density and soil conditions allow such solution. This could be done in collaboration with NGOs, which should be encouraged and supported by the councils.

162. In the urban areas where on-site disposal of excreta and wastewater is not possible, the local authorities should introduce water-borne sanitation of the type developed at Orangi District in Karachi where people-financed construction of toilets and lane sewers (more information about Orangi Project is available in the Supplement to Appendix 6). This should be supported by the council-funded main sewerage and sewage disposal. The councils should always consider first sewage disposal by stabilization pond method.

163. The local authorities should establish and maintain records of the existing water supply and sanitation facilities, should ensure that operating instructions for all the facilities exist and are used, should ensure that schedules of preventive maintenance for water supply and sanitation facilities are prepared and followed. For these tasks, they should obtain services of consulting engineers who specialize in these aspects of water supply and sanitation. The authorities should make the permanent staff available for the operation and maintenance of water supply and sanitation facilities and ensure that the staff are adequately trained to perform these functions.

164. The local authorities should establish appropriate financial management and accounting systems, supported by full cost recovery and adequate regular tariff increases.

165. The local authorities should introduce surveillance of drinking water quality with regular bacteriological tests and periodic tests for toxic elements.

166. Using, as far as practicable, the services of consulting engineers, the local authorities should prepare for the future growth of the town and for the expansion of water supply and sanitation facilities to meet this growth.

C. Investment Requirements

167. An indicative estimate has been prepared of the financial resources required to satisfy the amended coverage targets for the five-year period from 1988 to 1993 and the subsequent 10-year period to the year 2003. These are based on the amended coverage targets presented in Section II.F, Table 9, and estimated per capita unit investment costs. The unit investment costs have been derived from information provided by: the Physical Planning and Housing Section of the Ministry of Planning and Development, the Provincial PHEDs and recent consultants' reports. The unit costs also assume the following:

- (i) Continuing application of cost-effective solutions using technology which is both affordable and appropriate to local conditions.
- (ii) Component for rehabilitation of poorly constructed and maintained facilities.
- (iii) Emphasis on improved maintenance and operating standards to maximize utilization of existing assets. This includes reduction of non-revenue water.
- (iv) Active participation of the local community and the private sector to relieve the pressure on public sector investment funds, e.g., increased mobilization of private resources for low-cost sanitation and sewerage facilities, particularly in the poor urban areas.
- (v) Effective cost recovery to increase financial viability within the sector and encourage consumers to economize on their use of water and sewerage services.

168. The investment costs have been prepared in terms of 1989 constant prices and current prices, i.e., including an allowance for inflation at the following forecast rates:

Year	Local (%)	Foreign (%)
1989	10.0	5.3
1990	9.0	5.3
1991-1994	8.0	4.1
1995 onwards	5.0	4.1

169. The foreign exchange component in the investment costs is assumed to be 30 per cent which reflects the distribution in recent internationally funded projects in which foreign exchange costs ranged from 20 to 40 per cent of the total.

170. The resulting indicative investment costs are summarized in Table 17 with details by province in Table 18. For the five-year period from 1988 to 1993, investment costs for urban water supply and sewerage would amount to Rs13.3 billion (\$665 million) at 1989 constant prices and Rs15.1 billion (\$770 million) at current prices. In the 10 years after 1993, the required investment is broadly estimated at nearly Rs40 billion (approx. \$2 billion) at 1989 constant prices and Rs70 billion (\$3.5 billion) at current prices. These figures illustrate the magnitude of the investment requirements if sector objectives are to be attained by 1993 and 100 per cent coverage is to be achieved by the year 2003. Improvements in sector efficiency (e.g., institutional strengthening, training, improved operation and maintenance, improved financial management, effective cost recovery, community participation, public education, etc.) will be essential if the proposed physical targets are to be reached without significant delays and cost overruns.

Table 17. Summary of Indicative Investment Requirements in Urban Water Supply and Sanitation Sector 1988-2003

	Rs billion			\$ million		
	Local	Foreign	Total	Local	Foreign	Total
<u>1988-1993</u>						
Water Supply	1.8	2.0	6.8	240	100	340
Sewerage	4.6	1.9	6.5	230	95	325
Total - 1989 Prices	9.4	3.9	13.3	470	195	665
Price Contingencies	1.6	0.5	2.1	80	25	105
Total - Current Prices	11.0	4.4	15.4	550	220	770
<u>1993-2003</u>						
Water Supply	11.3	4.8	16.1	565	240	805
Sewerage	16.6	7.1	23.7	830	355	1,185
Total - 1989 Prices	27.9	11.9	39.8	1,395	595	1,990
Price Contingencies	24.3	5.9	30.2	1,215	295	1,510
Total - Current Prices	52.2	17.8	70.0	2,610	890	3,500

Source: Table 18 and study estimates.

