Sindh

Strategic Provincial Investment Plan
and Project Preparation for
Rural Water Supply,
Sanitation and Health.

Draft Investment Plan

July, 1989

Wardrop - Acres
Cowater International
NESPAK.

Inflation rate (World Bank)
+ 10% - 15% (World Bank?)
+ more for construction material

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EXECUTIVE SUMMARY

THE NEED

In the budget recently announced by the Government of Sindh, about Rs. 246 million of the Annual Development Programme was allocated for rural water supply and drainage schemes to be implemented by the PHED. A further Rs. 22 million is expected to be available to the Sector through SAZDA and the Local Councils. Because of economic constraints this level of investment is expected to continue for the remainder of the Seventh Plan and for the Eighth Plan period. However, the level of investment required to reach the target coverage for water supply and drainage is estimated to be in the range Rs 400 to 500 million per year. Moreover the Government is faced with increasing cost to operate and maintain the water supply and drainage facilities.

The current rate of Government investment is not sufficient to achieve the desired coverage with acceptable water supply drainage facilities and human waste disposal facilities. In addition, a redirection of the Annual Development Programme is required in order to maximize the effectiveness of the limited financial resources. In particular, there is a need to establish a process to ensure that the facilities provided can be sustained over the long term. The intent of the proposed donor investment is to assist the Government to incorporate into the ADP, procedures that will result in appropriate, affordable sustainable water supply, drainage and human waste disposal facilities and in the process contribute significantly to increasing coverage.

goal.

THE PROPOSED STRATEGY

The main points of the proposed strategy for future investments in the Sector are:

- consolidate past investments through rehabilitation of existing facilities;
- shift the emphasis to smaller settlements in which 70 percent of the rural residents live and, wherever possible, use hand pump type technologies which are significantly lower in cost than pipe borne schemes;

- as a prerequisite to implementing a water supply or drainage scheme, establish village organizations to be involved in the all aspects of planning, design and construction and then assume responsibility for the on-going operation and maintenance of the scheme; and

- integrate training, hygiene education and the promotion of latrines construction as part of the process of providing the water supply and drainage facilities.

The objective would be to have incorporated these initiatives into the Annual Development Programme by the middle of the Eighth Plan period.

THE PROPOSED DONOR INVESTMENT

To assist the Government of Sindh introduce the strategy changes and in the process increase coverage, an investment by international donor agencies equivalent to Rs 850 million is proposed over the period 1990-98. The annual level of investment would rise from about Rs. 65 million in 1990/91 to Rs. 140 million in 1994/95. This donor investment would form an integral part of the overall Sector development programme of the Government.

So what does the government put in?

DONOR INVESTMENT IN SEVENTH PLAN

In the Seventh Plan period the proposed components and the average annual allocation are as follows:

Component	Average Annual Allocation Rs. (million)
Village participation Programme	0.8
Rehabilitation	17.6
New Water Supplies in brackish zone of barrage area	28.0
Water Supplies in Arid Zone	8.0
Latrine promotion	0.8
Training and Institutional Strengthening	11.2
Hygiene Education	7.2
Monitoring and Evaluation	4.8
Total	Rs. 80 Million

Village Participation Promotion

A Central theme of the proposed investment strategy is to shift the responsibility for the operation and maintenance of water supply and drainage facilities from the Government to the beneficiaries. This would be accomplished by establishing village organizations which would be involved in the entire process of planning and implementing their water supply or drainage schemes. This is believed to be the best means of ensuring that the facilities continue to perform as intended over the long term. In the process the burden of financing operation and maintenance will be shifted from the Government.

Formation of a village organization to assume responsibilities for the facilities is proposed as a prerequisite for the Government to undertake the rehabilitation of an existing or the implementation of a new water supply or drainage scheme. The government agencies

→ Criteria to be established (Indicators) iii → phasing required.

assigned to implement the scheme PHED, SAZDA and RDD, would be made responsible for arranging for the establishment of the village organization.

Rehabilitation

An estimated 75 per cent of the nearly 300 PHED water supply and drainage schemes require rehabilitation. The target for the Seventh Plan period is to rehabilitate 80 water supply and 24 drainage schemes. The rehabilitation programme would be undertaken through PHED using existing staff. An expatriate Team Leader would be engaged to initiate the programme with, if necessary, a Pakistani consultant engineer to supplement PHED staff.

New Water Supplies

The intention is to concentrate on new water supply schemes in the brackish water zone of the barrage area. Communal tanks drawing from a filtered canal source would be provided for medium size villages (500-1000) and communal hand pumps either situated near an irrigation water course or drawing from a hand dug well or sand filter unit near the water course would be provided for small villages (less than 500). The target for the Seventh Plan is to complete schemes in 45 medium size villages and 330 small villages.

The Public Health Engineering Department would be assigned responsibility for the schemes in the medium size villages and Rural Development Department for those in the small villages. An expatriate Team Leader would be assigned to initiate the project.

Water Supplies in Arid Zones

This component would consist of:

- improvement to existing hand dug wells in Thar, Nara and Kohistan;
- construction of a few schemes based on dams on small streams in Kohistan; and
- support for continuation of ground water exploration.

The Sind Arid Zone Development Authority would be assigned as the lead agency with assistance by an expatriate ground water specialist.

Latrine Promotion

This component would consist of installing subsidized demonstration latrines as a means of encouraging householders' to invest in latrines and developing the necessary construction skills in the villages. This initiative would be implemented in the villages targeted for the rehabilitation and new water supplies.

Training and Institutional Strengthening

Approximately 15 per cent of the investment in the Seventh Plan period would be allocated to training and institutional strengthening to prepare government staff to implement the revised strategy. Training would encompass operators of water supply and drainage schemes, staff to implement the village participation and hygiene education components, and technical and administrative staff of the government agencies. The Local Government Academy would be focal point for the training. Training coordinators are proposed for the PHED and RDD and expatriate specialists to establish the programmes.

Hygiene Education

Hygiene education is proposed as an integral part of the process of delivering the water supply and drainage facilities so that the villagers have the knowledge needed to maximize the benefits of the improved facilities. During the project implementation period hygiene messages would be delivered directly by PHED, SAZDA and RDD staff with the assistance of local volunteers. This would be supported by a broad based hygiene promotional campaign through the mass media, schools and health services. A team of expatriate and Pakistani specialists would be engaged to initiate the programme.

Programme Management, Monitoring and Evaluation

An overall management, monitoring and evaluation unit is proposed to be established in the Directorate of Monitoring and Evaluation of the Planning and Development Department. An expatriate Programme Director would be assigned. The unit would ensure coordination of effort, monitor progress and evaluate the processes and technologies being applied.

PROPOSED DONOR INVESTMENT IN THE EIGHTH PLAN

At the end of the Seventh Plan period a complete assessment would be made of the processes and technologies adopted and a detailed programme for the Eighth Plan period would be developed. The anticipated direction of the donor investment during the Eighth Plan is;

- gradual incorporation into the Annual Development Programme of the processes and technologies demonstrated by the donor investment components;

- responsibility for funding of training, village participation, hygiene education and latrine promotion components gradually shifted to the Government and donor investment emphasis shifted to supporting installation of facilities to increase coverage;

- expansion of the water supply development in small and medium size settlements and some support to large settlements;

- emphasis on implementation of drainage schemes;

- expansion of the water supply improvements component in the Arid Zones and commencement of deep tube well construction in areas identified in the ground water supply; and

- expansion of the latrine promotion campaign.

PROGRAMME IMPLEMENTATION STRATEGY

The programme components would be delivered as one or more integrated packages wherein the implementation of a rehabilitation initiative or a new water supply initiative should be accompanied by the village participation, training, and hygiene education components.

1. INTRODUCTION

The Government of Sindh has undertaken an ambitious programme to provide water supply, sanitation and drainage facilities to rural settlements. The Seventh Five Year Plan set a target of increasing water supply coverage for the rural populace to 75 %. Guidelines were established for target areas for water supply and drainage with an emphasis on low level technologies, in particular hand pump type schemes, with pipe borne schemes restricted to large settlements.

At a National Policy Conference on Rural Water Supply and Sanitation held in Islamabad in April, 1988, delegates proposed a strategy for future investments in the Sector which would expand the role of the beneficiaries in the development of projects, including financing of operations and maintenance costs. Hygiene education was proposed as an integral part of delivering water supply and sanitation facilities. Strengthening of Sector institutions and enhancement of the role of the private sector were emphasized. It was agreed that technologies which are appropriate, sustainable and affordable and which beneficiaries want and can afford should be adopted.

The purpose of this report is to outline a revised investment strategy for the balance of the Seventh Five Year Plan with recommendations for the Eighth Plan. The strategy reflects the principles outlined above and is intended to maximize the benefits of the investments being made. The strategy has been developed by a team of Pakistani and international consultants working with senior staff of the government agencies involved in the Sector.

2. RURAL WATER SUPPLY, SANITATION, DRAINAGE AND HEALTH EDUCATION SECTOR

2.1 General Considerations

2.1.1 Scope of Sector

Rural Water Supply

Rural refers to settlements which do not have a Town Committee. Normally this means settlements with a population of less than 5000. Water supplies vary with physiographic area but consist mainly of ground water abstracted via hand pumps, open wells and tubewells, and surface water obtained from irrigation canals, and from rivers.

Sanitation

Sanitation includes drainage (collection and disposal of sullage water), disposal of human wastes, and disposal of solid waste. Most of the drainage facilities in rural settlements consist of open drains which may or may not be lined. Disposal of human wastes refers mainly to latrines but could also encompass septic tanks and small bore sewers, where appropriate.

Health

Within the context of the programme under consideration, the health aspect of the Sector is constrained to hygiene education related to water usage and disposal of human wastes.

2.1.2 Physiographic Zones

For the purpose of planning for the Sector investments, the Province has been subdivided into 5 physiographic zones as shown on Figure 1. The zones and their approximate areal extents are:

Zone	Area (Sq. Km)
Barrage Brackish Water Zone	39,000
Barrage Sweet Water Zone	25,000
Delta Zone	8,600
Hilly Desert Zone (Kohistan)	24,600
Sandy Desert Zone (Thar, Nara)	44,600
Total	141,800

The portion of each District that is occupied by these physiographic zones is indicated on Table A-1 in the Appendix.

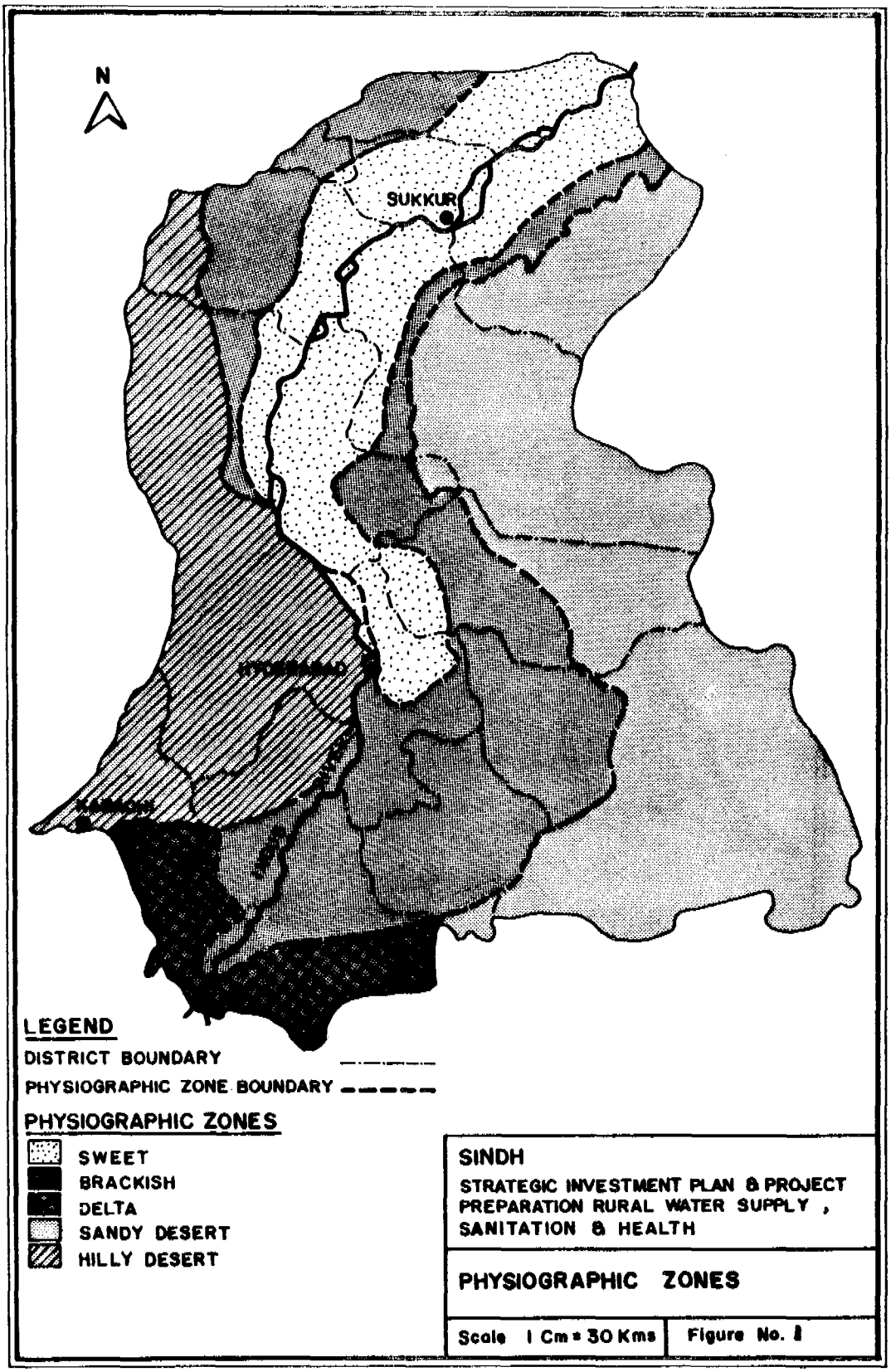
Barrage Brackish Water Zone

The brackish water zone of the barrage area constitutes about 28% of the total area of the Province. Over most of the area, ground water has a Total Dissolved Solids content in excess of 2500 ppm. However, there are pockets of sweet water immediately adjacent to the irrigation canals and distributaries. This sweet water is available for extraction using the appropriate technology.

Most of the approximately 5.2 million rural residents in this zone use water taken from the canals and distributaries without treatment. The bacteriological quality of this water is very poor as indicated by tests conducted by the PHED and the users generally have poor health as a result.

Barrage Sweet Water Zone

The barrage sweet water zone consists primarily of a belt along both sides of the Indus River where infiltration is sufficient to maintain a balance between the upper lens of sweet water and the underlying brackish water. The zone occupies about 18% of the area of the


N
SUKKUR
HYDERABAD
KARACHI
LEGEND
DISTRICT BOUNDARY
PHYSIOGRAPHIC ZONE BOUNDARY
PHYSIOGRAPHIC ZONES
SWEET
BRACKISH
DELTA
SANDY DESERT
HILLY DESERT
SINDH
STRATEGIC INVESTMENT PLAN & PROJECT PREPARATION RURAL WATER SUPPLY , SANITATION & HEALTH
PHYSIOGRAPHIC ZONES
Scale 1 Cm = 30 Kms
Figure No. 1

Province. Most of the estimated 5.3 million rural residents in the sweet water zone obtain their water supply from private hand pumps.

Sandy Desert Zone (Thar and Nara)

The sandy desert zone occupies about 31% of the Province and consists of relatively stable ancient sand dunes with intervening valleys which are lined with surficial silts. Rainfall in the zone varies from over 10 inches per year in the Nagar Parkar area in the south east to less than 4 inches in the Nara area in the north. However the rainfall is very intermittent. There have been periods in which practically no rain has fallen for over three years.

Surface water supplies are practically non-existent. Most of the approximately 1.0 million rural residents in this zone rely on hand dug wells. The water in most of these wells is brackish and many go dry in extended periods of drought. Moreover, most open wells are polluted as a result of methods used to lift the water. Tarais (ponds) provide a source for a short period after the rains.

Hilly Desert Zone (Kohistan)

The hilly desert zone occupies about 17% of the Province and consists of a series of parallel hill ranges which on the extreme western edge of the Province reach an elevation of 1800 meters. The area is underlain by sedimentary formations with alluvial sands and gravels in the main valleys. The average annual rainfall is less than 7 inches.

Most of the 0.9 million rural people in this zone depend on hand dug wells for their water supply. These are completed in the alluvial deposits of the river channels and in the sedimentary formations. Some tube wells have been completed but the water is often brackish. There are a few piped water supply schemes based on large diameter open wells completed in the river channel and equipped with mechanized pumps. These open wells capture the thin layer of sweet water that lies at the base of the alluvial deposits and above the underlying brackish water. There are also a few villages that obtain water from springs or from small dams.

Delta Zone

The Delta of the Indus River forms a low lying poorly drained plain along the Arabian Sea which constitutes about 6% of the area of the Province. Ground water is brackish throughout the area except for small lenses of sweet water along the few canals and distributaries that provide irrigation water. Most of the approximately 0.2 million rural residents in the zone use water drawn directly from the canals. Because much of the area receives irrigation water only half of the year, people store the canal water in surface reservoirs.

2.1.3 Administrative Divisions

The Province is subdivided into 14 districts as indicated on Figure 2. A District Council, composed of elected representatives and government appointed administrators and technical staff, is responsible for providing rural services.