171. The provincial distribution in Table 18 indicates that Punjab would account for 53 per cent of the total investment, Sind - 37 per cent, NWFP - 6 per cent, Baluchistan - 3 per cent and Islamabad F.A. - 1 per cent.

Table 18. Provincial Distribution of Investment Requirements in Urban Water Supply and Sanitation Sector 1988-2003

	Punjab	Sind	NWFP	Baluchistan	Islamabad F.A.	Total
<u>Estimated Unit Investment Costs (Rs per capita)</u>						
Water Supply	625	750	525	1,000	600	-
Sewerage	625	810	675	700	600	-
<u>Additional Population Served (million)</u>						
<u>1988-1993</u>						
Water Supply	6.1	3.2	0.6	0.2	0.1	10.2
Sewerage	4.9	3.2	0.7	0.4	0.1	9.3
<u>1993-2003</u>						
Water Supply	14.0	7.8	1.6	0.7	0.1	24.2
Sewerage	20.0	10.7	2.5	1.0	0.1	34.3
<u>Estimated Capital Costs (Rs million - 1989 prices)</u>						
<u>1988-1993</u>						
Water Supply	3.8	2.4	0.3	0.2	0.1	6.8
Sewerage	3.1	2.6	0.4	0.3	0.1	6.5
Total	6.9	5.0	0.7	0.5	0.2	13.3
<u>1993-2003</u>						
Water Supply	8.7	5.8	0.8	0.7	0.1	16.1
Sewerage	12.5	8.7	1.7	0.7	0.1	23.7
Total	21.2	14.5	2.5	1.4	0.2	39.8
Grand Total	28.1	19.5	3.3	1.9	0.4	53.1

Sources: (i) Unit Investment Costs - Physical Planning and Housing Section MPD; Provincial PHEDs and recent consultants' reports.

(ii) Study estimates.

1988	10.0	5.3
1990	2.0	5.3
1991-1994	8.0	4.1
1995 onwards	3.0	4.1

172. International funding agencies (ADB, World Bank) and bilateral agencies (from the United Kingdom, the Netherlands and Japan) are actively supporting the Government's investment program in the urban water supply and sanitation sector. These projects are all concentrated in the major cities, with the exception of the proposed ADB-supported urban development project in NWFP (including Peshawar plus six other urban centers). The total capital expenditure (international plus local contributions) on these projects amount to an estimated Rs7.8 billion (\$392 million) during the Seventh Five-Year Plan 1988-1993, which would account for 59 per cent of the proposed sector capital requirement. Table 19 presents the distribution between the major cities. It should be noted that the projects supported by ADB, World Bank and the United Kingdom also contain significant components for stormwater drainage, institutional strengthening and training.

Table 19. UWSS - Projects in Major Cities Supported by International Funding Agencies in Seventh Five-Year Plan 1988-1993

Province	City	International Funding Agency	Seventh Plan 1988-1993	
			Rs million	\$ million
<u>On-going Projects</u>				
Punjab	Faisalabad	ADB	124	6.2
Sind	Karachi	World Bank, ADB	818	40.9
	Hyderabad	ADB	184	9.2
Baluchistan	Quetta	Netherlands	283	14.2
Sub-total			1,409	70.1
<u>New Projects - Approved and Pending</u>				
Punjab	Lahore a/ Islamabad/ Rawalpindi b/	World Bank	1,118	55.9
Sind	Karachi c/	World Bank, ADB, UK	3,550	177.5
NWFP	7 Towns d/	ADB et al	540	27.0
Sub-total			6,441	322.0
Total			7,850	392.4

Notes: a/ WASA Lahore - total cost Rs1.34 billion for water supply, sewerage and drainage 1988-1995.
 b/ Bulk water supply and transmission to Islamabad/Rawalpindi - total cost Rs2.87 billion 1989-1997.
 c/ KWSB Karachi - total cost Rs5.07 billion for water supply and sewerage 1988-1994.
 d/ Peshawar, Abbottabad, Bannu, D.I. Khan, Kohat, Mardan and Mingora - total cost Rs634 million for water supply, sewerage and drainage 1989-1995.

Source: EUAD, 1989.

D. Identified Investment Packages

173. The identification of potential investment packages which might be considered by the Government of Pakistan and multilateral/bilateral funding agencies, including ADB, is based on the following parameters: (a) to support the priorities of the Government's urban development strategy; (b) to reflect the development objectives of the provincial governments; (c) to complement development initiatives which have already commenced with international support; and (d) to target specific urban communities which are important to balanced provincial development and are deficient in water supply and sanitation facilities.

174. Recent studies carried out by the Government ^{1/} indicate a need to re-direct national urban development strategy towards secondary cities and medium-sized towns. The aim would be to promote more balanced economic growth and to reduce the increasing pressure on the metropolitan and main cities of Pakistan. In the period from 1993 to 2003, the Government has targeted 23 intermediate towns as priority candidates for regional planning and investment in four growth regions located along the National Highway (N5), as follows:

- (i) Nowshera-Taxila-Haripur
- (ii) Jhelum-Gujrat
- (iii) Sheikhpura-Gujranwala-Sialkot
- (iv) Rahimyar-Khan-Rohri

175. In terms of urban water supply and sanitation, the proposed focus on intermediate cities and town is timely because all of the major cities (e.g., Karachi, Lahore, Faisalabad, Hyderabad, Peshawar and Quetta) have received or are continuing to receive substantial international funding for improved services and institutional strengthening.

176. The objective of the Provincial Governments is to maximize service coverage with limited financial resources. However, from a planning viewpoint, none of the provinces has a comprehensive sector planning which is integrated into a rational urban development strategy. Therefore, provincial priorities tend to be expressed in terms of generalized planning objectives, such as: (a) towns with greatest administrative importance (e.g., divisional headquarters) and large population concentrations; (b) balanced distribution investment resources between divisions and districts; (c) priority to on-going and externally supported projects; (d) focus on urban centers where the need for improved facilities is greatest; and (e) urban centers which are capable and willing to bear their share of the development responsibility, and the financial burden of the project.

^{1/} National Human Settlements Policy Study, Environment and Urban Affairs Division. Report of the Working Group on Urbanization, Planning Commission, July 1987.

177. In the provinces of Punjab, Sind and NWFP, there are three urban planning projects which concentrate on the development needs of specific intermediate towns. The outline details and current status of these projects are set out below:

- (i) Punjab Urban Development Project - project supported by the World Bank includes pilot upgrading schemes and action-oriented phased medium-term investment plans for Multan, Gujranwala, Sialkot, Sargodha, Bahawalpur, Sahiwal, Sheikhpura and Rahimyar Khan. These projects and studies are programmed to take place between 1989 and 1995.
- (ii) Sind Secondary Cities Development Planning Project planning studies of nine intermediate urban centers to be funded by the United Nations Development Programme (UNDP) with the United Nations Center for Human Settlements (UNCHS-HABITAT) as the executing agency. The nine urban centers are: Sukkur, Mirpurkas, Larkana, Nawabshah, Jacobabad, Tandul Adam, Khairpur, Dadu and Sanghar. The studies are expected to be commissioned in late 1989 and completed by 1990/91.
- (iii) NWFP Second Urban Development Project - studies have been completed with funding support by ADB and UNDP for Peshawar, Mardan, Mingora, Kohat, D.I. Khan, Abbottabad and Bannu. The project package includes: renovation and improvement of existing infrastructure and services, including water supply and sewerage facilities; and institutional strengthening. ADB is in the process of appraising the project for prospective implementation between 1989 and 1995. It is also understood that ADB is actively seeking co-financing support from other international agencies.

178. Table 20 presents a comprehensive listing of the intermediate and medium-sized towns which have been identified for prospective support by international funding agencies for investment in water supply and sanitation services, and related institutional strengthening. The table also includes indicative population projections to the year 2003 and the 1980 service coverage for water supply (access to piped water supply through house connections and standpipes) and sanitation (access to flush toilet facilities, separate and shared). A total of 52 urban centers have been identified: Punjab - 19 centers; Sind - 13 centers; NWFP - 14 centers; Baluchistan - 5 centers; and Islamabad F.A. itself.

Table 20. Urban Centers Identified for Potential Investment in Water Supply and Sanitation Facilities 1988-2003