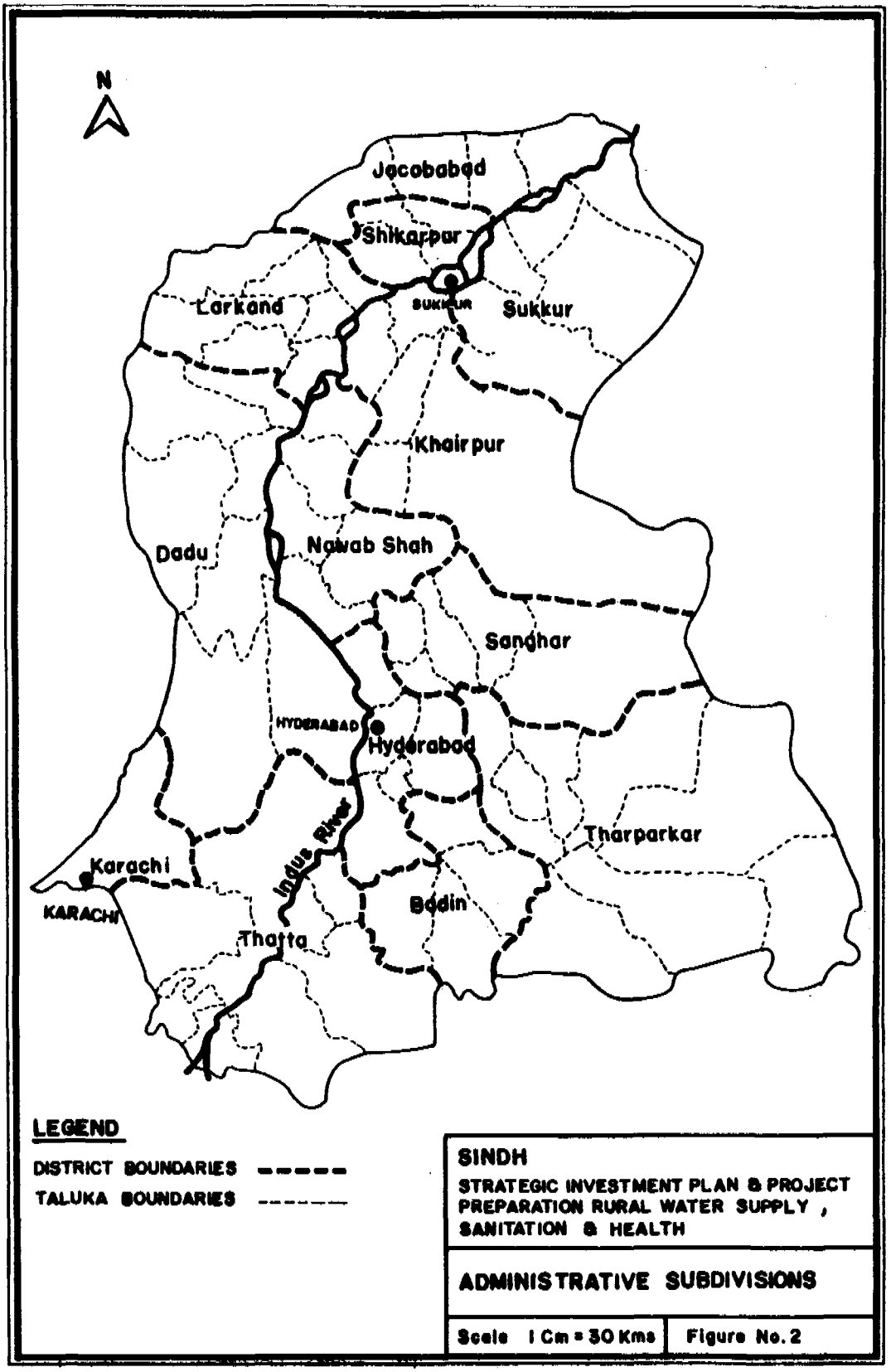
Each district is divided into from four to nine talukas. There are a total of 74 talukas in the Province. There is no administrative organization at the taluka level.

The talukas are subdivided into Dehs which are the basic unit used for tax collection. There are 5,925 dehs in the Province, each occupying an average of 24 sq. km. A group of 7 to 11 Dehs constitute the area of a Union Council. There are 629 Union Councils in the Province.

2.2 Sector Institutions

The main participants in the rural water supply, sanitation and hygiene education sector in Sindh are:

- Planning and Development Department;
- Public Health Engineering Department;
- Rural Development Department;
- Local Government Department;
- Sind Arid Zone Development Authority;
- Health Services;
- Local Councils;
- Private Sector;


N
Jacobabad
Shikarpur
Larkand
SUKKUR
Sukkur
Khairpur
Dadu
Nawab Shah
Sanghar
HYDERABAD
Hyderabad
Tharparkar
Karachi
KARACHI
Indus River
Badin
Thatta
LEGEND
DISTRICT BOUNDARIES
TALUKA BOUNDARIES
SINDH
STRATEGIC INVESTMENT PLAN & PROJECT PREPARATION RURAL WATER SUPPLY , SANITATION & HEALTH
ADMINISTRATIVE SUBDIVISIONS
Scale 1 Cm = 30 Kms
Figure No. 2

- Villages/Rural Settlements;
- Non-Government Organizations; and
- International Donor Agencies.

2.2.1 Planning and Development Department

The Planning and Development Department is responsible for preparing the budget for the Annual Development Programme (ADP) and for monitoring and evaluating the performance of the executing Departments and agencies. Proposals for new water supply and drainage schemes are received from Members of Provincial Assembly, Members of the National Assembly, Senators and advisors. These proposals are reviewed for feasibility by the Public Health Engineering Department and presented to the Chief Minister for final approval and inclusion in the Annual Development Programme.

2.2.2 Public Health Engineering Department

The ADP funds, allocated to both urban and rural water supply and drainage schemes, are disbursed through the Public Health Engineering Department (PHED). The Department has a staff of over 1300 professional and support staff organized into 5 Circles, and 19 Divisions with offices in almost every taluka throughout the Province. A complete listing of the staff is provided on Table A-2 in the Appendix.

The disbursements by PHED over the past 10 years have increased significantly. At the beginning of the Sixth 5-Year Plan (1983/84) the allocation was Rs. 155 million. By 1988/89 the allocation rose to Rs. 345 million. These funds have been directed to both rural and urban water supply and drainage. The portion allocated to rural water supply increased dramatically in 1986/87 as indicated in Table A-6 in the Appendix and was Rs. 279 in 1988/89.

For the 1988/89 budget year about sixty percent of the rural sector allocation was for water supply and forty percent for drainage schemes. The majority of the water supplies have been pipe borne schemes in villages of over 1000 population and have been based on either a canal or tubewell water source. The drainage schemes have also been placed in these larger villages but not always in those villages that have received a pipe borne water supply scheme.

The PHED has also been assigned responsibility for the operation and maintenance of the water supply and drainage schemes that it has implemented. The costs for this service are covered by an allocation from the recurring budget. Actual costs in 1988/89 are estimated to have been Rs. 16 million although the allocation was Rs. 54 million.

2.2.3 Rural Development Department

The Rural Development Department (RDD) provides technical support to the Union Councils and does not receive a direct allocation from the ADP. The Department consists of a Director General located in Karachi and Directors at Division level with Assistant Directors located in each District. There is a Technical Wing headed by a Director based in Hyderabad and there are two executive engineers; one located in Sukkur and the other located in Hyderabad. At the District level there are two to five Assistant Engineers and a District Planning Officer. Staffing is indicated in Table A-3 of the Appendix.

2.2.4 Local Government Department

The Local Government Department supervises District and Union Councils and in particular assists in the disbursement of ADP grant-in-aid funds for development works. There is a Director at each of the Divisional offices in Hyderabad and Sukkur, and an Assistant Director in each District headquarters. There are 70 Development officers distributed throughout the District offices. A breakdown of the Department establishment is provided on Table A-4 in the Appendix.

2.2.5 Sind Arid Zone Development Authority

The Sind Arid Zone Development Authority (SAZDA) was established to plan and implement, on a pilot project basis, development programmes for the Thar and Kohistan Arid Zones. This includes the development of water supplies. SAZDA has undertaken a few small projects involving the construction of water tanks and dug wells. However, the most significant initiative being implemented by SAZDA in the Sector is a ground water exploration programme that is being undertaken in conjunction with WAPDA with technical assistance provided through the British Overseas Development Administration (ODA). Currently the programme involves the drilling of 11 testholes in the Sandy Desert Zone (Thar).

SAZDA has established three regional offices; Kohistan based at Sehwan, Nara based at Khairpur, and Thar based at Mirpur Khas, and a Hydrogeological Wing based at Hyderabad. Field stations are situated at three locations in each Region.

Funds for the development activities of SAZDA are allocated from the Annual Development Programme. For 1982/83 the allocation was only Rs. 3.0 millions but it rose dramatically to Rs. 50.0 million by 1987/88. However the 1988/89 allocation was reduced to Rs. 39 million. About Rs. 10 million of the ADP allocation to SAZDA is invested in water supplies and ground water exploration.

2.2.6 Health Services

The most relevant section of the Department with respect to rural water supply and sanitation is the Health Services which is headed by a Director based in Hyderabad. There are three main initiatives that are being undertaken by Health Services that are of particular interest, namely:

- Primary Health Care Project;
- Traditional birth attendants or dais training programme; and
- Mobile Health Units.

Under the Primary Health Care Project some 300 Health Technicians have been trained and assigned to Basic Health Units throughout the Province. Lack of transport has confined the Health Technicians to the immediate vicinity of the Basic Health Units. However, they have been exposed to a thorough training programme which prepares them to assume a lead role in health education.

The training of traditional birth attendants (TBA) has been an important initiative of Health Services. Up to the end of 1988 a total of 6660 TBA's had been trained.

Health Services operates mobile health units which are based at the taluka headquarters town at the Rural Health Centre. Each team consists of a Lady Health Visitor, a Medical Technician, a Dispenser/Vaccinator, and an Ayah. The functions of the mobile teams include giving immunizations, advising on the use of Oral Rehydration Salts (ORS), and imparting some basic knowledge of hygiene. There were 15 such mobile teams in operation in 1988.

The Health Technicians, TBA's and Mobile Health Units represent potential deliverers of hygiene education messages. At present the amount of hygiene education achieved by the Health Department staff is very limited because of the many other duties that are more immediate. Staff shortages are being experienced by the Department at all levels in the rural areas. In particular there is an acute shortage of Lady Health Visitors in the more remote areas.

The allocation in the ADP to rural health services rose from Rs.27 million for 1982/83 to Rs.224 million for 1988/89 representing 27 and 61 percent respectively of total allocation to the Health Sector.

2.2.7 District Councils

The District Councils are comprised of elected members each of which represents about 20,000 to 25,000 people with 60 to 80 members per council. A Chairman is elected by the members. Attached to each District Office are a Chief Officer, Accounts Officer, Taxation Officer, an Executive Engineer and one or two Assistant Engineers. All of these officers are drawn from the Local Council Services. Support staff are recruited directly by the Council. A listing of typical complement of District Council establishment is provided in Table A-5 in the Appendix.

The District Councils have limited capability to invest in the development of water supply and drainage works. The District Councils are allocated a portion of the ADP under the Matching Grant-in-aid programme which has ranged from Rs. 23 million to Rs. 48 million per year during the Sixth Plan period. In addition, each district allocates a portion of its self-generated funds to development works. Table A-7 shows an annual budget summary for Khairpur District. For example in 1986/87 in Khairpur District the amount of Matching Grant-in-Aid was Rs. 0.74 million and the allocation of self generated funds to development works was Rs. 4.5 million.

The District Councils have concentrated most of their effort on schools and roads and have restricted activities in water supply to the provision of hand pumps. For example, in the case of Khairpur District, the amount budgeted for water supply and drainage schemes was Rs. 0.72 million for 1988/89 and was designated for purchase of hand pumps, construction of communal water tanks, construction of open wells and improvements to drainage.

2.2.8 Union Councils

The lowest level of public administration is the Union Council which is an elected body composed of members representing from 1000 to 1500 people. There are from 10 to 20 members in each Union Council. Members are elected for a term of four years. The Union Councils have been assigned responsibility for implementing and maintaining small water supply schemes. In this regard the Union Councils are assisted with technical support from the Rural Development Department.

The funds available to the Union Councils are quite limited and do not match the prescribed scope of responsibilities. For example, of the 259 councils in the Hyderabad Division, 170 generated less than Rs.5000 in 1987-88. Table A-8 in the Appendix shows a sample budget statement for a Union Council. In most cases, water supply development works are limited to the purchase of a few hand pumps and repair of water tanks, tarais and open wells.

2.2.9 Non-Governmental Organizations

The Social Welfare Department reports that there are about 250 non-government organizations involved in rural development. However, most make little contribution to the Sector. The most active are:

- Rattanabad Social and Agricultural Extension Centre;
- Agha Khan Foundation; and
- Baanhn Beli;

Rattanabad Social and Agricultural Extension Centre

The Rattanabad programme covers about 60 villages in the vicinity of Mirpur Khas in Tharparkar District. The focus of the activities of the Centre is on agricultural cooperatives which are composed of members from three or four villages and are set up to assist small land holders with credit and agricultural extension services. Health, Hygiene education, water supply and sanitation are attached to each cooperative.

The Rattanabad area lies in the brackish water zone and thus most of the people have been using water taken directly from the irrigation canals. The Centre promotes the installation of communal hand pumps which are based on one of three supply sources:

- hand bailer tubewells installed adjacent to irrigation canals or distributaries to capture sweet water derived from infiltration of the irrigation water;
- hand dug wells adjacent to irrigation canals or distributaries; and
- hand pump drawing from a sand filter unit which is used to treat water from the irrigation canals.

The assistance provided by the Centre for development of a water supply includes test boring to determine if sweet water is available and supply of cement for the concrete pad. The villages pay a nominal fee for the test boring, pay for the supply and installation of the pump and the placement of the concrete pad.

The Centre also has a latrine construction programme. A promotion campaign stressing health benefits is used to gain commitment from households. The Centre provides cement, ferro-cement rings, the pan, and bricks. The owner pays Rs.350 plus providing the labour and the superstructure.

For the health programme, the centre:

- trains village health workers and dais;
- conducts hygiene education sessions using audio-visual equipment in the villages;
- provides medicines at a cost of Rs.15 per month per household; and
- provides vaccinations and family planning advice.

The Centre is supported by Oxfam.

Agha Khan Foundation

The Agha Khan Health Services with support from the Canadian International Development Agency is involved in training health workers in Primary Health Care methods. The trainees include Lady Health Workers and dais.

A community oriented training demonstration area has been established at Vur in Thatta District. The concept being adopted is that the people participate in directing the health programme for their community.

Baanhn Beli

The Baanhn Beli organization has focused on development works in the Thar desert. The organization has sponsored the construction of hand dig wells and training of women health educators.

Others

Other NGO's that are actively involved in the sector are:

- Sindh Rural Workers Cooperative Organization which is supporting in efforts to improve water supply and sanitation in rural settlements in the vicinity of Karachi;
- Sindh Graduates Association who are mainly supporting programmes of preventative medicine such as vaccinations and eye camps; and
- Goth Sudhar Sangat which is a movement consisting of independent chapters established in about 80 villages to promote development works.

2.2.10 Donor Agencies

The main donor agencies participating in the rural water supply, sanitation and health sector in Sindh are:

- UNICEF;
- Canadian International Development Agency;

- Overseas Development Administration; and
- German KFW/GTZ

UNICEF

UNICEF activities in the rural water supply, sanitation and health sector in Sindh include:

- support to Health Services for the expanded programme of immunization, the dais training programme, and the diarrhoea control programme;

- assistance to Public Health Engineering Department for development of ground water supplies in the arid zones (completed);

- assistance to the Rural Development Department for installation of about 2300 hand pumps and improvement of hand dug wells and tarais; and

- pilot project on water supply and sanitation in six villages through the Rural Development Department.

UNICEF has prepared a comprehensive national programme for the period 1988-92 which would allocate US$ 21.5 million to water, sanitation, and hygiene education. The portion that would be allocated to Sindh has not been determined.

Canadian International Development Agency

The main involvement of CIDA in Sindh has been the dais training programme and immunization programmes being implemented through Health Services. The commitment for the period 1987 to 1994 is about US$ 17 million. In addition CIDA has funded this Strategic Provincial Investment Plan and Project Preparation effort.

Overseas Development Administration

ODA has been providing technical assistance to Sind Arid Zone Development Authority in the implementation of an exploration programme in the Thar desert area. This has included provision of some geophysical equipment and technical advisory service for test hole drilling.

German KFW/GTZ

A German/WAPDA project for ground water exploration has been under way for several years in the eastern part of the Thar desert. An inventory of existing wells, and airborne and ground geophysical surveys have been completed. The results of the surveys have not yet been published but it appears that there is a limited amount of water of acceptable quality and quantity available within the area surveyed.

2.2.11 Private Sector

The private sector makes a major contribution to the provision of water supply and sanitation facilities in rural Sindh. The main participants are involvement are artisans, manufacturers, consulting firms and contractors.

Artisans

From discussions held with house holders and retailers in the rural areas, there appears to be no shortage of artisans such as plumbers, hand pump installers, and masons, for undertaking work in the Sector. However, all are agreed that some training is required for improving the quality of work and installations. It appears that training is provided on-the-job by parents. Normally, at about age 40 to 50, the father retires and becomes a retailer in the sector and the son takes over as a master craftsman. Some become petty contractors working for the PHED and RDD.

Well digging is undertaken by villagers themselves in most areas. Where wells are lined, trained masons are employed. Linings used are either new brick linings or stone recovered from abandoned dry wells. However, owing to the relatively high costs of open wells, there is a tendency to replace these by hand pumps in the sweet water zone and in the brackish areas where perennial canal irrigation is available.

Almost all hand pumps are installed by private sector artisans. Hand pumps are installed using the bail down method. The equipment consists of a bailer at the end of a cable which passes over a pulley at the top of a tripod. Most of the drilling is done manually. Depths in the sweet water and brackish water zones range from 30 feet to 125 feet and cost Rs. 3 to 4 per foot. Pipes used are generally of a low quality. Only about 10 per cent of the

installations use the high quality pipes manufactured by Karachi Pipe Mills or International Industries Ltd.

Manufacturers

There appears to be adequate manufacturing capacity to meet the needs of the Sector both provincially and nationally. Most of the plants are located in Karachi. High capacity, quality pumps and motors are produced by multinational firms. Galvanized iron, mild steel and asbestos cement pipes of PS specifications are manufactured at three factories. Each of these units, however, has some spare capacity to meet additional demand. Sanitary ware of international standards is manufactured by two units and each has spare capacity to meet expanded needs. Caste iron hand pumps of an indigenous design are manufactured by three units - one in Kotri and two in Sukkur.

Consultants

Of the more than 50 consultants registered by the Pakistan Engineering Council in the Sector only two appear to have experience in designing water systems in the rural areas - Techno Consult and Engineering Associates. Both have worked for the Baluchistan Integrated Area Development. In addition two Architects/Planners (Arif Hassan and Khalid Ashfaq) have worked on and designed low cost appropriate technology based water supply schemes in the rural areas for private sector clients and donor agencies both in Baluchistan and Sindh (Thar Desert). Techno-Consult is the only consultant firm which has designed slow sand filters for water supply systems.

Contractors

PHED has a tradition of implementing each rural water supply and drainage scheme through several small contracts. As a result there has been little opportunity for large contractors to work with the Department and therefore, large contractors have little experience with village water supply and drainage schemes. Most small contractors lack the financial, equipment and technical resources to overcome difficulties. This results in poor quality of construction and delays in implementation.

The PHED maintains a list of registered contractors that have been approved for certain types of work. On the other hand, because of the small works undertaken, the RDD

operates through petty contractors. Discussions with contractors and department officers suggest that the skills of managers and artisans employed by contractors need to be upgraded.

2.2.12 The Rural Settlements

According to the Rural Settlement Surveys conducted in the period 1982-86 there are about 69,000 rural settlements in Sindh. However, using the definition of a village as being a settlement composed of ten households or more, there are an estimated 33,000 villages in the Province.

Most large villages are comprised of several ethnic communities while in almost half of the small villages the people are of the same ethnic group. There are few artisans in villages with less than 500 people. In over 80 per cent of these small villages surveyed by the Sindh Team there was no mason. On the other hand there is are at least 2 masons in over 60 per cent of the large villages.

Based on the surveys conducted by the Sindh Team of sociologists, there are recognized self help groups in about 75% of large villages (over 1000) 52% of medium villages (500-1000) and only 30% of small villages. There self help groups or village organizations are informal. They meet from time to time to deal with problems of mutual concern and undertake improvement works such as drains, and repairs to wells and tarais.

Improved water supply and drainage are indicated to be first priorities in 50 to 60 per cent of the large and medium size villages but in only 30 per cent of the small villages.

2.3 Current Water Supply Situation

The available data as sufficiently reliable to allow only a rough estimate of the percentage of the rural population that has access to a water supply of acceptable quantity and quality.

According to the 1980 Housing Census the main sources of water used by rural households in Sindh and their estimated percentages were hand pumps (38%), canals, ponds, and streams (33%), dug wells (20%) and pipe borne supplies (9%). A detailed breakdown by district is presented on Table A-9 in the Appendix.