Urban Center	Sponsoring Agency	Period	Population (000)				Growth Rate 1988-2003 (% p.a.)	Water Supply %	Sanitation %
			1981	1988	1993	2003			
<u>ISLAMABAD P.A.</u>		1988-1993	304	283	355	500	3.9	71	52
<u>PUNJAB</u>									
Bawalpindi		1988-1993	795	1090	1350	1880	3.7	52	24
Multan	WB	1988-1995	732	940	1120	1500	3.2	36	11
Gujranwala	WB	1988-1995	659	990	1340	2040	4.9	37	15
Sialkot	WB	1988-1995	302	440	560	820	4.2	56	12
Sargodha	WB	1988-1995	291	410	510	720	3.8	48	16
Jhang			196	285	365	540	4.3	12	8
Bahawalpur	WB	1988-1995	180	240	290	400	3.5	32	19
Gujrat	PP&H	1988-1993	155	235	305	455	4.5	22	11
Sahiwal	WB	1988-1995	151	210	260	365	3.8	49	19
Sheikhupura	PP&H, WB	1993-2003	141	210	275	420	4.7	27	10
Rahimyar Khan	PP&H, WB	1988-1993	119	180	235	360	4.7	45	17
Jhelum	PP&H	1988-1993	106	155	200	300	4.5	n.a.	n.a.
Burewala	PP&H	1993-2003	86	125	160	236	4.3	n.a.	n.a.
Jaranwala	PP&H	1993-2003	69	101	129	190	4.3	n.a.	n.a.
Mian Channu	PP&H	1988-1993	41	52	60	77	2.7	n.a.	n.a.
Taxila	PP&H	1988-1993	38	53	66	93	3.8	n.a.	n.a.
Muridke	PP&H	1988-1993	35	57	78	127	5.5	n.a.	n.a.
Hasan Abdal	PP&H	1988-1993	23	37	50	76	4.9	n.a.	n.a.
Khemra	PP&H	1993-2003	19	25	30	40	3.2	n.a.	n.a.
<u>SIND</u>									
Sukkur	UNDP		191	250	305	410	3.4	90	20
Mirpur Khas	UNDP		124	170	215	300	3.9	73	15
Larkana	UNDP or ADB		124	170	215	300	3.9	31	10
Nawabshah	UNDP		102	135	165	220	3.3	54	22
Jacobabad	UNDP		79	110	138	195	3.9	56	18
Tandu Adam	UNDP		63	85	105	147	3.7	56	18
Khairpur	PP&H, UNDP	1988-1993	61	83	103	145	3.8	56	18
Dadu	UNDP		39	50	59	76	2.8	n.a.	n.a.
Bohri	PP&H	1993-2003	31	40	48	64	3.2	n.a.	n.a.
Sanghar	UNDP		29	40	48	64	2.2	n.a.	n.a.
Badin	PP&H	1993-2003	24	33	42	55	3.5	n.a.	n.a.
Thatta	PP&H	1993-2003	22	27	31	40	2.7	n.a.	n.a.
Gambat	PP&H	1993-2003	17	24	29	40	3.5	n.a.	n.a.

Table 20. Urban Centers Identified for Potential Investment in Water Supply and Sanitation Facilities 1988-2003 (con't)

Water Center	Sponsoring Agency ^{a/}	Period	Population (000)				Growth Rate 1988-2003 (a p.a.)	Water Supply ^{b/}	Sanitation ^{c/}
			1988	1989	1992	2003			
PUNJAB									
Darbhaur	ADB	1989-1995	567	750	970	1420	4.2	20	15
Haridwar	ADB	1989-1995	140	178	204	268	2.7	11	7
Mangera	ADB	1989-1995	80	115	142	205	3.9	18	12
Hohat	ADB	1989-1995	78	134	157	215	3.2	42	12
Nowshera	PP&H	1988-1993	75	95	120	170	4.0	18	12
D.I. Khan	ADB	1989-1995	69	102	122	172	3.5	13	12
Abbottabad	ADB	1989-1995	66	91	101	123	3.0	49	12
Fano	ADB	1989-1995	42	75	86	112	2.7	42	13
Mansohra	PP&H	1988-1993	27	45	51	66	3.8	n.a.	n.a.
Haripur	PP&H	1988-1993	31	41	50	70	4.4	58	17
Khalabad	PP&H	1993-2003	24	32	41	60	4.3	59	13
Tarht Bhai	PP&H	1993-2003	18	25	33	50	4.7	n.a.	n.a.
Jhangira	PP&H	1988-1993	18	25	33	50	4.7	n.a.	n.a.
Havelian	PP&H	1993-2003	16	22	29	44	4.7	n.a.	n.a.
BALUCHISTAN									
Turbat			52	70	86	120	3.7	2	5
Zhot			32	43	55	80	4.2	n.a.	22
Rhusdar			31	41	51	72	3.8	n.a.	22
Camar			30	40	50	70	3.8	n.a.	22
Pishin			15	19	23	31	3.3	n.a.	n.a.

Notes: a/ Sponsoring Agency:

PP&H - Physical Planning and Housing Section, Planning Commission

WB - World Bank: Punjab Urban Development Project

UNDP - United Nations Development Program: Sind Secondary Cities Development Planning Project

ADB - Asian Development Bank: Second Urban Development Project

b/ Piped Water Supply - house connections and standpipes.

c/ Flush toilet facilities - separate and shared.

Source: Study elaboration, 1989.

179. Potential investment packages are identified below for possible financing by multilateral and bilateral agencies for feasibility studies, detailed design and construction financing. It should be noted that the Consultants recommend that all projects should include components for: low-cost appropriate technology for both water supply and sanitation, particularly in poor urban areas; training; institutional strengthening; and effective financial management, including full cost recovery. The potential packages are listed below by province:

Punjab

1. Rawalpindi - project to rehabilitate and improve service networks and to propose appropriate institutional improvements - 1988 population 1.1 million.
2. Multan - project to rehabilitate and improve service networks and to propose appropriate institutional improvements - 1988 population 910,000.
3. Gujranwala - project to rehabilitate and improve service networks and to propose appropriate institutional improvements - 1988 population 990,000.
4. Package of four towns (200,000 to 400,000 population): Sialkot, Sargodha, Jhang and Bahawalpur - division of district headquarters - combined 1988 population 1.4 million.
5. Package of four towns (200,000 to 300,000 population): Gujrat, Sahiwal, Sheikhpura and Rahimyar Khan - combined 1988 population 885,000.
6. Package of four towns (50,000 to 250,000 population): Gujrat, Bahimyar Khan, Jhelum and Mian Channu to support the Government's urban development strategy - combined 1988 population 620,000.
7. Package of three towns (1 divisional headquarters and 2 smaller towns): Multan, Muridke and Hasan Abdal to support the Government's urban/ development study - combined 1988 population 1 million.
8. Package of three towns (1 divisional headquarters and 2 small towns): Gujranwala, Mian Channu and Taxila to support the Government's urban development strategy - combined 1988 population 1.1 million.