The Rural Settlement Survey conducted in the period 1982-86 suggested that about 29 per cent of rural residents have hand pumps. The PHED reported that its pipe borne schemes reached 5 per cent of the rural population at the end of June 1988.

Normally, hand pumps and piped water supplies are considered to provide adequate water supplies while dug wells and surface sources such as canal water are not considered acceptable because of bacteriological contamination. However, sampling conducted by the Sindh Team suggests that at least 50 per cent of the hand pump wells are polluted and many of the piped water supplies are not providing acceptable quality water. Taking these factors into account and the results of the various surveys we conclude that the coverage by acceptable water supplies is in the range 20 to 25 per cent.

2.3.1 Hand Pumps

Hand pump usage varies considerably over the Province. It is almost the only water supply source in the sweet water zone of the barrage area. While in the arid zones there are very few hand pumps.

The type of hand pumps also varies regionally. In the sweet water zones of Upper Sind the water table is close to the surface and caste iron bodied suction pumps are used exclusively. These are manufactured in foundries in Sukkur.

In the sweet water zones of Middle Sind galvanized iron bodied shallow lift piston pumps are used. These are manufactured in Karachi and Lahore and have low durability. Although the capital cost is low (Rs.1000 to Rs.2000 including installation), the frequent repairs and replacement of parts means that maintenance costs are high.

In an effort to reduce the overall cost of hand pumps to the users, UNICEF promoted the introduction of a new hand pump, the Caste Iron No.6 which is manufactured in Kotri near Hyderabad. In addition UNICEF is introducing the Afridev pump for settings to 125 feet. These are being manufactured in North West Frontier Province.

Deep set hand pumps are an options for hand dug wells in the desert areas. In many of these wells the water level is in excess of 200 feet, thus the Afridev pump with plastic riser pipe is not suitable. However, there are hand pumps in the market that perform satisfactorily to depths as great as 260 feet.

Preliminary result of sampling surveys suggest that over 50% of the hand pumps in the barrage area are polluted. This appears to stem mainly from lack of an adequate seal around the pump casing at ground level. Most hand pumps are installed without a concrete pad.

2.3.2 Canal Water, Ponds and Streams

An estimated 33% of rural residents in Sindh obtain there water supply from surface water sources, mainly irrigation canals and distributaries. This is particularly so in the brackish water zone of the irrigated area. These waters are badly polluted.

2.3.3 Hand Dug Wells

Hand dug wells are the main source of water in the arid zones. These are mainly lined wells with diameters of 5 to 10 feet and depths which exceed 200 feet in some cases.

2.3.4 Piped Water Supply

Almost all community pipe borne water supply schemes have been installed by the Public Health Engineering Department. Up to the end of June 1988 the Department reported having completed 220 water supply schemes. However, only 140 of these have actually been placed in service. The balance have not been commissioned primarily because the electrical connection has not been made or the canal intake has not been authorized. A further 330 water supply schemes were under construction. At the current rate of progress an estimated 630 water supply schemes will be either commissioned, completed but not commissioned, or under construction by the end of 1990. The status of schemes on a District basis is indicated on Table A-10 in the Appendix.

Many of the schemes require rehabilitation, in particular those that are classified as completed but have not yet been commissioned. Some of these have lain idle for over two years and have deteriorated.

Most of the PHED water supply schemes are in villages with population of over 1000. There are three basic technologies being used:

- canal source with settling tank;
- tubewells; and
- large diameter wells.

Canal Source Schemes

These schemes are used in the brackish water zone of the barrage area. The basic components are two settling tanks with a total capacity for about three weeks storage. In only a few older systems is the settled water passed through a sand filter. Generally the settled water is pumped directly to the mains. There is an in-line chlorinator but it often does not perform satisfactorily. The water quality is poor as indicated by bacteriological tests conducted by the PHED laboratory.

The PHED discontinued the installation of sand filters an new schemes as a cost saving measure and because of the operation and maintenance difficulties. In order to ensure an acceptable quality water sand filters are considered necessary. However this must be coupled with a suitable operator training programme.

Tubewell Source Schemes

PHED schemes are based on tubewells in the sweet water zone of the barrage area. In some cases tubewells have been successfully completed in the brackish zone by locating the installation near a canal where a lens of infiltration water is available. Tubewells are also used in the arid zone, however, considerable difficulty has been experienced in obtaining water of suitable chemical quality.

Large Diameter Wells

In the Hilly Desert Zone, the Department has successfully completed schemes based in large diameter open wells constructed in the alluvial sands and gravel of the main river channels. These installations capture a relatively thin layer of sweet water that lies at the base of these alluvial deposits and above the brackish water in the underlying sedimentary formations. For example, in the case of Thano Ahmed Khan in Dadu District, three such

installations have been constructed. A vertical turbine pump is mounted on each well and the water is pumped directly to the distribution system.

Dams and Springs

Some of the villages in the interior valleys of the Hilly Desert Zone use springs, for example, Karchat, and Sumar, while other have used small dams. Many of the dams have failed because of inadequate design to deal with the high runoff rate that occurs in these hill torrents.

2.3.5 Rehabilitation Needs for Piped water supply and Drainage Schemes

Rehabilitation is required for most of the 140 water supply and 30 drainage schemes that have been commissioned and the 80 water supplies and 30 drainage schemes that are reported completed but have not yet been commissioned. In general, there are four categories of rehabilitation works:

Category	Examples of Rehabilitation Works
Minor Works	Minor repairs to pumps, valves, and electrical controls
Medium Works	Replacement of electro-mechanical equipment, addition of flow control valves to improve operations
Major Works	Restoration of the reservoir, extensions to the distribution piping, completion of the intake, and refurbishing pumping equipment
Sand Filters	Provision of slow sand filters.

Preliminary surveys suggest that about 40% of the schemes require minor works, 17% medium works and 11% major works. About 80% of the schemes require a sand filter.

2.4 Current Human Waste Disposal Situation

There are few households in rural Sindh that have a suitable facility for disposal of human wastes. Most male members use the fields and most women use a Khuddi for defection. Neither of these are acceptable from a health standpoint. Based on sample surveys, only about 5 percent of the rural population has access to an acceptable human waste disposal facility, to either a pour flush latrine or a pit latrine. The main constraint to installation of a latrine is the cost which ranges from Rs. 2000 to Rs. 4000 depending on design.

2.5 Current Drainage Scheme Situation

Most villages have a basic drainage system with unlined ditches but these are often blocked and not effective. A few villages have concrete lined open collector drains. Most have been provided by the PHED and a few by the District Councils. The Department reported having completed 56 drainage schemes to June 1988. Of these, about 30 are actually operating. Currently there are about 170 schemes under construction. The numbers of drainage schemes in each district are indicated on Table A-10 in the Appendix.

Basically the PHED drainage schemes consist of a network of collector drains which lead the sullage to a pumping station on the edge of the village. The sullage water is then intended to be placed in an oxidation pond and then discharged to an irrigation canal or a SCARP drain. In many cases the oxidation pond has not been provided and the untreated waste water is either discharged directly to the drains, or to the canals, or to a pond on the edge of the village. Most of the schemes require some level of renovations, particularly those that are classified as completed but have not yet been commissioned.

2.6 Human Resources Development (Training)

2.6.1 Departments

There is no structured training programme in PHED or RDD. In the case of PHED newly recruited assistant engineers are assigned to an experienced engineer for a six month in-service familiarization programme. Some senior staff have attended overseas courses or government sponsored in country seminars. There is nothing specific to the needs of the various sub-professional groups available. There is a lack of reference materials, both in print and audio-visual.

The Local Government Department operates a Training Academy at Tando Jam. The facilities offer hostel accommodation for up to 50 trainees, kitchen and dining room, and some recreational activities. There are two fully equipped classrooms, a large library, and all the necessary support facilities. The buildings are located on 25 acres of land.

Currently there is very little activity at the Academy. From time to time orientation courses are given to newly elected local council representatives. In-service training for Local Government and Rural Development Department employees were offered in subjects such as Public and Financial administration, Pakistan studies, Agricultural Extension, Rural Economics, and Sociology but due to budget constraints courses have been discontinued. Community development programmes were very active in the past but again budget constraints are making course delivery difficult.

UNICEF recently sponsored a Hand Pump Caretakers Master Training programme in the support of their project which is supplying some 2300 hand pumps.

2.6.2 Primary Schools

There are approximately 15,000 Primary Schools in the Province of Sindh, employing some 30,000 teachers. The curriculum currently being delivered contains a number of Health/ Hygiene segments pertaining to Social and Islamic studies. Generally, the textbooks display the Health/ Hygiene message by way of pictures and script. The Teacher Training process has a number of weaknesses, in that Health/ Hygiene activities are not depicted through demonstration, imitation, or drama; the training process is too short and the availability of teacher learning materials including visual aids is limited.

2.6.3 Colleges of Technology, Polytechnics & Institutes of Technology

The Province of Sindh currently operates four colleges of Technology, six Polytechnic Institutions (two of which are for women), and three Institutes of Technology. A complete list is provided on Table A-12 in the Appendix.

A typical institution offers 3 or 4 year Diploma programmes in the basic technologies (Electrical, Mechanical, and Civil), as well as specialised areas. The programmes are structured on standardized curricula which are controlled by the Federal Government. The

courses are designed to present the topics on a basis of 70% practical and 30% theory. The Civil faculty offers courses in water supply, sanitation and hydraulics but the material is more relevant to the urban than the rural environment. The Mechanical department has the capability to cover topics such as pumps, motors, and engines. but lacks the appropriate demonstration equipment. An exception is diesel technology course which does have adequate facilities for training. The Polytechnic system has recently expanded its coverage by operating facilities in the rural areas (4 institutions). All teaching staff appear to be adequately trained in their disciplines.

2.6.4 Universities

The only University which has an existing programme relevant to the sector is the NED University of Engineering in Karachi which operates an Institute of Environmental Engineering. There are four full time faculty members and the required support staff. However, there are no permanent facilities or equipment allocated to these programme. Courses are offered at the Masters level on a part time basis. The faculty has one member who has an extensive background in rural sanitation, but the curriculum has no content that relates to low cost rural water supply and sanitation, or rural sociology.

2.6.5 Directorate of Manpower and Training

The Directorate operates 10 Technical Training Centres, 2 Apprenticeship Training Centres and a Government Vocational Institute. Seven new Vocational Training Centres (VTC's) are also planned. In addition there are seven Youth Vocational Centres which are operated and maintained by the Directorate but funded by the Federal Ministry of Youth, Sports and Culture. Table A-11 provides a complete list of the institutions.

The existing facilities are very spacious and well equipped but in some cases the equipment does not reflect that used by the private sector. However the various Centres appear to be adapting to the needs. All curriculum is standardized to the trade and /or occupational skills analysis which is published by the National Training Board and are very practical in nature.

Of particular importance in considering the training needs of the water and sanitation sector, is that the Directorate appears to be quite flexible in accommodating course requests from external sources. Essentially, the Directorate will operate a given course of

specific design at any one of its institutions when funding is provided by the client and trainees are made available.

2.7 Hygiene Education

At present there is no successful Province-wide hygiene education programme. There are a number of initiatives under way, but no consistent method has been adopted. The Health Education Unit of the Health Department has emphasized the production of materials such as posters, pamphlets, and radio and television spots produced in large numbers, but without pre-testing or follow-up. UNICEF and some Non-Governmental Organizations have focused on smaller numbers of materials with extensive pre-testing and follow-up, but with limited distribution. On projects which have attempted to integrate hygiene education with the delivery of water and sanitation facilities the hygiene education component invariably is the most difficult and least successful.

There is general agreement that women should be the primary audience for hygiene education, but cultural and social constraints make it difficult to reach them. Over ninety per cent of rural women are illiterate and their traditional beliefs and superstitions constrain the influence of new ideas. Although the sample surveys conduct by the Team Sociologists suggest that many women are aware of the importance of clean water to health, they appear apathetic toward improving their situation.

Experienced health educators argue that rural women are best reached through women-to-women contact during home visits, with women's discussion groups as another useful means of contact. However, the low numbers of trained women available for such activities in Sindh is a major constraint. The Traditional Birth Attendants who have been trained through the Health Services programme should be able to participate in hygiene education activities. However, they are compensated on a fee-for-service basis and therefore there is little incentive to assume this additional workload. Female primary school teachers are another potential resource but are expected to be available only on a volunteer basis.

One promising development has been the preparation of a new curriculum and training materials for male and female Health Technicians. This places particular emphasis on the role of the Health Technician as a health educator and includes a section on environmental health that covers water supplies and excreta disposal.

Schools are another possible avenue for hygiene education. However, enrolment is low and most children do not progress beyond primary school; 77 percent of male students and 89 percent of female students drop out in primary school. There are also some 800 doctors employed by the Department of Education to operate health clinics in the high schools in rural centres. These doctors are a potential resource for involvement in hygiene education.

Mass media coverage has expanded considerably and health authorities have made use of radio and television to promote certain health messages. However, the limited research that has been undertaken suggests that most rural residents learn about health immunization and diarrhoeal disease control programmes through interpersonal communications at the mosque and from the vaccinators. However, it is expected that mass media has had some impact in building awareness.

2.8 Summary of Sector Issues

In the Inception Report twelve key issues or constraints in the sector were identified. Subsequent field surveys and discussion in workshop and on an individual basis has confirmed most of these initial perceptions and modified others.

The main problems which need to be addressed are:

- water supply schemes that are either not operating or not delivering water of acceptable quality;
- drainage schemes that are either not operating or are not properly treating the waste water;
- large numbers of rural residents that are using surface water that is bacteriologically unfit for human consumption;
- increasing burden being placed on government for operation and maintenance of water supply and drainage schemes;
- lack of facilities for the disposal of waste waters in most villages with a pipe borne water system;

- inadequate quality and poor quality water being used by most rural residents in the arid zone;
- inadequate numbers of acceptable human waste disposal facilities; and
- general absence of proper hygiene practices.

3. POPULATION AND DEMAND

3.1 Population

The rural population of Sindh for 1988 is estimated to be 12.8 million based on the intercensal growth rates for each district. This is expected to rise to 14.6 million by 1993 and 16.5 million by 1998. The district population estimates are shown in Table A-12 in the Appendix.

According to the Rural Settlement Survey conducted in the period 1983-86 by the Bureau of Statistics there were about 66,800 rural settlements in the Province. The numbers of small settlements has increased significantly but the number of medium and large villages is expected to have changed little. The estimated number of villages in the three size categories in 1988 is:

Settlement Size	No. of Settlements	Population
Small (under 500)	64,625	8,950,000
Medium (500-1000)	2,585	2,084,000
Large (over 1000)	890	1,806,000
Totals	68,100	12,840,000

As indicated in the above table, almost 70 per cent of the people in rural Sindh live in settlements with a population of less than 500. Only 14 per cent live in large settlements.

The estimated numbers of rural settlements by district are presented on Table A-13 in the Appendix. The estimated population by settlement size in each district for 1988 is shown on Table A-14.

3.2 Demand for Services

3.2.1 Water Supply

The coverage of water supply of acceptable quality is estimated to be between 20 and 25 percent. Thus, an estimated 9 to 10 million of the rural population is without an acceptable water supply. The lowest coverage in terms of population is in the brackish water and delta

zones of the barrage area where an estimated 4.0 million rural residents use canal water. However, the expressed demand is relatively low because water is readily available from the irrigation water courses. An exception is the areas of non-perennial irrigation which have an acute water shortage during six months of the year.

The percentage coverage is lowest in the Arid Zones but the population is significantly lower than in the barrage area and thus absolute demand is lower. However, water quality is poor and water is difficult to locate in the Arid Zones so that expressed demand is high.

The lowest demand is in the sweet water zone where most people use privately owned hand pumps and mechanized hand pump type tube wells. In many of the village surveyed the residents indicated little interest in a community water supply scheme.

3.2.2 Drainage

Drainage of sullage water is required where there is a pipe borne water scheme or where people have mechanized hand pump type tube wells. There are an estimated 140 villages with operating pipe borne schemes. There are only about 30 villages with operating drainage schemes. In many cases these drainage schemes have not been placed in villages which also have a pipe borne scheme. On completion of the schemes currently being constructed under the ADP there will be over 600 villages with pipe borne schemes. The ADP allocation to drainage schemes has been about forty per cent that of water supply schemes. Thus by 1990/91 there will be a need for over 350 drainage schemes.

In addition there is an increasing demand for drainage schemes in the sweet water zone. Some households in larger villages have mechanized small diameter shallow tube wells connected to a piped water system. Moreover, where there are large numbers of hand pumps and clayey soils at surface, disposal of spillage water is a problem. There are about 300 villages in the sweet water zone with populations over 1000 and are thus classified as large. A substantial number of these villages require a drainage scheme because of household mechanized shallow tube wells and hand pump spillage water.

3.2.3 Human Waste Disposal

The coverage of latrines is estimated to be less than 5 percent. The need for latrines is greatest in villages with a population of over 500. This represents about 3500 villages and

a population of nearly 4.0 million. Thus about 450,000 households in medium and large villages require a latrine.

3.2.4 Hygiene Education

Although the sample surveys conducted by the Team sociologists indicate that there is some knowledge of the link between poor water quality and poor health, most rural residents are apathetic to the situation and are not taking any significant measures to deal with the problem. A strong hygiene education programme is needed to raise peoples level of understanding to the point where they are motivated to take positive steps to obtain an improved water supply and suitable human waste disposal facility.

3.3 Proposed Level of Service and Technology

3.3.1 Water Supply

Level of Service

The premise is that the people should be provided with a basic level of service using a technology for which they can afford the long term operation and maintenance. These basic levels of services would be:

- hand pumps in villages with populations less than 500 in the barrage area;
- communal water tanks in villages of 500 to 1000 in the barrage area;
- hand pumps, improved open wells, or improved tarais in the arid zones; and
- distribution systems without house connections in villages with populations over 1000 in the barrage area.

The cost of any levels of service above these should be borne by the user. For example, the cost of a house connection should be fully covered by the household served.

The appropriate technology for a basic water supply scheme varies with the water source and the size of the village. Table 1 provides an indication of the potential water supply technology choices in each physiographic zone.

Quantity

The quantity of water to be supplied per capita depends on the service level.

The following design quantities are proposed:

Service Level	Gallons/Capita
Communal hand pump	5
Communal water tank	10
House connections	15

Quality

The main criteria for acceptability of water is the bacteriological quality as measured by the number of coliform bacteria. According to guidelines established by the World Health Organization there should be no faecal coliforms present in the water and the maximum number of non-faecal coliforms should be less than 10 per 100 millilitres of water sample.

The acceptability of water with respect to chemical quality is not well defined. The World Health Organization has established a guideline of 1500 total dissolved solids as a maximum. However, most of the waters in the Arid Zones exceed this limit and total dissolved solid levels as high as 3500 are considered tolerable. The main concern is that there be no elements present in sufficient quantity to be harmful to health. In this regard, nitrate levels in water from hand pumps and open wells is a concern. In many cases the levels in open wells exceed the maximum value of 45 mg/l. as N.

TABLE 1 TECHNOLOGY CHOICES FOR BASIC WATER SUPPLY SCHEMES

TECHNOLOGY	BRACKISH WATER AND DELTA ZONE			SWEET WATER ZONE			SANDY DESERT ZONE			HILLY DESERT ZONE		
	Rural Settlement Size			Rural Settlement Size			Rural Settlement Size			Rural Settlement Size		
	over 1000	500-1000	less 500	over 1000	500-1000	less 500	over 1000	500-1000	less 500	over 1000	500-1000	less 500
Shallow Hand Pumps				O	O	O						
Deep Hand Pumps				O	O	O	O	O	O	O	O	O
Shallow Hand Pumps Beside Canals		O	O									
Hand Dug Wells with Hand Pump Offset		O	O									
Sand Filter with Hand Pump Offset		O	O									
Protected Open Wells								O	O		O	O
Tubewells with Communal Tanks				O	O		O			O		
Canal Source with Treatment and Communal Tanks	O	O										
Large Open Wells Type Intake in River Bed with Communal Tanks										O	O	

TECHNOLOGIES REQUIRING FIELD VERIFICATION

Scavenger Tubewells	O	O										
Scavenger Hand Pumps		O	O									
Infiltration Gallery										O	O	
Small Dams											O	O

3.3.2 Drainage of Waste Water (Sullage)

The appropriate technology for disposal of sullage water depends on volume and physiographic conditions. The choices are:

- household Soak pits;
- open or closed drains to an oxidation pond; and
- small bore sewers:

Soak pits are suitable for household use where:

- soils are sandy;
- water table is more than ten feet below surface;
- shallow hand pumps are not being used for water supply; and
- space in the compound is adequate to accommodate the facility.

Open collector drains leading to a pumping stations and on oxidation pond is the standard PHED design. This is considered appropriate where conditions are not suitable for soak pits. The difficulty with open drains is the maintenance requirements, particularly where there are not enough sweepers. Insufficient waste water moving in the drains is also a problem. The disadvantages of closed drains are high cost and difficulty in removing blockages. Small bore sewers are also more costly and difficult to maintain. Further study is required before the most cost effective method can be selected. This is proposed as part of the investment strategy for the Seventh Plan period.

3.3.3 Disposal of Human Waste

Latrines are considered the most appropriate basic technology for disposal of human wastes in the rural villages of Sindh. Higher levels of service such as septic tanks and community sewers could also be used but are not proposed as part of the investment plan.

There are many varieties of latrines. The one that is most commonly suggested is the pour flush type; either the single soak pit or double soak pit type. This is considered a satisfactory choice. However, simple dry well type latrines are also considered suitable providing they are properly designed. The common khuddi type latrine is not considered acceptable.

The choice of technology for a latrine is a household decision. The intent is to promote the use of latrines by subsidizing demonstration units. It is proposed that these demonstration units be of either the single pit pour flush type or the dry well type with a higher proportion of costs being borne by the owner in case of the former.

4. PROPOSED INVESTMENT STRATEGY

executive summary

4.1 Objectives

The overall objective of the proposed investment is to contribute to improved health and quality of life of the rural population through increased coverage of water supply, sanitation and drainage facilities which are sustainable and affordable and which are integrated with a hygiene education programme.

Investments should be consistent with guidelines previously established by the Government for the Sector. In the Seventh Five Year Plan, the Government set targets of extending water supply coverage to 75 % of the population and sanitation coverage to 30 %. In this regard the following guidelines were established:

- priority should be given to areas where sweet ground water is not available at reasonable depths, where water has to be fetched from distant sources and where people presently use untreated surface water which is unfit for human consumption;

- priority should be given to sanitation and disposal schemes in areas where people have installed their own hand pumps;

- systems using piped water supply (i.e distribution networks) be restricted to villages with populations greater than 3,000 with hand pumps being used in smaller villages; and

- initial delivery systems should be based on stand-posts and storage tanks, not house connections.

At the Policy Conference held in Islamabad in April, 1988, representatives of government line departments and other agencies involved in the Sector recommended that future initiatives should incorporate the following concepts:

beneficiaries should participate in all phases of the development of the facilities from planning through construction to operation and maintenance and should bear a part of the capital cost and all of the operation and maintenance costs;

- special attention should be given to enhancing the role of women;
- integration of water supply, sanitation and hygiene education;
- strengthening of institutions through training programmes which develop the skills necessary to achieve village participation and to design appropriate facilities;
- improved coordination among the agencies participating in the Sector;
- strengthening of the private sector;
- adoption of technologies which are affordable to, and sustainable by, the beneficiaries; and
- service levels which the beneficiaries want and can afford, with the government providing basic levels of service.

The strategy proposed herein encompasses all of these concepts but coverage targets are revised downward in view of financial and institutional constraints.

4.2 Proposed Investment Strategy

4.2.1 The Strategy

The proposed investment strategy is to increase coverage by applying an equitable allocation of available funds over the various size categories of villages within institutional capacity constraints and to establish a framework for long term sustainability of the facilities and the processes adopted for their implementation.

In the case of water supplies it is proposed that the investment be allocated among the various village size categories using population and appropriate technology as the criteria. The choice of technology would be determined by water source and the ability of the village to assume responsibility for its operation and maintenance.

Sustainability means that a water supply or drainage scheme will continue to provide the intended level of service for many years in the future. In other words, if one comes back ten years after the scheme was commissioned, it is still in operating as originally planned.

Experience has shown that the most effective means of achieving sustainability of water supply and drainage schemes is to place the responsibility for their management with the users of the facilities. Thus the proposed investment strategy will emphasize placement of the responsibility for the management of the water supply and drainage system with the recipient village. This will have a positive impact on Government financing in that the cost of operation and maintenance will be shifted to the villages.

Under the present strategy the majority of the available resources are invested in pipe borne water supplies in villages of 1000 and more population with government directly delivering the service and assuming responsibility for operation and maintenance. The implications of continuing with this strategy is that the coverage achievable by the end of the Eighth Year Plan is probably less than 50%. This is because the relatively high cost per capita of pipe borne schemes means that fewer people can be served within the available funds.

Another strategy that could be considered is to maximize coverage by investing the majority of the available resources in the lowest cost per capita water supply facilities such as hand pumps. This approach is not considered realistic because these low cost per capita facilities are not appropriate for large villages. Moreover at least in the short term the institutions do not have the capacity to deliver a programme which focuses entirely on low technology facilities.

The proposed strategy is intended to achieve a balance between the desire to increase coverage and the need to provide more costly facilities in larger villages.

4.2.2 Implementation Process

The proposed strategy implies a very significant change in the manner in which schemes funded under the ADP are implemented. In particular the donor funded investment would introduce a village participation programme, shift emphasis to smaller settlements and modify technologies. The expectation is that these new processes and technologies will become part of the ADP. However, this will take time to accomplish.

Thus a phased implementation strategy is proposed wherein during the Seventh Plan period the emphasis should be on shifting the investment to smaller settlements and lower cost technologies. In this regard the proposed basis for allocation of the ADP for rural water supply is 60 percent on population and 40 percent on the inverse of cost per capita for technology appropriate to the village size. The 60 percent allocation would be determined by the number of villages in three size ranges; namely, large (over 1000), medium (500-1000) and small (under 500).

The following graduated change in the allocation of the rural water supply component of the ADP over the remainder of the Seventh Year Plan and the beginning of the Eighth Year Plan is proposed.

PROPOSED PERCENTAGE ALLOCATION OF ADP
BY BUDGET YEAR

Village Size	1990/91	91/92	92/93	93/94
Over 1000	80	65	45	40
500 to 1000	10	15	25	25
Less than 500	10	20	30	35

For the pipe borne schemes PHED would continue to be the main implementing agency but should incorporate a village participation component. For low technology systems in the barrage areas we propose that the Rural Development Department take the lead in promoting the formation of village organizations and in providing technical assistance to them. In the Arid Zones SAZDA is eventually expected to become the lead agency for water supply development and should also develop a capability to promote village participation.

The shift in emphasis to lower cost simpler technologies should be phased in over a period of two or three years. This will allow time for strengthening the Rural Development Department.

The introduction of the village participation programme is expected to require a longer period and is not likely to be fully implemented until near the end of the Eight Year Plan.

4.3 Proposed Investment Criteria for Donor Funds

In this section consideration is given to criteria for deciding on the allocation of donor funds to the various potential components of the investment plan and to the various areas of the Province.

4.3.1 Allocation to Components

The allocation of donor funds in the Seventh Plan period was made considering the following criteria:

- contributes to coverage to the maximum extent possible;
- contributes to achieving sustainability of the facilities provided;
- can be implemented with minimal increase in the recurring budget; and
- establishes a framework for long term improvements in water supply and sanitation conditions.

4.3.2 Targeted Areas for Water Supply

It is proposed to identify targeted areas for water supply based on the following criteria:

- population not already covered;
- measure of the difficulty in obtaining a potable water supply; and
- cost per capita for the facility.

Using a weighted average approach, an indication of the areas of greatest need will be identified on a priority basis. A further evaluation will be undertaken based on factors such as land ownership patterns, level of development, degree of government penetration, and anticipated response. These factors will be analyzed using a computerized spreadsheet to further priorize targeted areas.

4.3.3 Targeted Areas for Drainage

The need for drainage of sullage water arises when households acquire a pipe borne water system. Since most pipe borne schemes are in villages of over 1000 and are public facilities, the targeted areas for drainage correspond to those in which water supply schemes are to be implemented. An exception is in the larger villages of the sweet water zone where private hand pumps type tube wells are being mechanized to distribute water within individual households, thereby creating a waste water disposal problem. These larger villages in the sweet water portion of the Districts should also be targeted.

4.3.4 Targeted Areas for Latrines

There is a general need for latrines irrespective of population or physiographic zone. However, the need becomes particularly acute as village size increases. The strategy adopted for this investment plan is to incorporate latrine promotion as part of the activities associated with the delivery of water supply and drainage facilities.

5. INVESTMENT PLAN

5.1 Rationale for Donor Investment

5.1.1 Present Situation

The estimated total public investment in the rural water supply, sanitation and health education Sector is expected to be about Rs. 268 million for 1989-90. This includes funds allocated from the ADP through PHED, SAZDA and local councils and funds allocated through the RDD/UNICEF programme. Only a portion of the total allocation to SAZDA and the local councils actually goes to the Sector. The estimated allocations are shown in Table 2.

TABLE 2 - ESTIMATED PUBLIC INVESTMENT IN SECTOR FOR 1989/90

Public Health Engineering Department	Rs. 246 million
Sind Arid Zone Development Authority	Rs. 10 million
Local Councils	Rs. 6 million
RDD/UNICEF Programme	Rs. 6 million
Total	Rs. 268 million

The ADP allocation to PHED is split into water supply, Rs. 148 million, and drainage, Rs. 98 million. Most of the SAZDA and local council sector allocation went into water supply. The RDD/UNICEF contribution goes primarily into water supply but a small portion goes into human waste disposal (latrines), village participation and training particularly, support to the Local Government Academy.

5.1.2 Need for Donor Investment

The proposed strategy for the Sector implies a significant redistribution of the allocation of the ADP. A shift in emphases toward lower cost water supply schemes in small villages is proposed. Also, to achieve sustainability investments in training, village participation and hygiene education are necessary. Moreover, the promotion of latrine construction would become an integral part of the long term investment strategy for the Sector.

The current allocation of the ADP provides very little for training, village participation, hygiene education or promotion of latrines. To incorporate these elements into the ADP will require a significant investment and will require several years to accomplish.

As will be discussed in Section 6.0 of this report the amount of the ADP is likely to remain near the current level in real terms. Because of the constraints on available funds and the continuing pressure to maximize allocation to new schemes it is unlikely that a significant portion of the ADP will be available for those components considered essential for achieving sustainability of the facilities and thereby maximizing the effectiveness of public the investments in water supply and sanitation.

To assist the Government of Sindh in achieving the desired redirection of investment in the Sector a significant investment by donor agencies over the remainder of the Seventh Plan (1990-93) and all of the Eighth Plan period (1993-98) is considered appropriate.

The proposed investment over the eight year period is the equivalent of Rs. 850 million.

5.1.3 Proposed Overall Sector Investment

The intention of the donor intervention is to assist the Government in making the transition to a situation where the allocation of the ADP funds places appropriate emphasis on components that will ensure sustainability, and will achieve the desired coverage. The donor investment in works will be relatively modest at the out set as the emphasis is placed on the sustainability components; i.e., village participation, training, and institution strengthening. During the Seventh Plan period the ADP allocation is not expected to change significantly except perhaps to adopt the proposed shift to place more emphasis on small villages water supplies. The Table 3 provides an indication of the anticipated average investment through the ADP and donor contributions during the Seventh Plan period.

TABLE 3 - ESTIMATED AVERAGE ALLOCATION TO SECTOR IN SEVENTH PLAN
(Rs. millions)

Sector Component	ADP	Proposed Donor	Total
Water Supplies			
Large Villages	70	--	70
Medium Villages	40	21	61
Small Villages	50	17	67
Drainage	100	--	100
Rehabilitation	--	18	18
Sustainability Components (Training, village participation)	--	15	15
Hygiene Education	--	8	8
Total	260	79	339

Figure 3 provides a pictorial presentation of the average Sector allocations.

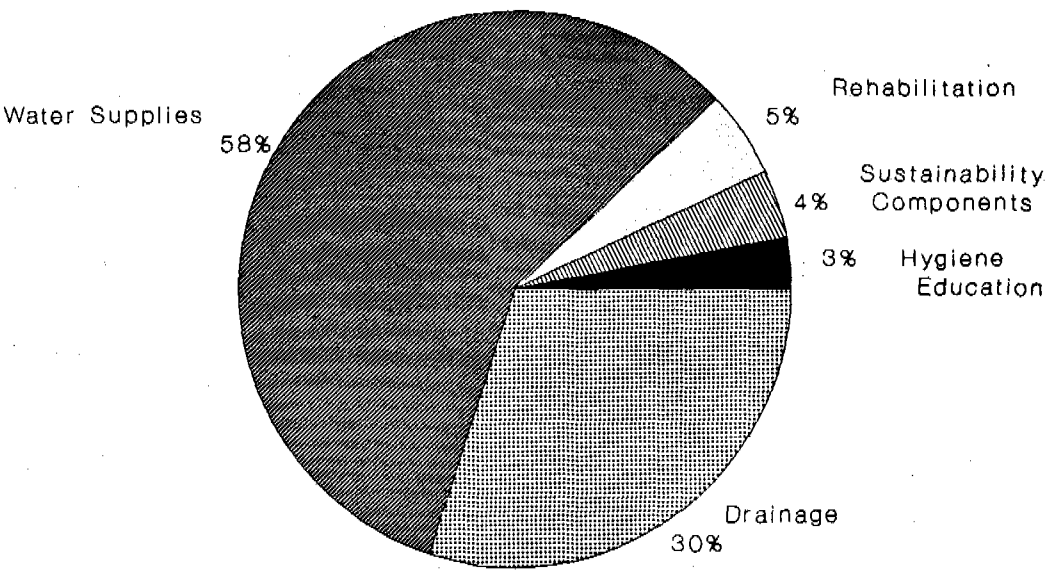
In the Eighth Plan period the expectation is that the procedures and technologies introduced through the donor investment will gradually become incorporated in the ADP investment plan. By 1995 a significant portion of the investment in the sustainability components and hygiene education should be provided from the ADP. The allocation of the investment from donor funds would then shift gradually to an increased amount of hardware components.

5.2 Proposed Donor Investments in Seventh Year Plan, 1990-1993

The donor investments in the Seventh Year Plan should reflect the proposed shift in emphasis for the allocation of the ADP and provide a framework for achieving sustainability. The focus will be on consolidation of existing facilities and pilot projects to introduce village participation concepts and modified technologies. Investments are proposed in the following components:

- Rehabilitation of water supply and drainage schemes;
- Water supplies for villages 500 to 1000 in the brackish water and delta zone of the barrage area;

ESTIMATED AVERAGE PROPORTIONS TO SECTOR COMPONENTS PERIOD 1990-93



ANNUAL DEVELOPMENT PROGRAMME AND DONOR INVESTMENT • RS. 375 MILLION

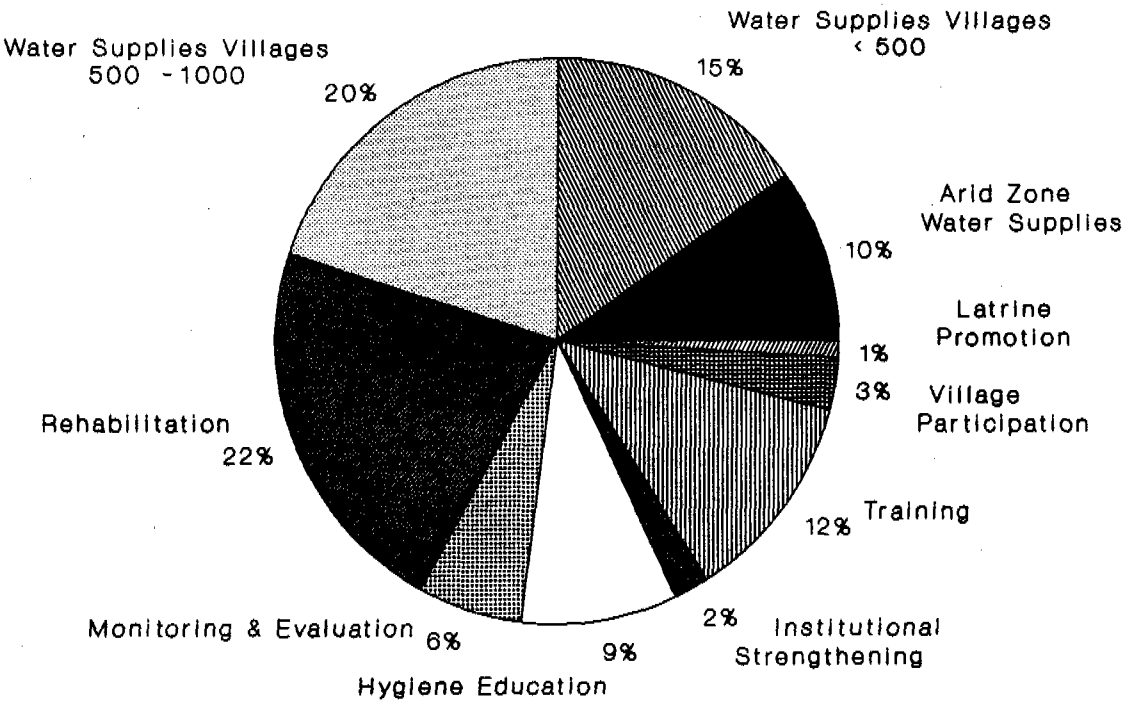
FIGURE 3

- Water supplies for villages less than 500 in the brackish water and delta zone of the barrage area;
- Arid zone water supplies;
- Village Participation Programme;
- Latrine Promotion;
- Training;
- Institutional Strengthening;
- Hygiene Education; and
- Monitoring and Evaluation.

5.3 Summary of Allocation to Components

Table 4 summarizes the allocation to each of the components over the Seventh Plan period. The pie chart Figure 4 provides a graphic presentation of the relative sizes of the components. In the remainder of this Section an outline of the proposed implementation strategy and estimated expenditures for each component is provided. The overall programme management, coordination and control are addressed in Section 7.0 of this report.