Sind

9. Package of four towns (150,000 to 250,000 population): Sukkur, Mirpurkhas, Larkana and Nawabshah - combined 1988 population 725,000.
10. Package of four towns (50,000 to 150,000 population): Jacobabad, Tando Adam, Khairpur and Kotri to support the Government's urban development strategy - combined 1988 population 330,000.

NWFP

11. Package of four towns (25,000 to 100,000 population): Nowshera, Haripur, Khalabat and Jehangira to support the Government's urban development strategy - combined 1988 population 200,000.
12. Package of four towns (25,000 to 100,000 population): Nowshera, Haripur, Jehangira and Havelian to support the Government's urban development strategy - combined 1988 population 180,000.

Baluchistan

13. Package of five towns (25,000 to 75,000 population): Turbat, Zhob, Khuzdar, Canan and Pishin - combined 1988 population 220,000.

E. Sector Management

180. The proposed institutional reform of the urban water supply and sanitation sector will require the following actions by the Government to enable the sector to provide safe, adequate and continuous supply of water and hygienic sanitation services at affordable cost:

- (i) Encourage and gradually compel urban local authorities to accept and carry out their legal responsibilities for water supply and sanitation by: (a) public information and education; (b) gradual reduction and phasing out of government subsidies (see also para. 182 below); and (c) introduction of monitoring and control of the local authorities performance in the sector.
- (ii) Prepare instructions and action plan for the introduction of the institutional changes at: (a) federal level; (b) provincial level; and (c) local level.
- (iii) Prepare instructions and action plan for strengthening of: (a) consulting services; (b) construction services; and (c) manufacturing of materials and equipment for the sector. It should be noted that the recommendations (a) and (b) apply also to other sectors of national economy. In planning actions for strengthening consulting services and manufacturing sector, the Government ought to explore the possibility of obtaining international and/or bilateral technical assistance.

181. The implementation of the proposed institutional changes will result in the passing of the urban water supply and sanitation sector's management to the local authorities. The management responsibilities of the Provincial Governments will include support, monitoring and control of performance of the local urban authorities. The sector management function of the Federal Government will include: monitoring of the urban water supply and sanitation sector on national basis; support of the sector with national policies and necessary laws; and obtaining foreign assistance where and when necessary. In short, the management responsibilities of the Federal and Provincial Governments will become those of support and control, not of direct involvement in the development and operation of the sector facilities, which will gradually become the sole responsibility of the local urban authorities who are the elected representatives of the users of these facilities and services.

F. Sector Financing

182. The proposed investment program and identified investment packages will require the following action by Government to secure the necessary financial support over the next four or five years:

- (i) Re-examine the Public Sector Investment Program 1988-1993 to determine whether sufficient financial resources can be made available to satisfy the revised coverage targets.
- (ii) Prepare instruction and action plan for the phase introduction of full cost recovery in all urban water supply and sanitation services and to eliminate subsidies.

- (iii) Take final decision on financial proposals for the sector set out in the Seventh Five-Year Plan 1988-1993: (a) domestic loans to be available at concessional rates; (b) external loans to be passed on under the same conditions charged by foreign donor agencies; (c) machinery and equipment to be exempt from customs duty; and (d) electricity to be charged at same concessional rates as applied to irrigation tubewells. In taking a decision on these proposals, the Government should bear in mind the need for financial discipline within the sector and the impact on the real allocation of resources within the economy.
- (iv) Prepare outline project documents for selected investment packages in order to attract the support of potential international funding agencies. Well prepared documentation is more likely to attract the necessary support.
- (v) Encourage increased mobilization of local capital resources. This should include active community participation in low-cost technical solutions particularly among the urban poor.

183. The actions of Government at federal, provincial and local levels over the next five years will determine whether the target of 100 per cent coverage in urban water supply and sanitation by the year 2003 is a realistic possibility.

V. PROPOSED ROLE OF THE BANK

A. General

184. The Asian Development Bank (ADB), as one of the leading international funding agencies, already plays an important role in the urban water supply and sanitation sector. Increasing urbanization in Pakistan will highlight the importance of that role in the future and the need to expand the Bank's role in terms of project loans, technical assistance and interchange of ideas on sector development.