PROPOSED AVERAGE ALLOCATION OF DONOR FUNDS IN SEVENTH PLAN PERIOD 1990-93



PROPOSED AVERAGE DONOR INVESTMENT FOR SEVENTH PLAN = RS. 80 MILLION

FIGURE 4

TABLE 4 - PROPOSED DONOR INVESTMENT FOR SEVENTH PLAN
(Millions of Rupees)

Component / Budget Year	90/91	91/92	92/93
Rehabilitation	8.1	16.6	26.0
Water supplies villages 500 to 1000	5.3	15.5	26.0
Water supplies villages less than 500	4.9	13.3	18.1
Arid zone water supplies	10.0	7.3	6.9
Latrine promotion	1.1	0.4	0.5
Village Participation	3.3	2.0	1.0
Training	15.2	11.4	2.2
Institutional Strengthening	3.5	1.2	0.7
Hygiene Education	8.4	8.0	3.9
Monitoring and Evaluation	5.3	4.2	4.1
Total	65.1	79.9	89.4

(Note: Foreign costs are converted to equivalent rupees at 1$US = Rs.20)

5.4 Rehabilitation of Water Supply and Drainage Schemes

The justification for investment in rehabilitation is that it will add to coverage quickly. The majority of the investment has already been made and it is a matter of providing some additional funds to allow the intended service to be delivered. It will also provide an opportunity for introducing the village participation concepts to PHED.

5.4.1 Proposed Component Implementation Strategy

It is proposed that the rehabilitation programme be undertaken by PHED. To initiate the programme an expatriate water supply specialist would be engaged as a Team Leader to provide direction and supervision with a team of Pakistani sociologists providing training and support related to village participation. Allowance has also been made for the assistance

of a Pakistani consultant engineer to supplement PHED staff and short term inputs of an expatriate design engineer if needed.

The work should be incorporated into the on-going activities of each Division rather than creating a separate cell. The program would be introduced into each Circle successively, commencing with Circle III (Hyderabad) where there is the greatest concentration of schemes requiring rehabilitation works. The implementation process would consist of the following general steps:

- establishment of a work plan and commitment of staff and facilities to the program;
- establishment of a village organization;
- assessment of rehabilitation needs and preparation of preliminary designs;
- review and approval of preliminary designs by the village organizations;
- preparation of detailed designs and contract documents;
- approval of the final design and tendering of the works by both the Government and the village representatives; and
- PHED supervision of the works and recommissioning of the scheme with the village organization monitoring the process.

As part of the rehabilitation component it is proposed to conduct an evaluation of alternative methods of disposing of waste water generated by the water supply schemes. A short term specialist would be engaged for this purpose.

5.4.3 Estimated Expenditures and Cash Flow

A target of 105 rehabilitated schemes is proposed for the Seventh Plan Period. Based on the average cost for the various categories of rehabilitation works, the following estimated cost schedule was developed:

Budget Year	1990/91		1991/92		1992/93	
Cost ('000)	Rs.	US$	Rs.	US$	Rs.	US$
Civil Works	650	---	11,500	---	21000	---
Transport and Equipment	1470	---	100	---	100	---
Supervision and Management	1400	230	1400	180	1500	170
Totals	3500	230	13000	180	22600	170

5.5 **Pilot Water Supply Schemes in Brackish Water Zone of Barrage**

It is proposed that donor funds be allocated to undertaking pilot schemes in small (less than 500 population) and medium (500 to 1000) size villages in the brackish water and delta zones of the barrage area during the Seventh Plan Period. These pilot projects are intended to introduce modified technologies and to establish the village participation programme in the Government agencies.

The justification for concentrating on these smaller villages is twofold. First, it is anticipated to be easier to obtain cooperation in establishing a village organization in smaller villages where there are fewer ethnic groups. Secondly, these smaller villages represent the major portion of the population and yet have not received a proportionate amount of earlier investment.

To initiate the programme it is proposed to engage an expatriate Team Leader. He would be assigned responsibility for directing the implementation of the pilot schemes for both medium and small villages.

5.6 Pilot Water Supplies in Villages 500 to 1000

5.6.1 Proposed Component Implementation Strategy

Implementing Agency

It is proposed that PHED be assigned as the implementing agency for this component. The type of schemes being considered are similar to those already being installed under the ADP. Moreover, the Department is perceived to have the capacity to implement a modest scope of work without a substantial increase in staff. Consultant inputs would be provided by the proposed expatriate Team Leader, Pakistani senior engineer and a scavenger well specialist.

Technology

In most cases the appropriate technology for villages with population 500 to 1000 in the brackish water and delta zones is expected to be communal tanks with a canal water source and treatment by means of slow sand filter units and chlorinators. The design concept is similar to that being used by PHED for large villages but modification in terms of component size and arrangement would be made. However, the cost per capita will still be relatively high primarily because of the facilities required to produce potable water from the canal source. Ground water is a less expensive source, but fresh water is available only in lenses beneath the canals. To test the feasibility of capturing this ground water it is proposed to include at least two scavenger well type installations on a trial basis.

Scope and Target Areas

Taking into account the capacity of PHED to absorb the workload 45 schemes using canal sources and 2 trial schemes based on scavenger wells would be implemented. Based on preliminary analysis using the criteria
adopted in Section 4 priority would be given to Districts Thatta, Badin, Tharparkar, Jacobabad and Hyderabad with the emphasis on brackish water areas with non-perennial irrigation.

Implementation Process

The implementation process would consist of the following steps:

- submission of a list of potentially suitable villages to government for approval of priorities;
- identification of those priority villages in the targeted area that are prepared to form a village organization to assume responsibility for the scheme;
- establishment of an agreement between the village and the executing agency indicating areas of responsibility and basis for implementing the scheme
- surveys and preliminary design of the scheme including cost estimates;
- review of the preliminary design with the village organization and approval;
- tendering of the works;
- construction supervision; and
- commissioning of the completed scheme and turning over to the village organization for long term management.

The process envisaged for achieving village participation is outlined in Section 5.8.

5.6.2 Estimated Expenditure and Cash Flow

Based on an estimated average cost of Rs. 750,000 per scheme, the cash flow would be as follows:

Budget Year Cost ('000)	1990/91 Rs	1990/91 US$	91/92 Rs	91/92 US$	92/93 Rs	92/93 US$
Civil Works	0	0	11250	0	22500	0
Transport & Equipment	1350	0	50	0	100	0
Project Management	1680	115	1680	125	1670	85
Totals	3030	115	12980	125	24270	85

5.7 Pilot Water Supplies in Villages Less Than 500

5.7.1 Proposed Component Implementation Strategy

Technology and Service Levels

The appropriate technology for villages with populations less than 500 in the brackish water zone will be hand pump type schemes. These will be one of the following types:

- hand pumps installed adjacent to canals or distributaries to capture the lens of sweet water formed by the infiltration of irrigation water;
- hand dug well situated adjacent to a canal or distributary with a hand pump placed some distance away and connected with an intake pipe; and
- sand filter connected to the canal water source with a hand pump mounted some distance away and connected by an intake pipe.

Allowance has also be made for trial installations using scavenger hand pump wells. Thus the basic level of service is a communal hand pump.

Implementing Agency and Scope

The proposed implementing agency for these simple schemes is the Rural Development Department. The scope of work that can be accommodated within the Seventh Plan period is dependent on the capacity of RDD and the availability of donor funds. Within these constraints it is proposed that 330 schemes be implemented in the Seventh Plan period including ten trial scavenger hand pump installations.

Implementation Arrangement

Basically the implementation process would consist of the same steps as outlined for the pipe borne schemes except that the village would be required to make a contribution in the form of labour and some components.

The RDD staff would be responsible for promoting the establishment of the village organization. This would be a prerequisite for the implementation of the scheme.

5.7.2 Estimated Expenditures and Cash Flow

The estimated expenditures and cash flow for the Seventh Plan period would be as follows:

Budget Year	1990/91		91/92		92/93	
Cost (Rs. '000)	US$	Rs.	US$	Rs.	US$	Rs.
Civil Works	750	0	9300	0	15700	0
Transport	1350	0	850	0	50	0
Project Management (excluding PHED)	470	115	660	125	660	85
Totals	2570	115	10800	125	16400	85

5.8 **Arid Zone Water Supplies**

Three initiatives are proposed for the Arid Zones:

- improvement of open wells in Sandy and Hilly Desert Zones;
- rehabilitation of small dams in Hilly Desert zone; and
- technical support for ground water exploration.

It is proposed that the Sind Arid Zone Development Authority be assigned as the executing agency for this component. An expatriate Team Leader would be assigned to work with the staff of the Authority.

5.8.1 Proposed Component Implementation Strategy

Improvements to Open Wells

The main source of water in the arid zones (sandy desert and hilly desert) is open wells. In most cases the water is brackish and limited in quantity and the method used for extracting the water causes pollution. To reduce the level of pollution and increase the quantity of water available from hand dug wells it is proposed to invest in deepening and repairing these wells and to provide more efficient and sanitary lifting devices. In general, these improved lifting devices would consist of either deep set hand pumps or double drum pulleys. Small villages, generally less than 500 population, would be targeted. A village participation programme would be an integral part of the process.

Rehabilitation of Small Dams in Kohistan Desert.

Many of the small dams on the hill torrents of Kohistan have failed because of inadequate design. The intent is to rehabilitate at least two of these installations on a pilot scheme basis in the Seventh Plan period. The target villages would be those in the range 500-1000.

Technical Support to Ground Water Exploration

In effect this initiative would extend the technical support that has been provided to the SAZDA/WAPDA ground water exploration programme in the Thar desert by the Overseas Development Administration. It is proposed that the emphasis in the next phase of the programme be shifted to the Hilly Desert Zone (Kohistan) where the prospects for developing tube wells appear to be better than in the Sandy Desert Zone.

5.8.2 Estimated Expenditures and Cash Flow

Allowance has been made for improving 60 hand dug well schemes in the Sandy Desert Zone and improving 40 hand dug well and rehabilitating 2 small dams in the Hilly Desert

Zone during the Seventh Plan period. In addition, rehabilitation of ten tarais would be undertaken.

The estimated cash flow would be as follows:

Budget Year	1990/91		91/92		92/93	
Cost ('000)	Rs	US$	Rs	US$	Rs	US$
Civil Works	50	0	550	0	900	0
Transport and equipment	1750	100	1050	30	0	50
Project Management	680	275	970	205	1050	195
Totals	2480	375	2570	235	1950	245

5.9 Village Participation Promotion Programme

5.9.1 Proposed Component Implementation Strategy

The establishment of village organizations to assume responsibility for long term management of the schemes is proposed as a prerequisite for proceeding with the rehabilitation of an existing water supply or drainage scheme and the implementation of a new water supply scheme. The staff of the government agency assigned to implement the scheme should undertake the activities associated with establishing the village organization. This would be PHED in the case of the rehabilitation component and pipe borne water supplies in villages 500 to 1000, SAZDA in the case of improvement of wells in the Arid Zones and RDD for hand pump type schemes in the small villages of the barrage area.

The process of establishing the village organization involves several steps. A promotion team consisting of an assistant engineer and a sociologist from the respective government agency would take the lead in the motivation activities. Volunteers drawn from the Union Council area would be recruited to assist in the process. Training and supervision of the promotion team would be provided by an experienced sociologist. Since there is no one presently in the government agency with the requisite capability to organize and supervise this village participation programme, it is proposed that a qualified consultant be engaged for the

Seventh Plan period to initiate the process and train counterpart staff to continue into the Eighth Plan.

Normally the implementation process would consist of:

- training of village participation promotion teams in PHED, SAZDA and RDD;
- promotion team identifying and recruiting volunteers in the area of the targeted villages;
- training of the volunteers to assume their role in the promotion activity;
- promotional team and volunteers visit the village and conduct an interactive village meeting to arouse interest in the concept of developing a water supply scheme and introduce some basic hygiene education messages;
- second visit to promote the formation of a village organization and present options for development of a water supply scheme;
- third visit to formalize the village organization and reach consensus on the appropriate technology, locations and lay outs;
- fourth visit to obtain decisions on detailed design and to assign responsibilities for the implementation phase; and
- implementation of the scheme.

There is no fixed number of visits that will result in a properly established village organization. The four indicated above is likely the minimum requirement.

Properly qualified village promotion staff do not exist in either PHED SAZDA or RDD. Because of the desire to minimize the impact on the recurring budget of the Government it is proposed, that to initiate the programme, existing staff be trained to assume this role. The necessary staff would be draw from the existing establishment of PHED, SAZDA and RDD or from other Departments such as the Social Welfare Department. Assistant Engineers in PHED, Development Officers from LGD, Planning Officers from RDD,

Technical Staff of SAZDA and Sociologists from Social Welfare Department would be trained for this role.

The volunteers would be prominent persons in the area who are interested in assisting in the development process. These persons might be members of an existing NGO, teachers, doctors attached to the high schools health workers from the Basic Health Unit, members of the local councils or religious leaders.

5.9.2 Scope of Component in Seventh Plan

In the Seventh Plan period the village participation promotion efforts would be confined to the initiatives undertaken with the assistance of the donor funds. Thus the number of villages involved would be in the order of 550. Actual villages visited will be considerably more because not all villages will respond to the promotional efforts.

5.9.3 Estimated Expenditures and Cash Flow

The cost associated with the component for the Seventh Plan period would be related to services of one senior consultant sociologist and three intermediate sociologists, development of promotional materials, equipment, and transport. The cash flow for the Seventh Year Plan period would be as follows:

	1990/91		91/92		92/93	
	Rs	US$	Rs	US$	Rs	US$
Supervision & Management	1850	0	1850	0	950	0
Transport and equipment	1400	0	100	0	60	0
Totals	3250	0	1950	0	1010	0

5.10 **Latrine Promotion Programme**

5.10.1 Proposed Component Implementation Strategy

The intent of the programme is to encourage rural residents to invest in latrines. This would be achieved through a combination of promotion, subsidization of the cost of demonstration

installations and the provision of technical advice and training to local masons. The single well pour flush latrine and the pit latrine will be adopted as the basic designs.

The executing agency proposed for this initiative is the Rural Development Department. The initial step would be to convince people to invest in a latrine. This promotional effort would be part of the hygiene education programme and would emphasize the diseases that result from improper disposal of human wastes as well as privacy and convenience advantages. Once an agreement is reached, the executing agency would provide technical advice plus some of the materials such as the bricks or concrete rings for lining the well, cement for the floor, and the pan.

5.10.2 Scope of Seventh Plan Programme

Support for the construction of 170 demonstration latrines is proposed for the Seventh Plan period. These would be the same villages for which the new water supplies are proposed in the brackish water and delta zones of the barrage area.

5.10.3 Estimated Expenditures and Cash Flow

The estimated donor cost input to the construction of each latrine is Rs. 2000. In addition there will be costs associated with the provision of transport for the technical staff and consultant project management inputs.

Budget Year	1990/91		91/92		92/93	
Costs ('000)	Rs.	US$	Rs.	US$	Rs.	US$
Civil Works	40	0	100	0	200	0
Transport and Equipment	800	0	50	0	50	0
Supervision and Management	250		250	0	250	0
Totals	1090	0	400	0	500	0

5.11 Training

5.11.1 Scope of Training Programme

The training programme during the Seventh Plan period would encompass the following groups:

- operators of water supply and drainage schemes;
- administrative staff of the PHED, SADZA and RDD;
- technical staff of PHED, SAZDA and RDD;
- village participation promoters;
- village organizations; and
- local elected officials.

The proposed focal points for the training programme are the Local Government Academy at Tando Jam, the PHED, SADZA and RDD, the Polytechnics and the UNICEF Primary Education Curriculum Reform Project.

Local Government Academy

The Academy is proposed as the Centre for training, the following groups:

- operators of water supply and drainage schemes;
- village participation promoters;
- local elected officials; and
- artisans (as an out reach programme).

The Academy would be strengthened by designing and developing the requisite new courses and providing the demonstration equipment and materials. The existing staff would be reoriented to deliver courses in the appropriate disciplines.

To assist the Academy in establishing the programme it is proposed that two counterpart consultants, one expatriate and one Pakistani, be engaged to work with the Principal and Chief Instructor.

Operators of Water Supply and Drainage Schemes

The intent is to train operators to assume responsibility for the rehabilitated and new schemes installed under the donor funded initiatives. Three week training sessions for groups of up to ten operators are envisaged. Demonstration models of the main types of water supply and drainage schemes would be installed at the Academy. Assistant Engineers from PHED would be seconded and trained to become trainers.

Village Participation Promoters

The intent is to train staff of PHED, SAZDA and RDD in village participation promotion techniques at the Academy. The orientation programme for the volunteers would also be held there. The proposed consultant sociologists would take the lead in developing and implementing these training programmes on a counterpart basis with staff at the Academy.

Village Organizations

Short courses for leaders of village organizations would be held at the Academy. Courses would be related to such areas as budgets, cost control, record keeping, and facilities management.

Local Elected Officials

This initiative would involve upgrading existing courses for elected local representatives. This would include such topics as:

- building awareness of the water, sanitation and health programme;
- roles of the various participants in the programme; and
- village participation processes.

Artisans

The Academy will be responsible for coordinating the training of artisans, as required, at an appropriate Youth Vocational Centre. Course design will be to suit rural conditions and the cost will be met with project training funds to be administered by the Academy.

The Public Health Engineering and Rural Development Departments

The training programme proposed for both the PHED and RDD would be directed towards:

- establishing a training coordination capacity in each department;
- establishing Human Resource Information Systems;
- in-service training of administrative staff in information handling;
- facilitating short term technical courses for senior and sub-professional engineering staff at the Polytechnic; and
- building up library resources.

To facilitate the training process at PHED and RDD, it is proposed that a new position, training coordinator, be created in each department. One expatriate training advisor is proposed to work with both training coordinators to initiate the programme. The advisor will act as a counterpart to the coordinators and in doing so will impart skills and knowledge pertaining to training needs and job analysis training plans management of training programmes and the evaluation and monitoring process applicable to training.

Sind Arid Zone Development Authority

The training focus in SADZA would be directed at enhancing the capabilities of the staff of the Hydrogeological Wing. Priority would be given to information handling related to water resources and to training technicians for ground water exploration.

Polytechnics

The Polytechnics provide a major portion of the sub-professional staff employed at PHED and RDD. The investment will involve the expansion of the Civil Technology curriculum to include low cost rural water supply, sanitation and drainage topics. Equipment and library materials will be provided and the faculty will be trained. In turn the polytechnics will provide training to the existing senior and sub-professional engineering staff of PHED and RDD as well as the regular student body. Training for the senior and sub-professional

engineering staff will be arranged by the proposed Training Coordination Officer. Initially, the courses will be at the Hyderabad Polytechnic. Senior engineers will attend a 2-3 day course to refresh their knowledge on rural water supply, drainage and sanitation schemes. Sub-professional engineering personnel will attend a 10 day course which will cover design, construction, operation and maintenance of schemes.

5.11.2 Primary Education Curriculum Reform Project

UNICEF is currently implementing a Primary Education Curriculum Reform Project in Sindh. It is proposed that curriculum revision, teacher training improvements, and learning materials required to strengthen hygiene education in the primary schools be included in the UNICEF Project.

5.11.3 Estimated Expenditures and Cash Flow

The proposed expenditures for training are high in the first two years and then reduce significantly for the remainder of the investment period. The schedule for the Seventh Plan period would be:

Budget Year	1990/91		91/92		92/93	
Costs ('000)	Rs.	US	Rs.	US	Rs.	US
Equipment, transport and materials	3700		620		100	
Training Related Costs	2450		1300		650	
Supervision & Management	1850	360	2030	370	90	70
Totals	8000	360	3950	370	840	70

5.12 **Institutional Strengthening**

5.12.1 Proposed Interventions

Specific institutional strengthening interventions would be:

- modification of PHED contracting procedures;
- improvement of information handling systems in PHED, SADZA and RDD;
- enhancing the planning capabilities of PHED, SAZDA and RDD;

- modification of ADP disbursement schedule for individual schemes;
- enhancing the monitoring and evaluation process in Pⅅ
- establishment of a cost of recovery mechanism for operation and maintenance; and
- strengthening PHED water analysis laboratory.

PHED Contracting Procedures

The intent is to modify the present system of implementing PHED pipe borne water schemes and drainage schemes. Current practice involves using several small contractors with the Department in effect acting as the general contractor. The objective is to improve accountability and transfer the responsibility for commissioning the scheme to private sector general contractors.

Information Handling Systems

This initiative would involve establishing information handling systems in PHED, SADZA and RDD. The types of information to be compiled would be identified and a computerized data handling centre would be established in the PHED and RDD head offices in Hyderabad and the Hydrogeological Wing of SADZA. Data compilation processes would be established in the Divisional and Subdivisional offices. The information handling system would focus on data related to human resources, cost control, project management, stores scheme performance and characteristics and water resources.

Planning Capabilities of PHED and RDD

The process for planning and establishing priorities would be enhanced. The present procedure has the initiative for identification of potential schemes coming mainly from the elected representatives at the provincial level. The proposed planning concept would have the Departments prepare lists of candidate villages in conjunction with the local councils and submit these for consideration by the Government who would then indicate priorities. The Departments would then prepare an implementation schedule based on these priorities. Actual feasibility of implementation will depend on technical factors and responsiveness of the village to assuming their role as owners and managers of the scheme.

Disbursement Schedule for Individual Schemes

The intent of the present budgeting procedure is to allocate funds to enable schemes to be completion within a two year period. In fact the disbursement schedule is often such that enough funds are committed each year to enable only a relatively small portion of the work to be undertaken. This prolongs the construction period and leads to deterioration of earlier completed works before the whole scheme is ready for commissioning. This initiative is intended to establish the basis for a more effective disbursement schedule.

Monitoring and Evaluation

The initiative envisaged would be to establish on-going monitoring and evaluation procedures in the PHED, RDD and SAZDA. This would complement the monitoring and evaluation component will be established for the overall programme as indicated in Section 5.12.

Cost Recovery Mechanism for Operation and Maintenance

This initiative would involve facilitating the establishment of cost recovery mechanisms for operation and maintenance. It is intended that the village organizations assume the responsibility for the cost recovery. The assignment would be to provide a framework for control and disbursement of the funds and to establish a budgeting methodology for the village organizations to follow. Ultimately it would be the village organization that would collect the tariffs by the means best suited to their circumstances.

Strengthening PHED Water Analysis Laboratory

UNICEF has provided equipment and training to the PHED water analysis laboratory. The intent is to continue to support this vital service through provision of additional equipment and refresher training.

5.12.2 Proposed Component Implementation Arrangements

Most of the activities associated with the institutional strengthening component will be undertaken in conjunction with other components. However, specialists input and equipment

are required in some cases, in particular for the information handling systems. One expatriate and two Pakistani information systems and administrative specialists are proposed to initiate the project.

5.12.3 Estimated Expenditures and Cash Flow

Budget Year 1990/91 Cost ('000)	Rs.	US$	91/92 Rs.	US$	92/93 Rs.	US$
Equipment	420	0	20	0	20	0
Short Term Specialists	1260	90	600	30	300	20
Totals	1680	90	620	30	320	20

5.13 **Hygiene Education**

5.13.1 Proposed Component Implementation Strategy

The main initiatives proposed for the hygiene education programme in the Seventh Plan period would encompass:

- focused delivery of hygiene messages;
- broad based hygiene promotion;
- development of appropriate messages; and
- social research.

Focused Deliver of Hygiene Messages

The proposed focused delivery strategy would have the hygiene education programme incorporated as an integral part of the process of providing the hard ware facilities to the villages. It would be part of the village participation process leading to rehabilitation of existing and provision of new facilities. The village promotion team from the respective executing agencies (PHED, RDD and SAZDA) would be responsible for coordinating the hygiene education effort. Their training would enable them to deliver the simple messages, but the preferred approach would be to delegate this role to the purposed volunteer group

which is expected to include members from the Basic Health Units in the area, in particular, the Health Technicians and Lady Health Visitors.

The hygiene messages would be delivered as part of the steps leading to implementation of the water supply or drainage scheme. This is the time at which the village is most likely to respond. Three methods are envisaged for delivering the messages:

- audio visual presentations to the entire village probably using simple flip charts and recordings;
- women's group sessions using an interactive approach; and
- male group sessions using an interactive participatory approach.

The village organization would be requested to establish the most appropriate forum for the women's group sessions.

By the time the planned facilities are in place the immediate objectives of building awareness of hygiene issues and initiating changed behaviours should be accomplished. However, the actual achievement of changed behaviour will require a long time. A broad based hygiene promotion programme is proposed as the vehicle for building on the gains made at the project implementation stage.

Broad Based Hygiene Promotion

This initiative would involve dissemination of health messages through a multitude of channels. These would include the mass media, courses in primary schools, dais, Lady Health Visitors, Health Technicians and dispensers.

Pre-tested, simple messages would be delivered at appropriate times on radio and television. Introduction of hygiene education material to the schools will necessitate changes in curricula and orientation of teachers as discussed in the Training Section. Similarly, orientation of Lady Health Visitors, Health Technicians, dais and dispensers will be required.

Development of Appropriate Hygiene Messages

There is a significant amount of hygiene education material already available in Pakistan, particularly through the Adult Basic Education Services and Allama Iqbal Open University. The existing materials would be assessed, modified, and pre-tested as necessary.

Social Research

Further research would be undertaken to determine existing beliefs and behaviours related to hygiene. This information is required to provide a basis for message development and delivery methodology.

Staffing

To initiate the programme in the Seventh Plan period it is proposed to engage one expatriate and two Pakistani specialists. They would select the appropriate the hygiene messages, initiate the mass media and school campaigns, conduct the social research and train trainers to orient the village participation promotion staff and volunteers. The training of trainers would be conducted at the Local Government Academy.

5.13.2 Estimated expenditures and Cash Flow

The costs directly attributable to the proposed hygiene education programme for the Seventh Plan period are:

Budget Year	1990/91		91/92		92/93	
Cost ('000)	Rs.	$US	Rs.	$US	Rs.	$US
Transport, equipment, Materials	1700		650		50	
Materials development and training related costs	900	20	1100	30	1050	0
Supervision & Management	2200	160	2200	170	1200	80
Totals	4800	180	3950	200	2300	80

5.14 **Monitoring and Evaluation**

It is proposed to establish a monitoring and evaluation unit in the existing Directorate of Monitoring and Evaluation in the Planning and Development Department. This unit would be headed by an expatriate consultant who would report directly to the Additional Chief Secretary Planning and Development.

The role of the Monitoring and Evaluation Unit would be to:

- coordinate the various components of the programmes;
- strengthen the monitoring and evaluation capabilities of the Directorate;
- liaise with the various agencies involved in the Sector;
- evaluate the appropriateness of the technologies and processes established in the Seventh Plan period; and
- monitor progress, performance and expenditure.

The estimate expenditures and cash flow schedule related to the monitoring and evaluation component are as follows:

Budget Year	1990/91		91/92		92/93	
Cost ('000)	Rs.	$US	Rs.	$US	Rs.	$US
Transport & Equipment	1200		50		50	
Supervision & management	540	180	540	180	620	170
Totals	1740	180	590	180	670	170

5.15 **Proposed Seventh Plan Expenditures and Cash Flow**

The estimated expenditures related to donor funded components is the equivalent of Rs. 850 million. The annual amounts by major cost category are set out in Table 5.

TABLE 5 - SUMMARY OF ESTIMATED SEVENTH PLAN EXPENDITURES ((MILLIONS)

Cost Category	1990/91 Rs	1990/91 $US	1991/92 Rs	1991/92 $US	1992/93 Rs	1992/93 $US
Civil Works	1.49	0	28.00	0	52.80	0
Transport & Equipment	15.14	0.10	3.54	0.03	0.58	0.05
Training Related Costs	3.35	.02	2.40	0.03	1.70	0
Supervision & Management	12.18	1.53	12.18	1.39	8.29	0.88
Totals	31.87	1.65	46.12	1.45	63.37	0.93
Equivalents in $US (conversion rate 1 $US= 20 Rs.)		$ 3.24		$ 3.76		$ 4.10

5.16 **Proposed Investments for Eighth Plan (1993-1998)**

5.16.1 General Scope of Investment

During the Eighth Plan period the intention is to gradually incorporate into the Government Annual Development Programme the procedures and technologies demonstrated through the donor investment. The objective is to have investment in training, village participation, hygiene education and latrine promotion as an integral part of the Annual Development Programme by the end of Eighth Plan period.

In the last half of the 1992-93 budget year a complete evaluation of the programme will be undertaken. This will involve an assessment of the procedures and technologies introduced through the donor investment as input to refining the investment strategy for the Eighth Plan period.

By 1995 it is expected that a significant portion of the sustainability and hygiene education components will have been incorporated into the Annual Development Programme. At the same time the emphasis of the donor investment would shift to providing more support for hardware components.

Table 6 provides an indication of the estimated average investment in the Sector from Annual Development Programme and donor sources in the Eighth Plan period.

TABLE 6 - ESTIMATED AVERAGE ALLOCATION TO SECTOR IN EIGHTH PLAN PERIOD
(Rs. millions)

Component	Proposed ADP	Proposed Donor	Totals
Water Supply			
Large	56	20	76
Medium	35	20	55
Small	48	37	85
Drainage	95	35	130
Rehabilitation	8	12	20
Sustainability Components	15	10	25
Hygiene Education	3	6	9
Total	260	140	400

5.16.2 Donor Funded Components

Rehabilitation

By the end of the Seventh Plan about 100 of the schemes requiring rehabilitation should be completed. This would leave further 100 to be completed in the Eighth Plan. This should be accomplished by the end of budget year 1994-95. However, there will still be a need for an on-going programme of renovations, extensions and upgrades.

New Water Supplies

It is propose to continue this component into the Eighth Plan with a support being extended to some larger schemes but the main focus continuing to be on the medium and small schemes. The total numbers of schemes will be increased significantly. The estimated impact on coverage will be on estimated.

Drainage Schemes

It is proposed to commence significant direct investment in drainage schemes at the beginning of the Eighth Plan period. By the 1994/95 budget year 30 per cent of the donor investment would go to drainage.

Improvements to Arid Zone Water Supplies

The numbers of improved and new hand dug wells would be increased significantly. A target of 1000 schemes is proposed for the Eighth Plan period. The dams rehabilitation initiative commenced in the Hilly Desert zone would also be expanded.

Ground Water Exploration

The ground water exploration programme proposed for the Hilly Desert Zone in the Seventh Plan should be completed by the end of budget year 1994-95. Based on an assessment of preliminary results at the end of the Seventh Plan, a programme of tube well construction is proposed to commence early in the Eighth Plan period.

Village Participation and Training Components

The intent is that these components will gradually be incorporated into the ADP funding and the contribution by the donor funds will be reduced. The village participation initiative would be continued and expanded to keep pace with the implementation of new schemes and improvements to existing schemes under both the ADP and donor programme.

By the end of the Seventh Plan the Training component should be well established. The training programmes would be continued and expanded to service the needs, as for example, the increasing numbers of scheme operators. However, it is proposed that the funding responsibility be shifted to the Government.

Hygiene Education and Latrine Promotion

The focused hygiene education aspect of this component would be expanded to meet the needs of the donor investments and extended to encompass the ADP schemes that are implemented. However, the scope of the broad based hygiene promotion efforts is not expected to increase significantly in the Eighth Plan. Latrine promotion will expand to an estimated 200 demonstration units per year.

Monitoring and Evaluation

This component would continue to be an integral part of the programme. Increasing responsibility would be shifted to staff of the Directorate as expatriate inputs are gradually scaled down to short term visits.

5.16.3 Estimated Expenditures and Cash Flow in Eighth Plan

At this point only a rough indication of the scale of investment in the main components of the programme is possible. The level of investment should reach a peak in budget year 1994/95 and begin to decline in 1996/97. The total estimated expenditure during the five year period is about the equivalent of Rs. 615 million to make a total donor investment over the entire investment period of Rs. 850 million. The proposed schedule is indicated on Table 7.

TABLE 7 - PROPOSED INVESTMENT SCHEDULE FOR SEVENTH AND EIGHTH PLAN
(Millions of Rupees)

	Seventh Plan	Eighth Plan Period				
Component	1990/93	1993/94	1994/95	1995/96	1996/97	1997/98
Rehabilitation	55	25	15	12	8	5
New Water Supplies	112	60	75	75	75	65
Drainage	0	10	30	35	30	25
Substainability	45	10	12	10	7	3
Hygiene Education	22	5	8	8	5	2
Total	234	110	140	140	125	100

5.17 Impact on Coverage

Donor support is proposed for almost 600 water supply schemes in the Seventh Plan period and a further 2500 in the Eighth Plan. The population that would benefit from an improved water supply is estimated at 1.5 million.

6. FINANCING

6.1 Macro Resource Availability

During the past few years, the resource position of the public sector has deteriorated significantly. Domestic resource mobilization has been constrained by a relatively inelastic and narrow tax base. Recurring expenditures on defence, debt servicing, general administration and subsidies have risen rapidly. Recurring deficits of the Provinces have widened considerably requiring large and growing subventions and grants-in-aid from the Federal Government. The consequence has been that development expenditure (ADP) in the public sector has become more dependent upon the flow of external resources.

Table 8 presents the ADP expenditures at constant prices of 1987/88 during the Fifth and Sixth Plan periods and the first year of the on-going Seventh Plan. Based on the recent Federal budget, a projection has been made of the level of real ADP for the next financial year. The table indicates that real ADPs of the Federal Government were constant during the Fifth Plan period, but showed growth during the Sixth Plan period. Provincial ADPs have demonstrated growth throughout the decade culminating with exceptionally large increases between 1985/86 and 1987/88. This enhanced rural development by increasing allocations for social and physical infrastructure (including rural water supply and sanitation), primarily through Provincial line departments.

The change of Government in 1988 along with a tightened resource situation and emergence of inflationary pressures in the economy has led to a cutback in development allocations. At the Federal level, it is expected that current real ADP expenditure will decline by about 2% from the previous year. Provincial development expenditure is likely to fall more dramatically, by almost 23%. The only component of the ADP which is likely to increase significantly is the Special Development Programme.

TABLE 8 - REAL ADP EXPENDITURES AT CONSTANT PRICES OF 1987/88*
(Rs in Billion)

	National	Provincial	Special	Programme	Total
Fifth Plan Period					
1978/79	29.4	7.2	-	-	36.6
1979/80	26.9	5.3	-	-	32.2
1980/81	29.8	6.4	-	-	36.2
1981/82	30.1	8.0	-	-	38.1
1982/83	29.7	8.3	0.2	-	38.2
Sixth Plan Period					
1983/84	27.4	8.9	0.5	-	36.8
1984/85	31.7	8.4	0.6	-	40.7
1985/86	31.5	10.7	0.9	-	43.1
1986/87	34.7	13.1	0.7	-	48.5
1987/88	34.0	14.5	1.3	-	49.8
Seventh Plan Period					
1988/89	33.4	11.2	3.4	-	48.0
1989/92**	32.4	10.8	3.1	2.5	48.8

* ADP expenditures at current prices have been converted into constant prices by applying the implicit GDP deflator for gross domestic capital formation

** Budget

Sources: Pakistan Economic Survey, 1988/89, Economic Advisers' Wing, Ministry of Finance, GOP
Budget-in-Brief, 1989/90, Ministry of Finance, GOP

There has been a noticeable change in government priorities which has lead to a precipitous decline in Provincial ADPs from the peak level. Instead, the Government has launched a Peoples Works Programme, which will also involve allocations for rural development including roads, education and water supply. Execution responsibility will primarily rest with District committees working directly under the control of the Federal Government.

Indications from the Federal budget of 1989/90 are that the recently established pattern in real ADP expenditures will continue. The Federal ADP could decline further in real terms by about 3% and the Provincial ADP by an equivalent percentage. The Peoples Works Programme will involve a development allocation of Rs 2.5 billion (at 1987/88 prices).

The prospects for the remaining years of the Seventh Plan period (up to 1992/93) are for continued pressure on public finances with anticipated rapid increases in debt servicing liabilities, which have emerged as the largest item in the recurring budget of the Federal

liabilities, which have emerged as the largest item in the recurring budget of the Federal Government. Unless a dramatic breakthrough is achieved in making the tax base more broad-based and buoyant, it is unlikely that even with significantly higher levels of foreign loans and grants, the overall development programme in the public sector will increase in real terms. Already the total public sector development programme is operating at a rate of between 70 to 75% of the target level in the Seventh Plan.

Not only will it be difficult to sustain real ADP at its present level but pressures on development funds will increase as limits to growth are attained due to bottlenecks in physical infrastructure. As shown by Table 9 the need for physical infrastructure has caused larger allocations to be made to the power and transport and communications sectors. Simultaneously, cutback is visible in sectors like physical planning and housing and rural development from which investments in rural water supply and sanitation have traditionally been financed. Greater external Donor assistance will be required if the country is to come close to achieving the Seventh Plan targets for drinking water and sanitation.

TABLE 9 - REAL SECTORAL ADP EXPENDITURES AT CONSTANT PRICES OF 1987/88
(for Federal and Provincial Governments combined)

	Energy	Transport and Communications	Physical Planning and Housing	Rural Development	Others	Total
Fifth Plan Period						
1978/79	5.2	7.2	2.7	0.4	21.1	36.6
1979/80	4.8	5.7	2.1	0.3	19.3	32.2
1980/81	5.3	6.9	2.7	0.6	20.7	36.2
1981/82	6.3	7.5	2.6	1.0	19.9	37.3
1982/83	7.2	7.5	2.8	1.3	19.4	38.2
Sixth Plan Period						
1983/84	6.5	6.3	3.3	1.2	19.5	36.8
1984/85	9.6	6.6	3.3	1.2	20.0	40.7
1985/86	9.5	7.3	3.3	1.0	22.1	43.2
1986/87	11.5	6.4	4.8	2.2	23.7	48.6
1987/88	13.1	5.1	5.6	2.7	23.3	49.8
Seventh Plan Period						
1988/89	12.8	7.1	3.7	1.9	22.5	48.0
1989/90	13.8	N.A	N.A	N.A	N.A	48.8

Sources: Pakistan Economic Survey, 1988/89, Economic Advisers' Wing, Ministry of Finance, GOP
Budget-in-Brief, 1989/90, Ministry of Finance, GOP

The emerging scenario for the next few years is characterized by the following salient features:

- no growth or only modest growth in the overall public sector ADP;
- a larger share being executed by the Federal Government;
- higher priority being given to investments in physical infrastructure; and
- lower real allocations for the social sectors, including rural water supply and sanitation.