B. Sector Experience of the Bank

185. The ADB has been active in the urban water supply and sanitation sector since the mid-1970s. Between 1974 and 1988, the Bank committed a total of \$165.8 million, of which: \$164.9 million was committed to project loans in Hyderabad, Faisalabad and Karachi; and \$850,000 was allocated to four technical assistance projects in Faisalabad, Hyderabad, Rawalpindi and the current Urban Sector Study. The assistance to the sector represents only 3.8 per cent of the Bank's total assistance to Pakistan of \$4,414 million as at the end of December 1988. This consists of \$2,014.5 million (45.6 per cent) in loans from ordinary capital resources, \$2,399.5 million (54.4 per cent) in concessionary loans from the Asian Development Fund (ADF) and \$15.8 million in technical assistance grants. All ADB's loans to the urban water supply and sanitation sector have been on concessional terms: interest rate 1 per cent per annum; grace period 10 years; repayment period 40 years. These loans are normally on-lent to the agency concerned at an interest rates of 5 per cent per annum with 5 years grace and a repayment period of 20 to 25 years.

186. The Bank's current policy towards the urban water supply and sanitation sector in Pakistan is to provide appropriate loans and technical assistance to the Government and people of Pakistan which will make a significant impact on the development of the sector both in terms of specific investment projects, institutional strengthening and effective financial management. The Bank also has a policy of entering into direct dialogue with Government at Federal, Provincial and Local levels on all key issues which affect sector performance.

187. In this context, it is important to highlight previous experience with the two Bank-financed projects in Hyderabad and Faisalabad. Completion of the Hyderabad project has been delayed by nearly seven years - the original completion date was the end of 1982 and now it is expected to be completed sometime in 1989. The main causes of the delay have been identified by the Bank as follows:

- (i) late recruitment of consultants (partly due to the political situation in Pakistan in 1976 and 1977);
- (ii) major cost overruns which required a reformulation of the project;

- (iii) long period (more than two years) taken by the Federal and Provincial Governments to approve the reformulated project;
- (iv) protracted negotiations between the Provincial Government and the Executing Agency (Hyderabad Development Authority) on the provision of local funds;
- (v) serious shortcoming the management of the project by the Executing Agency;
- (vi) poor performance of the project contractors; and
- (vii) poor financial performance of Hyderabad Water and Sanitation Agency (WASA), which has highlighted the need for regular and adequate tariff increases, improved cost control and consideration of debt service relief.

188. Similar problems have been encountered in the Faisalabad Project, which is also seven years behind schedule. The original completion date was September 1982, but actual completion is likely to be delayed until 1990. In addition, delays were caused by a proposal from the Executing Agency (Faisalabad Development Authority - FDA) to change the water source from groundwater to surface water from an irrigation canal (with which the Bank did not agree) and the need to recruit new consultants during the course of project implementation. The situation has been complicated further by the recent loss in early 1989, through fire, of some machinery and equipment for the sewerage component.

189. ADB's experience with these two projects is likely to lead to more emphasis on the following issues during future project preparation and negotiations with the relevant authorities:

- (i) realistic assessment of and political commitment to a financially viable organization which is supported by effective cost recovery;
- (ii) strengthening of institutional and financial capabilities;
- (iii) realistic assessment of implementation capacity and construction program;
- (iv) special attention to adequate site supervision and prequalification of contractors; and
- (v) contractors should be encouraged to bid with realistic current market rates which will ensure timely completion of the project and improved quality of construction.

C. Sector Support and Development

190. There are valid reasons why the Bank should strengthen and expand its support for the sector in view of:

- (i) the rapid growth in urban population;

- (ii) the need to improve and expand water supply and sanitation services;
- (iii) the need to improve public health and environmental quality;
- (iv) the need to raise the living standards of the urban poor; and
- (v) the need for international agencies like ADB to make a constructive and effective contribution to the socio-economic development in Pakistan, in line with Government's development priorities.

191. In terms of the broad issues of urban development, there is an argument for the Bank to become more aware of and involved in integrated urban development packages, of which water supply and sanitation is one important component. This is because many of the problems which afflict the urban water supply and sanitation sector are reflected in the general management and organization of urban affairs. Therefore, unless some of these broader issues are addressed, it is likely that the problem which constrains urban water supply and sanitation agencies will continue to persist. This suggests a broader and more integrated approach to urban development by ADB.

192. There are six areas where the Bank could provide specific support and advice to promote more efficient and effective development of the sector:

- (i) financial and accounting manual for urban finances;
- (ii) use of consultants;
- (iii) consultants and contractors procedures;
- (iv) training of engineers, accountants, and managers in line local authorities and line departments;
- (v) legislation; and
- (vi) study and field tests of cost containment and cost recovery procedures.

193. It is recommended that these topics should be discussed in detail with the Government of Pakistan to define the most appropriate ways and means in which the Bank can make an effective contribution in line with the recommendations set out in this Sector Study. The proposed establishment of an ADB representative office in 1989 will be a useful focal point in the future.

D. Financial Support

194. In line with the proposed investment requirements in Section IV, the proposed project packages for possible support by ADB in the urban sector are as follows:

VI. POSSIBLE PROJECT PREPARATION TECHNICAL ASSISTANCE (PPTA)

I. BACKGROUND

(i) Rawalpindi

195. The installed capacity of water supply facilities is rated at 44 million gallons per day (mgd). Water sources are Rawal Lake (21 mgd) and 82 deep wells spread over the city (23 mgd). However, because of a leakage problem with the old transmission line from Rawal treatment plant, the actual supply has been limited to 39 mgd, out of which about 10 mgd are supplied to the Cantonment area. At present, about 65 per cent of the 1.1 million population has individual house connections, 15 per cent uses public standpipes and 20 per cent uses other sources mainly private wells. The supply is intermittent (8-9 hours per day) and daily per capita consumption is 60-80 liters. Non-revenue water (NRW) is estimated at 50-60 per cent.

196. The sewerage system is inadequate to a large extent. Existing sewers can cover only a part of the city and there is no sewage treatment plant. In 1979, the Bank provided a technical assistance to formulate plans to increase the supply of drinking water and to improve sewerage system in Rawalpindi. ^{1/} The study recommended phased implementation, which included the following:

a. Water Supply

- (i) development of underground water (tubewells);
- (ii) construction of water supply system from Khanpur Dam;
- (iii) upgrading of distribution system; and
- (iv) rehabilitation of the existing facilities;

b. Sewerage

- (i) rehabilitation and improvement of primary, secondary and tertiary sewers; and
- (ii) construction of two sewage treatment plants.

Ongoing Project

197. Based on the recommendations of the study and other investigations conducted, some tubewells were installed throughout the 1980's. But major progress was achieved only in recent years. Japan International Cooperation Agency (JICA) completed recently a feasibility study for Khanpur Dam Scheme, and detailed design is expected to start in December 1989. The project is scheduled to be implemented from 1991 to 1994 and will cost about US\$140 million. The Overseas Economic Cooperation Fund (OECF) of Japan will finance about 40 per cent of the construction cost. The project components are: raw water channel from the existing Khanpur Dam, raw water reservoir, treatment plant, pumping station and transmission pipeline. The system will supply 51 mgd of treated water (first phase) to Islamabad and Rawalpindi. About 34.5 mgd are allocated for Rawalpindi, and it is estimated to meet the demand up to early 1990's combined with the capacity of the existing facilities.

^{1/} PPTA No. 297-PAK: Rawalpindi Water Supply and Sewerage, amount \$200,000, approved on 28 June 1979.

Proposed Projects

198. In line with the Khanpur Dam project, the Government is seeking Bank financing for a new project which aims at upgrading the existing system and strengthening the distribution system. The existing Rawal treatment plant will be rehabilitated and its capacity will be upgraded from 21 to 28 mgd. A new transmission pipeline will be constructed which will have 11 mgd of conveyance capacity taking into consideration deficiency in the existing one. The improvement and rehabilitation of the distribution system will also be given priority to accommodate increased water supply from the Khanpur Dam and the proposed Project and to decrease NRW. The Government is hoping to utilize Rawal Lake to the maximum extent possible because it is the most economical source for Rawalpindi. Water taken from Rawal Lake can reach the city by gravity while other sources need boosting up.

199. The sewer network needs extensive improvement. About 23 km of primary sewer is proposed for construction, and lengthy secondary and tertiary sewers will be constructed and rehabilitated. Two sewage treatment plants (East and West) are proposed to be built in the respective watersheds.

(ii) Mansehra

200. Mansehra City suffers from chronic shortage of drinking water. The existing system has a supply capacity of 0.7 mgd and serves half of the 39,000 total population. The supply is for about 3 hours per day. The surface water source is the Bhoot Katha river and water is pumped up to the city. There are no sewerage facilities.

Ongoing Project

201. A project to improve drinking water services is ongoing through local financing. Two tubewells of 0.36 mgd of the total production capacity are being developed 4 km apart from the city. Construction started in 1986 and will be finished by June 1990. However, this project can only meet the immediate demand and its operation is expensive due to the high cost of pumping.

Proposed Projects

202. The Government is proposing to develop two springs of about 1.5 mgd of cumulative capacity from which water can be conveyed by gravity flow. The Project will include about 18 km of transmission line and 30 km of distribution pipe. A combined sewerage and drainage system covering the whole city is also envisaged, which will include sewers, drains and treatment plant.

(iii) Larkana

203. Larkana City has a present population of 174,000. About 55 per cent of the population is provided with water through piped water supply (about 8 hours per day) and 35 per cent use handpumps. About 95 per cent of the households has flush toilets or pit latrines, but most of these discharge wastewater into open street drains or sewers. There is an oxidation pond which can treat sewage coming out from about 60 per cent of the city area.