Resource constraints confronted by the Government are not only operative on the development side but also on recurring expenditures. The last two Federal budgets have included an economy drive in current expenditures by Government departments. Table 10 indicates the trend in real recurring expenditures on general administration, social, economic and community services (including PHED) by the Federal and Provincial Governments. These expenditures grew rapidly up to 1986/87 but were followed by an attempt to contain the increase.

In 1988/89 real recurring expenditures by both levels of Government on administration and on the operating and maintenance of publicly provided services are likely to be below the level attained in 1986/87, with the prospect that they would be reduced even further in 1989/90. The pressure on provincial governments to cut back on recurring expenditures is likely to be exceptionally strong in view of the decision by the Federal Government to freeze the total flow of funds (revenues from divisible pool of taxes plus non-obligatory grants) to the provinces at the nominal level of 1988/89.

The economy drive on recurring expenditures implies that the ability of Provincial line departments (including PHED and LGRDD) to expand employment to undertake new initiatives will be limited in the next few years. In addition, there will be strong pressures to limit operation and maintenance expenditures on the existing network of services. The Provincial Government may try to develop its own revenue sources in the face of limits on Federal Government support. This opens up the prospect for more serious cost recovery with escalation in the level of user charges and improvements in revenue collection mechanisms.

TABLE 10 - NOMINAL AND REAL* GENERAL ADMINISTRATION AND SERVICES** RECURRING EXPENDITURE BY FEDERAL AND PROVINCIAL GOVERNMENTS
(Rs in Billion)

	National		Provincial	
	At Current Prices	At Constant Prices	At Current Prices	At Constant Prices
Sixth Plan Period				
1983/84	11.2	15.1	15.2	20.5
1984/85	13.2	17.8	16.8	22.7
1985/86	14.1	17.4	19.6	24.1
1986/87	21.1	22.8	24.0	25.9
1987/88	18.0	18.0	27.5	27.5
Seventh Plan Period				
1988/89	21.6	19.8	27.8***	25.5***
1989/90	23.1****	19.3	N.A	N.A

* At constant prices of 1987/88. The nominal expenditures have been converted into real expenditure by using the implicit GDP deflator for the public administration and defence sector in the National income accounts.
** On economic, social and community services (including PHED)
*** Budget estimate
**** Including cost of 5% salary increase for employee up to BPS-16.

Sources: Pakistan Economic Survey, 1988/89, Economic Advisers' Wing, Ministry of Finance, GOP
Budget-in-Brief, 1989/90, Ministry of Finance, GOP
Budget Speech, National Minister of State for Finance, June 3, 1989

6.2 Sector Resource Availability

Practically all past government investment in the sector has been through the Annual Development Programme. Most of this expenditure has been directed to Public Health Engineering Department for the implementation of water supply and drainage schemes. Minor expenditures have been made through the Local Councils in the form of matching grant-in-aid and block grants and through the Sind Arid Zone Development Authority.

The total public investment in the Sector in budget year 1988-89 was Rs.342 million composed of Rs. 279 million to PHED, Rs. 34 million to the Local Councils, and Rs. 39 million to SAZDA. However only about a quarter of the allocation to the Local Councils

and SAZDA is invested in the sector thus the actual allocation to the sector is estimated as follows:

Institution	1988/89 Estimated ADP to Sector
Public Health Engineering	279
Local Councils	6
SAZDA	10
Totals	295 Million

Allocations for previous years are indicated on Table A-6 in the Appendix.

The recently announced ADP budget allocated Rs. 246 million to rural water supply and drainage schemes to be implemented through PHED. The allocation to SAZDA was Rs. 32 million from the ADP and an expected Rs. 10 million from the Federal Special Development Programme. Local Councils were allocated Rs. 23 million from the ADP under the Grant-in-Aid programme for development works. Taking into account that only a portion of the allocation to SAZDA and the local councils goes to water and drainage, the total public investment in the sector in 1989/90 is expected to be about Rs. 260 million. Expenditures over the remainder of the Seventh Plan and over the Eighth Plan are expected to be at about the same level in real terms.

6.3 Donor Agency Funds

The amount of funding available from external source will not be known until commitments are made. The proposed investment is Rs. 850 million and it is expected that this amount can be made available. However, the level of funding depends to considerable extent on the degree to which potential donors agree with the proposed investment strategy. A particular concern will be the degree to which it is perceived that sustainability of the facilities will be achieved.

6.4 Recurrent Budget Implications

The proposed investment for the Seventh Plan is expected to have a minor impact on the recurring budget. Additional funds will be required for staff and for operating cost.

6.4.1 Staff

The components proposed for implementation by PHED in the Seventh Plan period are not expected to require a significant number of additional staff. This is based on the fact that the level of activity of the Department under the ADP is decreasing as the amount allocated for rural water supply and drainage declines in real terms. Moreover the proposed shift to lower technologies in small villages through RDD would result in a decrease in allocation to PHED. Four or five Sociologist for the village participation programme are required but it is proposed to second them from the Social Welfare Department for the Seventh Plan. Recruitment of additional sociologists will be required for the Eighth Plan period.

In the case of RDD there is a perceived shortage of staff to implement the proposed components. To initiate the programme it is proposed to make use of existing staff both within RDD and from the Local Government Department. However, a significant number of new staff will be required in the Eighth Plan period as the programme expands.

For both PHED and RDD, new positions of training coordination are proposed; are in each Department. In addition two assistant engineers to assume the role of operator trainers is proposed for PHED.

6.4.2 Operating Costs

Additional costs will accrue to PHED, RDD and SAZDA in the form of operating costs for vehicles used on the donor funded components and per diem for staff working on the programme.

6.5 Operations and Maintenance

At present the Public Health Engineering Department bears the cost of operating and maintaining the water supply and drainage schemes that it has implemented. Funds are made available for this purpose from the recurring budget. Expenditures over the past three years are reported to have been Rs. 6.65 million in 1986-87, Rs. 12.54 million in 1987-88 and Rs. 15.78 million in 1988-89. Allocations have actually been higher than expenditures, for example, for 1988-89 the allocation was Rs. 54 million.

The intent of the donor investment is to transfer the operation and maintenance cost to the users through village organizations. However, this programme will require time to phase into the on-going investment under the ADP. Assuming that PHED does not incorporate a village participation programme in the short term the number of schemes to be operated and maintained by PHED will increase significantly. By 1990 PHED will have about 630 water supply and about 250 drainage schemes either completed on under construction. Of these, over 500 schemes should be operating. Some will have been rehabilitated and in the process should be transferred to village management. The balance, an estimated 400 schemes, are assumed will be operated and maintained by PHED by the end of the Seventh Plan. This is expected to require a recurring budget allocation of about Rs. 40 million.

6.6 Willingness to Pay

An indication of the willingness of rural residents to pay for water supply services was obtained through a survey conducted by the Sindh Team throughout the Province. The results suggest that:

- most people in the Sweet Water Zone are not willing to support a pipe borne communal water supply scheme and prefer to continue using their hand pump supplies;
- in general about 30 per cent of the rural residents are prepared to pay more than Rs. 20 per month per household for a house connection;
- rural residents in the Arid Zones indicate the highest willingness to pay for operation and maintenance of a water supply scheme, most are prepared to pay more than Rs. 20 per month per household;
- over 90 per cent of those interviewed indicated a willingness to pay a tariff to support a stand post water supply scheme;
- in the barrage area about 65 per cent of rural residents indicated a willingness to pay between Rs. 10 and Rs. 20 for a stand post type water supply; and
- most rural residents prefer to pay the water tariff monthly.

The results suggest that there is a basis for expecting that rural residents will pay to support the operating cost of a water supply scheme.

The survey also included questions regarding willingness to install a latrine. About 80 per cent of respondents indicated a willingness to invest in a latrine if government provided some assistance.

7. PROJECT MANAGEMENT AND IMPLEMENTATION

7.1 Institutional Arrangement

Five key institutions are identified as the main implementing agencies for the proposed donor funded investment plan:

- Public Health Engineering Department;
- Rural Development Department;
- Sind Arid Zone Development Authority;
- Local Government Department; and
- Planning and Development Department.

7.1.1 Public Health Engineering Department

PHED would be assigned responsibility for the rehabilitation of existing pipe borne schemes and for the implementation of new pipe borne schemes in villages 500 to 1000 in the barrage area. The PHED staff would be responsible for implementing the village participation programme as a prerequisite for proceeding with the provision of the water supply facilities. In addition the Department would be responsible for undertaking the hygiene education component as an integral part of delivering the water supply facilities. A team consisting of an Assistant Engineer and a sociologist would be assigned responsibility for delivering the complete package. It is proposed that the required sociologists be seconded from the Social Welfare Department.

These components would be incorporated as part of the on-going work of the Department without creating a new cell. It is expected that during the Seventh Plan no additional staff will be required at the professional and sub-professional levels. However, in the Eighth Plan period some additional staff may be required as the scope of the programme expands.

Significant institutional strengthening initiatives are also proposed for PHED. This would include changes in contractual procedures; a more active planning role, and improvements to information handling. Additional staff will be required for the computerized information handling systems, although as many as possible existing staff will be re-oriented to this technology. In addition it is proposed that the Department create a new position of Training coordinator.

7.1.2 Rural Development Department

RDD is designated as the implementing agency for the small water supply schemes based on hand pump type technology and latrine promotion through demonstration installations. The scope of work would encompass arranging village participation, hygiene education, latrine promotion, and hand pump improvement promotion.

Some additional staff are expected to be required before the end of the Seventh Plan and significant increases in staff will be required in the Eighth Plan period in order to accommodate the proposed increase in the scope of the initiatives. To initiate the programme it is proposed that the village participation promotion teams be staffed to the maximum extent possible by existing staff such as the District Planning Officers (RDD) and District Development Officers (LGD).

7.1.3 Sind Arid Zone Development Authority

SAZDA would be responsible for the components of the proposed programme that would be undertaken in the Arid Zones. This would include improvements to existing hand dug wells and tarais. In the villages that the improvement works are undertaken the Authority would be responsible for arranging village participation, and conduct the hygiene education programme. The ground water exploration programme will also be undertaken by SAZDA in conjunction with WAPDA.

The relatively modest programme of hand dug well and tarai improvements proposed for the Seventh Plan is not expected to necessitate the Authority taking on additional staff. However, implementation of the expanded programme envisaged for the Eighth Plan is expected to require additional staff particularly for the village participation promotion roles.

7.1.4 Local Government Department

The main contribution of the Local Government Department would be through the Academy which is proposed as a focal point for much of the proposed training programme.

This would include:

- operator training;
- training for village participation and hygiene education programmes; and
- orientation of elected representatives.

7.1.5 Planning and Development Department

The main role proposed for the planning and Development Department is one of monitoring and evaluation. A unit would be incorporated into the existing Directorate of Monitoring and Evaluation.to assess the various procedures and technologies applied in the Seventh Plan so that appropriate detailed plans can be developed for the Eighth Plan period.

7.2 Organization and Management

7.2.1 Integrated implementation Approach

An integrated approach is recommended for the implementation of the proposed investment plan. If only one donor agency were involved, integration would occur as a logical consequence. However, even if more than one donor is involved, each should be assigned an integrated package which would include the implementation of the works as well as the village participation, hygiene education, latrine promotion, institutional strengthening and training components. This will avoid the problems of timing and coordination that often occur when key components are not assigned to the agency undertaking the main works.

7.2.2 Programme Organization

To implement the Investment Plan it is proposed to engage several expatriate Team Leaders Advisor. This approach is proposed as a means of initiating the programme quickly. In addition some Pakistani consultant staff are proposed to provide specialist input, for example, sociologists in the village participation component, and to supplement Department staff where existing staff capacity may not be adequate to accommodate the additional load. Table 11 provides a summary of the proposed expatriate and Pakistani consultant inputs during the Seventh Plan period and the institution to which they would relate.

TABLE 11 PROPOSED CONSULTANT IMPUTS IN SEVENTH PLAN

COMPONENT	INSTITUTION	PROPOSED CONSULTANT POSITIONS			
		EXPATRIATE		PAKISTANI	
		Position	Duration (Months)	Position	Duration (Months)
Monitering and Evaluation	P&DD	Programme Director	36		
Rehabilitation	PHED	Team Leader	36	Senior Engineer	36
		Design Engineer	4		
Water Supplies Villages 500-1000	PHED	Team Leader	36	Senior Engineer	36
Water Supplies Villages <500	RDD	Scavenger Well Specialist	2	Junior Engineer (2)	36
Arid Zone Water Supplies	SAZDA	Team Leader/ Advisor	36		
Village Participation Programme	PHED/RDD/SAZDA			Senior Sociologist	30
				(3) Junior Sociologists	30
Institutional Strengthening	PHED	Team Leader/ Advisor	9	Information Systems Specialist	14
	RDD			Administative Specialist	14
Training	Academy	Team Leader	24	Advisor	24
	PHED/RDD	Advisor	24		
Hygiene Education	PHED/RDD/SAZDA	Team Leader/ Advisor	30	Specialists (2)	30
		TOTALS	237		250

An overall Programme Director attached to the Planning and Development Department is recommended. He would be responsible for providing direction and coordination to the programme and for the monitoring and evaluation component. Each of the Team Leaders/Advisors would be accountable to the Programme Director.

7.3 Community Involvement

The proposed investment plan is based on the concept of village participation as a means of achieving sustainability of the facilities provided. A pre-requisite for implementation is the establishment of a village organization to be involved in the entire process leading to the completion of the works and then assuming the responsibility for on-going operation and maintenance. Recovery of costs would be through tariff collection system devised by and implemented by the village organization.

Maintaining the interest of the village organization over the long term is perceived to be a problem, particularly for small schemes based on low level technology where there are expected to be few decisions to be more after the scheme is commissioned. As a means of preventing this deterioration of interest it is suggested that the water supply, sanitation and health education components of village improvement be integrated with agricultural organizations wherever possible. Agricultural is the basic activity of most rural residents and therefore a long term focal point for people to come together to resolve mutual difficulties and explore improved techniques. Water supply or sanitation would then be one more issue to deal with when the organization comes together. For larger settlements with pipe borne schemes the need for decisions may be more frequent and thus organizations dedicated to the Sector would be more likely to survive over the long term.

7.4 Institutional Strengthening/Training

A considerable investment in institutional strengthening and training is proposed, particularly in the Seventh Plan period. This is considered an essential step toward achieving sustainability. A strong operator training component is proposed which will allow schemes to be implemented with the facilities, such as sand filters, that are necessary to ensure that a satisfactory quality of water is provided. New concepts and processes related to village participation and hygiene education are to be introduced into the Departments. Appropriate training is proposed to prepare staff to implement these components.

The Local Government Academy is proposed as the focus for much of the training activity. This will necessitate re-orientation of the training staff and provision of training facilities. Training coordinators are proposed for the PHED and RDD along with refresher courses for professional and sub-professional staff.

A significant investment in information handling systems are proposed for PHED and RDD. Training of existing staff and in some cases recruitment of additional staff will be a part of the upgraded system of cost control, budgeting, inventory control, personnel data handling and record keeping.

7.5 Hygiene Education

The proposed hygiene education component is based on a simultaneous focused and a broad based approach. The focused approach would involve integrating the delivery of hygiene education messages with the delivery of the rehabilitated water supply or drainage facility and the new water supplies. The staff in the respective government agencies who are responsible for establishing the village organization would be assigned to manage the delivery of the hygiene messages using volunteers from the area around the village. This approach will take advantage of the high level of interest at the time a scheme is being implemented and the presence of staff that are capable of delivering the messages.

The broad based hygiene education initiative has two proposes:

- building awareness in the rural community that should prepare the way for the village participation programme; and

- follow up after focused hygiene education effort at the time of the scheme is implemented, as a means of sustaining the awareness and gradually changing behaviours.

The broad based initiative would emphasize enhancement of hygiene elements of the primary school curriculum. The expectation is that the children will be the best means of long term gains in improving hygiene practices.

7.6 Support to Private Sector

Support to the private sector comes in two forms in the proposed investment plan:

- latrine promotion component; and
- small village water supplies.

Latrine construction is a private endeavour. The proposed latrine demonstration component is intended to build awareness and thereby encourage the general community to invest in similar facilities. The demonstration latrines are also intended to provide design models and to upgrade the skills of local artisans in their construction.

The small village water supplies will emphasize hand pump technology. An integral part of the implementation of this component will be promotion of better quality hand pumps and improved installation practices. Hand pumps are installed by the private sector in Sindh. Thus the promotional campaign both through demonstration and through mass media, messages should is aimed at upgrading the capability of the local artisans.

APPENDIX A

TABLE A-1 DISTRIBUTION OF PHYSIOGRAPHIC ZONES BY DISTRICT

District	Sweet Water Zone		Brackish Water Zone		Hilly Desert Zone		Sandy Desert Zone		Delta Zone		Total Area
	(sq. km)	Percentage	(sq. km)	Percentage	(sq. km)	Percentage	(sq. km)	Percentage	(sq. km)	Percentage	(sq. km)
Sangar	1,620	15.1	3,594	33.5			5,515	51.4			10,729
Sukkur	3,589	32.4	2,621	23.6			4,883	44.0			11,093
Dadu	1,277	6.7	1,450	7.6	16,289	85.7					19,016
Karachi					3,405	100.0					3,405
Badin			6,562	100.0							6,562
Nawab Shah	5,280	70.4	1,790	23.9			431	5.7			7,501
Hyderabad	1,953	34.4	3,730	65.6							5,683
Tharparkar			6,010	21.3			22,160	78.7			28,170
Larkana	2,320	31.3	3,420	46.1	1,677	22.6					7,423
Khairpur	3,058	19.4	1,125	7.1			11,572	73.5			15,736
Jacobabad	3,036	57.3	2,085	39.3	180	3.4					5,300
Shikarpur	2,842	100.0									2,842
Thatta			6,647	36.3	3,037	16.6			8,613	47.1	18,293
TOTAL	24,975	17.6	39,034	27.5	24,588	17.3	44,561	31.4	8,613	6.1	141,753

TABLE A-2 ESTABLISHMENT OF THE PUBLIC HEALTH ENGINEERING DEPARTMENT

Position	Grade Level	Head Office	Circle Offices	Division Offices	Totals
Chief Engineer	20	1			1
Director Design	19	1			1
Superintending Engineer	19		6		6
Assistant Director Works	18	1			1
Executive Engineers	18			19	19
Design Officer	18	2			2
Research Officer (Chemist)	18	1			1
Administrative Officer	17	1			1
Chief Draughtsman	17	1			1
Assistant Engineers	17			75	75
Assistant Design Officers	17	3	6		9
Superintendents	16	2	6		8
Assist. Research Officer	16	1			1
Circle Head Draughtsman	16		6		6
Budget & Accounts Officer	16	1			1
Divisional Accountant	13			19	19
Head Draughtsman	13	2		19	21
Stenographer	12	5	6	19	30
Sub Engineers	11			240	240
Head Clerks/Assistants	11	6	18	19	43
Sr. Research Assistant	11	3			3
Jr. Clerks	10	11	48	174	233
Draughtsman	10	3	12	38	53
Mechanic	7			2	2
Accounts Clerks	7	2	42	38	82
Sr. Clerks	6	3		60	63
Jr. Laboratory Technician	6	1			1
Storekeeper	6			1	1
Workmistri	5			264	264
Laboratory Assistant	5	1			1
Stores Clerk	5			1	1
Auditors	5			22	22
Tracers	5	4	12	38	54
Drivers	3	1	6	19	26
Daftaris	2		6		6
Qasid	2	1	2		3
Mechanics Helper	2			1	1
Daftari	2		4		4
Sweeper	1			2	2
Chowkidar	1	2	6	82	90
Laboratory Attendant	1	2			2
Ferroprinter	1	1			1
Malis (gardener)	1			2	2
TOTALS		58	180	1070	1308