Due to rapid expansion of the urban area, the vicinity of the pond is becoming densely populated and the city is confronted with serious environmental problems. Because of the lack of adequate drainage system, the city suffers from severe inundation during rainy days.

Ongoing Projects

204. A water supply project (phase III) financed by the Government of Pakistan is ongoing and its target completion date is June 1990. The project will increase supply capacity from the present 2.8 mgd to 5.9 mgd. The water sources are eight deep wells. The construction cost of the project is about US\$3.0 million and is being financed locally.

205. The Larkana sewerage project (phase IV) is being implemented as well. Its components are: about 18 km of surface drains, 4.2 km of sewer, one pumping station and a treatment plant (oxidation pond). The project started in 1985 and its target completion date is June 1989. However, out of the total construction cost of about \$0.8 million, only 23 per cent has been invested to date and project delay is inevitable.

Proposed Projects

206. A water supply project (phase IV), with about 4 mgd capacity, has been envisaged to meet future demands. Two irrigation canals are being considered as possible water sources to avoid the high pumping cost of deep wells.

207. A sewerage project (phase V) has also been proposed to meet the requirements up to the year 2000. It includes construction and rehabilitation of the existing sewer/drainage combined system and a sewage treatment plant. To address environmental problems with the existing oxidation ponds (see para. 10), Larkana City considers upgrading the treatment process of the existing facilities by introducing mechanical treatment. The technical and economical aspects of said improvement should be carefully studied because it could lead to a high capital investment and high O&M costs.

208. The Government has given higher priority to sewerage projects rather than to water supply projects and considers the proposed sewerage project (phase V) for Bank financing. However, Mission is of the opinion that the financing scheme for the ongoing sewerage project (see para. 12) should be closely looked into as well, particularly with regard to the considerable delay in the completion of the project.

(iv) Shikarpur

209. Shikarpur City has a present population of 125,000. The city is not provided with piped water supply and the people use shallow handpumps. There is an existing sewerage system; sewerage projects (phases I, II, III) have been completed. Sewers, drains and a treatment plant (oxidation pond) were constructed under these projects covering a part of the city. However, the city, like Larkana, is known to have serious inundation problems.

Ongoing Projects

210. There are two sewerage projects which are under way -- phase IV and the New Shikarpur. Details of these two local financing projects are as follows:

	<u>Phase IV</u>	<u>New Shikarpur</u>
i) Components	drains, sewers 1 oxidation pond	drains, sewers 1 oxidation pond
ii) Construction period	1985-1990	1984-1990
iii) Construction cost (US\$ '000)	120	360
iv) Progress (as of September 1989)	84%	39%

Apparently, there will be delay, particularly for the New Shikarpur project, because of difficulties in funding arrangements.

Proposed Projects

211. The city of Shikarpur proposed water/sewerage project to meet the demand up to the year 2000. But, as in the case of Larkana, the provincial government gives higher priority to sewerage projects because sewerage and drainage systems seem to have the most urgent problems in the city. The government considers that, for the time being, drinking water can be obtained from existing handpumps without difficulty. The project components are: primary, secondary and tertiary sewers and a treatment plant (oxidation pond). Rehabilitation of the existing treatment plant is also envisaged. The Mission considers that the progress of ongoing projects should also be monitored carefully.

(v) Quetta

212. Two projects of considerable sizes for water supply and sewerage are under implementation or will start soon in Quetta City. It was learned that the Federal Government had prepared the list of future projects for international financing, mainly the Bank, when the information possessed by the Federal Government in regard to financial assistance had not been properly updated. Kuwait and Dutch Governments are involved in bilateral financing for water supply and sewerage projects, respectively. During the Mission's visit, Quetta proposed a future water supply project and a drainage project. ^{1/} However, it does not seem appropriate for these projects to be included in the proposed TA in the light of their lack of urgency and/or difficulties in local financing.

^{1/} Unlike the rest of the proposed cities, Quetta City adopted a separate system of sewerage and drainage to prevent clogging of the sewer and left the drainage component for future implementation.

II. PROPOSED PROJECT PREPARATORY TECHNICAL ASSISTANCE

213. The Mission is of the opinion that projects within four cities, except Quetta, would be studied under the proposed TA. The TA will support a comprehensive study in the water supply and sanitation/sewerage fields for the proposed cities and will examine the technical, economic, financial and institutional aspects of the formulated projects, which include tentatively:

- (i) Rawalpindi and Mansehra: water supply and sewerage/drainage;
- (ii) Larkana and Shikarpur: sewerage/drainage.

214. The cost of the proposed PPTA is estimated at \$650,000, out of which about \$600,000 is expected to be financed by the Bank on a grant basis through French funds. The study period will be approximately six months.