TABLE A-3

ESTABLISHMENT OF RURAL DEVELOPMENT DEPARTMENT

TECHNICAL WING		DEVELOPMENT WING	
PROVINCE		**DIVISION LEVEL**	
Director	1	Director	2
Circle Draughtsman	1	Division Planning Officer	2
Head Clerk	1	Officer Superintendent	2
Stenographer	1	Stenographer	2
Senior Clerk	1	Office Assistant	2
Junior Clerk	1	Senior Clerk	4
Driver	1	Junior Clerk	6
Naib Qasid	1	Driver	2
Chowkidar	1	Naib Qasid	4
Total Staff	9	Total Staff	26
DIVISION LEVEL		**DISTRICT LEVEL**	
Executive Engineer	2	Assistant Director	12
Office Assistant	2	District Planning Officer	11
Draughtsman	2	Steno Typist	18
Junior Clerk	2	Junior Clerks	14
Tracer	2	Naib Qasid	11
Driver	2		
Naib Qasid	2		
Chowkidar	2	Total Staff	66
Total Staff	16		
TALUKA LEVEL			
Assistant Engineers	36		

TABLE A-4

ESTABLISHMENT OF LOCAL GOVERNMENT

DIVISION LEVEL

Director	2
Office Superintendent	2
Office Assistants	4
Stenographer	2
Senior Clerks	5
Junior Clerks	8
Naib Qasids	4
Driver	2
Total Staff	28

DISTRICT LEVEL

Assistant Director	12
Senior Clerks	12
Junior Clerks	12
Steno Typist	12
Naib Qasid	12
Driver	12
Total Staff	72

TALUKA LEVEL

Development Officers	71
All Clerks	71
Naib Qasid	71
Total Staff	213

TABLE A-5 DISTRICT COUNCIL ESTABLISHMENT

	Designation	Grade Level	No.
1.	Chief Officer	17	1
2.	Engineer	17	1
3.	Accounts Officer	17	1
4.	Office Superintendent	16	1
5.	Recovery Officer	16	1
6.	Taxation Officer	16	1
7.	Assistant	11	1
8.	Deputy Accountant	11	2
9.	Sindhi Typist	8	1
10.	P.A.	8	2
11.	Junior Clerks/Tax Clerks	5	61
12.	Painter	6	1
13.	Pesh Imam	6	1
14.	Electrician	5	1
15.	Driver	5	4
16.	Naib Qasid	1	12
17.	Chowkidar	1	1
18.	Malhi	1	1
19.	Sweeper	1	2
20.	Tax Inspector	10	1
21.	Sub-Inspector	8	2
22.	Tax Guard	1	41
23.	Sub-Engineers	16	1
24.	Sub-Engineers	11	8
25.	Draftsman	13	1
26.	Tracer	5	1
27.	Road Jamadars	2	5
28.	Beldars	1	34
29.	Chowkidars (Rest House)	1	7
30.	Road Roller Driver	5	1
31.	Road Roller Cleaner	1	1
32.	Cattle Pound Munshies	2	28
33.	Compounders	8	17
34.	Salutary Compounders	6	3
35.	Compounders	6	78
36.	Salutary Compounders	6	6
37.	Dresssers	1	80
38.	Chowkidar	1	44
39.	Female Dressers	1	16
40.	Waterman	1	7
41.	Sweeper	1	22
42.	Naib Qasid.	1	8
		TOTAL	512

TABLE A-6 PAST SECTORAL ADP ALLOCATIONS AND ACTUAL EXPENDITURES IN THE PROVINCE OF SINDH

YEAR	RURAL WATER SUPPLY AND SANITATION		URBAN WATER SUPPLY AND SANITATION		RURAL DEVELOPMENT		SINDH ARID ZONE DEVELOPMENT AUTHORITY		TOTAL PROVINCIAL ADP	
	Allocation	Actual Expenditure	Allocation	Actual Expenditure	Allocation	Actual Expenditure	Allocation	Actual Expenditure	Allocation	Actual Expenditure
SIXTH PLAN PERIOD										
1983-84	41.00	40.50	114.00	122.00	27.00	27.00	3.00	3.00	185.00	192.50
1984-85	59.49	58.99	112.28	112.78	47.50	47.50	2.71	2.71	221.98	221.98
1985-86	83.70	80.20	98.47	93.36	29.20	29.20	12.41	12.41	223.78	215.17
1986-87	209.43	209.58	83.19	86.89	23.01	23.01	17.43	17.43	333.06	336.91
1987-88	249.33	249.33	95.83	95.83	23.01	23.01	50.00	50.00	418.17	418.17
SEVENTH PLAN PERIOD										
1988-89	278.65	315.25	83.38	125.98	23.65	23.65	38.95	38.95	424.63	503.83

TABLE A-7 SUMMARY BUDGETS FOR DISTRICT COUNCIL KHAIRPUR

INCOME	Actual 1986-87	Budget 1987-88	Budget 1988-89	EXPENDITURES	Actual 1986-87	Budget 1987-88	Budget 1988-89
1. Taxes	7,947,000	12,415,000	13,864,000	1. Establishment	3,243,400	4,848,400	6,550,000
2. Fees	221,300	99,000	115,000	2. Contingencies	899,600	1,608,000	1,372,000
3. Rent	71,500	71,000	90,000	3. Charged Expenditures	1,240,700	2,179,000	2,952,000
4. Other Receipts	29,500	174,100	33,000	4. Liabilities	572,200	1,085,000	1,085,000
5. Capital Income excluding Matching and Block Grant-In-Aid	2,633,100	2,464,500	3,956,800	5. Reserve	300,000	110,000	120,000
				6. Grants	127,000	152,000	246,000
6. Matching and Block Grant-In-Aid	743,800	743,400	1,300,000	7. Scholarships	58,100	150,000	305,000
				8. Women's Social Welfare Activities	0	0	10,000
				9. Capital Development Expenditure	5,162,100	4,748,400	7,032,000
TOTAL (Rs.)	11,646,200	15,967,000	19,358,800	TOTAL (Rs.)	11,603,100	14,880,800	19,672,000

TABLE A-8 SUMMARY BUDGET FOR UNION COUNCIL KANTIO

INCOME:

ITEM DESCRIPTION	1986-87 ACTUAL	1987-88 BUDGET	1987-88 ACTUAL	1988-89 BUDGET
A. REVENUE				
1. Octroi Duty	31,638	66,700	13,187	55,200
2. Share of Export Tax	4,985	50,000	8,905	50,000
3. Marriage tax	0	0	0	500
4. Health Tax	0	15,000	0	15,000
5. Local Cess	7,089	10,000	5,546	10,000
B. FEES				
1. Piri/Chapara fee	0	0	0	1,000
2. Certificate fee	0	0	0	1,000
3. Share of Paddy fee	7,377	10,000	0	10,000
4. Tender fees	0	0	0	200
5. Licence	0	0	0	0
6. Miscellaneous Fee	0	4,000	137	4,000
C. CAPITAL				
1. Grant in Aid For Salaries	0	15,000	0	15,000
2. Special Grant for Works	0	42,000	20,000	40,000
3. Gov't Grant for Works	11,840	0	11,570	0
4. Deposits of Contractors	0	0	0	0
5. From Octori Contractor	0	10,506	0	14,458
6. Recovery of Arrears	0	20,000	0	31,041
7. Refund of Loans	3,400	0	0	0
8. Miscellaneous	0	1,000	0	25,000
TOTALS (Rs.)	66,329	244,206	59,344	272,399

EXPENDITURES:

ITEM DESCRIPTION	1986-87 ACTUAL	1987-88 BUDGET	1987-88 ACTUAL	1988-89 BUDGET
A. EXPENDITURES GENERAL ADMINISTRATION				
1. Pay of Office Staff	13,779	20,406	10,527	49,598
2. Contingencies	2,470	22,900	3,344	24,900
3. T.A./D.A.	675	5,000	1,443	9,209
4. Honourarium to Chairman	1,000	1,000	0	1,000
B. TAXATION DEPT.				
1. Pay of Octroi Staff	0	10,506	3,460	21,378
2. Pay of Recovery Staff	0	0	0	17,256
3. Contingencies	0	0	0	1,000
C. HEALTH AND SANITATION DEPARTMENT				
1. Pay of Conservancy Staff	5,488	21,998	2,983	21,902
2. Contingencies	7,731	31,000	3,820	31,000
D. CHARGED EXPENDITURE				
1. Audit Fee	0	3,000	0	3,000
2. Unforseen Charges	0	7,605	0	5,000
3. Advertisement Charges	0	0	500	0
E. WATER SUPPLY DEPT.				
1. Pay of Establishment	2,935	7,114	3,522	10,951
2. Contingencies	0	4,000	3,440	0
F. CAPITAL WORKS				
1. Construction of Building	31,250	47,000	8,400	31,000
2. Water Supply Works	0	43,000	17,920	3,580
3. Refund of Loans Made	3,400	0	0	0
4. Miscellaneous	0	0	3,482	8,000
TOTALS (Rs.)	68,728	224,529	62,841	238,774

TABLE A-9 SOURCES OF WATER USED BY RURAL RESIDENTS
(1980 Housing Survey)

	DISTRICT	Housing Units	Percent of Households: Hand Pumps	Dug Wells	Surface Water	Piped
1	Sukkur	115,600	71.6	12.8	8.2	7.4
2	Khairpur	92,400	63.2	18.2	7.6	11.0
3	Nawab Shah	172,000	56.1	18.8	13.1	12.0
4	Larkana	117,100	55.8	15.9	21.6	6.7
5	Jacobabad	107,300	64.7	11.2	13.5	10.5
6	Shikarpur	64,500	90.3	2.8	2.2	4.7
7	Hyderabad	172,100	44.4	14.3	34.1	7.2
8	Sangar	90,100	28.7	11.6	50.1	9.6
9	Tharparkar	204,500	3.6	43.6	50.7	2.0
10	Badin	113,000	6.9	10.5	80.4	2.2
11	Thatta	101,100	6.3	13.1	75.4	5.2
12	Dadu	132,000	19.6	44.0	28.7	7.7
13	Karachi	46,200	4.3	26.1	9.6	60.0
Average Percentage of each Source			38	20	33	9

TABLE A-10 STATUS OF PHED WATER SUPPLY AND DRAINAGE SCHEMES

District	Water Supply Schemes			Drainage Schemes	
	Commissioned	Completed but not Commissioned	Under Construction	Completed to June 1988	Under Construction
Sukkur	6	8	22	7	12
Khairpur	11	4	35	5	29
Jacobabad	7	8	23	3	8
Shikarpur	2	4	7	15	23
Larkana	8	6	29	2	23
Nawabshah	11	6	16	8	18
Sangar	12	4	27	4	9
Dadu	24	2	39	0	6
Hyderabad	13	10	34	1	13
Tharparkar	20	3	35	3	4
Badin	11	12	24	2	9
Thatta	11	9	23	2	5
Karachi	4	7	17	4	10
Total	140	83	331	56	169
Percentage	25.3	15.0	59.7	24.9	75.1

TABLE 11: SINDH TRAINING FACILITIES - COURSES BY FEDERAL DIRECTORATE OF MANPOWER AND TRAINING

NAME OF CENTRE	SHIFT	DURATION AND TRAINING	CIVIL DRAFTING	MECHANICAL DRAFTING	RADIO & T.V.	REF. & AIR CONDITIONING	ELECTRICIAN/WIREMAN	AUTO MECHANIC	TURNER	MACHINIST	BENCH FITTER	WELDING ELEC./GAS	CARPENTRY/WOOD MACH.	SHEET METAL	PATTERN MAKING	FOUNDRY	SHUTTERING CARPENTRY	PLUMBING	MASONARY	HOUSEHOLD ELEC. APPLIANCES	CABINET MAKING	TRACTOR MECHANIC	MILLWRIGHT FITTER	MAINTENANCE FITTER	TEXTILE MECHANIC	WEAVING	AUTO BODY REPAIR & PAINTING	FARM MECHANIC	GENERAL FITTER	AUTO CYCLE MECHANIC	STENOGRAPHER	TYPING
T.T.C. Karachi	Day	2 Year	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*													
T.T.C. Karachi	Evn.	1 Year	*	*		*	*	*	*	*	*	*	*		*	*	*	*														
T.T.C. Kotri	Day	2 Year	*	*	*		*	*	*	*	*	*		*				*														
T.T.C. Kotri	Evn.	1 Year	*	*			*	*	*	*	*	*		*				*														
T.T.C. Sukkur	Day	1 Year																														
		6 Month	*		*	*	*					*					*	*	*			*									
T.T.C. for Women Karachi	Day	1 Year	*		*															*												
T.T.C. Liaquatabad Karachi	Day	1 Year				*	*														*											
Y.V.C. Tandoallah Yar	Day	1 Year					*	*														*										
Y.V.C. Matli	Day	1 Year					*	*														*										
Y.V.C. Hala	Day	1 Year					*	*																						*	*	
Y.V.C. Digree	Day	1 Year					*	*														*										
Y.V.C. Thauro Shah	Day	1 Year					*	*																						*	*	
Y.V.C. Sujawal	Day	1 Year					*	*																						*	*	
Y.V.C. Kandhkot	Day	1 Year					*	*														*										
T.T.C. Sukkur	Evn.	1 Year																														
		6 Month	*		*	*	*			*		*					*	*	*			*			*							
A.T.C. Landhi/Korangi, Karachi	Day	1 Year	*		*	*		*	*	*		*	*	*				*					*	*	*	*							
A.T.C. Landhi/Korangi, Karachi	Evn.	1 Year	*		*	*		*	*	*		*	*	*									*	*	*	*							
A.T.C. Hyderabad	Day	1 Year				*				*		*		*																			
A.T.C. Hyderabad	Evn.	1 Year				*				*		*		*																			
G.V.I. Khadda, Karachi	Day	1 Year			*		*	*	*			*	*																			
G.V.I. Khadda, Karachi	Evn.	1 Year			*		*	*	*			*	*																			
T.T.C. Larkana	Day	1 Year			*		*		*									*					*									
T.T.C. Larkana	Evn.	1 Year			*		*		*									*					*									
T.T.C. Thatta	Day	1 Year					*				*												*									
V.T.C. Sanghar (Phase II)	Day	1 Year			*		*						*					*										*				
V.T.C. Tandoadam (Phase II)	Day	1 Year			*		*					*																*	*			
V.T.C. Mirpur Mathelo (Phase II)	Day	1 Year			*		*											*										*				
V.T.C. Khairpur Mirs. (Phase II)	Day	1 Year			*		*																					*	*	*		
V.T.C. Umer Kot. (Phase II)	Day	1 Year			*		*					*						*										*				
V.T.C. Shikarpur (Phase II)	Day	1 Year			*		*																					*	*	*		
V.T.C. Jacobabad (Phase II)	Day	1 Year			*		*																					*	*	*		
V.T.C. Nowshero Reroz (Phase II)	Day	1 Year			*		*					*						*										*				

TABLE A-12 SUMMARY OF RURAL POPULATION PROJECTIONS

DISTRICT	PROJECTED POPULATIONS ('000)		
	1988	1993	1998
Sukkur	949.0	1,087.4	1,246.0
Khairpur	845.5	931.2	1,025.6
Nawab Shah	1,567.2	1,710.1	1,865.9
Larkana	985.3	1,063.6	1,148.0
Jacobabad	1,110.6	1,331.2	1,595.6
Shikarpur	553.4	589.4	627.8
Hyderabad	1,358.4	1,530.2	1,723.7
Sangar	876.4	998.8	1,138.4
Tharparkar	1,653.3	2,010.6	2,445.0
Badin	827.1	933.5	1,053.6
Thatta	772.5	836.7	906.2
Dadu	1,134.0	1,305.1	1,502.0
Karachi	208.5	223.9	240.4
TOTAL	12,841.2	14,551.7	16,518.2

TABLE A-13 PROJECTED NUMBERS OF RURAL SETTLEMENTS

DISTRICT	1988			1993			1998		
	Small	Medium	Large	Small	Medium	Large	Small	Medium	Large
Sukkur	4,311	147	45	4,442	147	46	4,577	147	46
Khairpur	4,670	188	78	4,812	188	78	4,958	188	78
Nawab Shah	6,938	325	134	7,149	325	134	7,366	325	134
Larkana	4,435	258	111	4,570	258	111	4,708	258	111
Jacobabad	4,343	188	64	4,475	188	64	4,611	188	64
Shikarpur	1,974	147	66	2,034	147	66	2,096	147	66
Hyderabad	4,931	281	148	5,081	281	148	5,235	281	148
Sangar	5,446	169	48	5,611	169	48	5,782	169	48
Tharparkar	3,877	341	72	3,995	341	72	4,116	341	72
Badin	6,384	125	29	6,578	125	29	6,778	125	29
Thatta	6,491	101	22	6,688	101	22	6,891	101	22
Dadu	4,034	269	117	4,156	269	117	4,283	269	117
Karachi					554	46	571	46	
TOTAL	57,834	2,539	934	59,591	3,093	981	61,972	2,585	935

TABLE A-14 ESTIMATED POPULATION BY SETTLEMENT SIZE IN 1988

DISTRICT	SMALL			MEDIUM			LARGE		
	Number	Population	Percentage	Number	Population	Percentage	Number	Population	Percentage
Sukkur	4,775	726,100	76.5	147	122,900	13.0	46	100,000	10.5
Khairpur	5,178	566,300	67.0	188	146,900	17.4	78	132,300	15.6
Nawab Shah	7,700	1,077,000	68.7	325	249,600	15.9	134	240,600	15.4
Larkana	4,930	587,700	59.6	258	195,800	19.9	111	201,800	20.5
Jacobabad	4,816	826,300	74.4	188	161,500	14.5	64	122,800	11.1
Shikarpur	2,199	327,200	59.1	147	110,900	20.0	66	115,300	20.8
Hyderabad	5,483	829,300	61.0	281	224,400	16.5	148	304,700	22.4
Sangar	6,029	659,900	75.3	169	137,400	15.7	48	79,100	9.0
Tharparkar	4,369	1,219,000	73.7	341	297,300	18.0	22	137,000	8.3
Badin	7,057	677,500	81.9	125	99,200	12.0	29	50,400	6.1
Thatta	7,172	656,100	84.9	101	74,700	9.7	22	41,700	5.4
Dadu	4,494	665,500	58.7	269	230,000	20.3	112	238,500	21.0
Karachi	422	132,100	63.4	46	33,100	15.9	18	43,300	20.8
TOTAL	64,624	8,950,000	69.7	2,585	2,083,700	16.2	898	1,807,500	14.1

John Parry 6.0

- IIT schemes assessed: rehabilitation needs, why not operating etc
- surveys in 200 villages. Asking questions related to health conditions etc, Comm. based organisations
- M2a/pen. Surveys of the private sector
- No discussions with P&D. This did not work out. Committee meeting: Wanted to jump from inception report to investments.
- Workshops: 45 people, including directors of departments plus NGOs. 6. Working groups. List of questions to address. They got good response. → feed-back ok.
- Investment: General exercise with the other teams
- Donor programme used as a vehicle to charge P&D.
- Social safeguards/ community orientation required.