

# Sind

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

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## Inception Report

March, 1989

Wardrop - Acres  
Cowater International  
NESPAK.

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

## INCEPTION REPORT

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## EXECUTIVE SUMMARY

### I BACKGROUND

This Strategic Provincial Investment Plan and Project Preparation process was initiated by the World Bank to assist the Government of Sind in developing a strategy for investment in the rural water supply, sanitation and health sector. The overall goal is to improve the health of the rural population through cost effective and sustainable water supply and sanitation facilities which maximize the involvement of the communities. The World Bank with the support of the Canadian International Development Agency engaged the ~~Project Team of Wardrop-Heres and Cowater~~ International in association with National Engineering Services (Pakistan) Ltd. to develop the investment plans and to prepare projects for funding.

Preliminary initiatives to address the perceived critical issues in the Sector are identified as a preview to the likely direction of the investment plans to be prepared over the coming months. Outlines of several potential projects are also presented as an indication of the types of projects that might evolve from the planning process.

THE CRITICAL ISSUES

Based on the analysis completed to this point in the Project it is proposed to address the following key critical issues:

- (1) ~~lack of awareness~~ of the impact of poor water quality and improper sanitation/human waste disposal on health;
- (2) incompatibility between level of service and ability of the users to meet operation and maintenance costs;
- (3) absence of an effective mechanism for ~~cost recovery~~;
- (4) consumption of untreated water from the canals and distributaries in the irrigated areas;
- (5) shortage of water supplies of acceptable quantity and quality in the Kohistan and Thar Arid Zones;
- (6) substandard quality of most locally made hand pumps and insufficient number of properly qualified Pakistani consulting firms to effectively service the Sector;
- (7) insufficient acceptable facilities for disposal of human waste;
- (8) inadequate drainage in most larger settlements;
- (9) overlapping roles and insufficient coordination of agencies working in the Sector;
- (10) limited capability in appropriate technologies and in working with community based organizations;
- (11) insufficient number of community based organizations participating in the Sector; and
- (12) inadequate performance of existing water supply schemes.

To address these issues seventeen preliminary initiatives are proposed for consideration. For most of these initiatives two or three options for implementation are presented. Modifications to these preliminary initiatives and addition of others is expected to evolve out of the discussions among the Government of Sind, World Bank and Project Team staff.

PRELIMINARY INITIATIVESCommunity Development Initiatives

## 1. Community Hygiene Education Program

*Behavioral  
claps?*

This initiative would ~~raise awareness levels~~ of the rural residents, particularly women, as to the importance of clean water and proper hygiene to health. The options proposed for implementation are:

- . expanding and strengthening teaching of hygiene and safe water usage in the schools;
- . using promoters or animators to deliver hygiene and safe water usage messages in the communities;
- . strengthening the role of the Health Services field staff as promoters of hygiene and usage of clean water; and
- . promoting safe water usage and hygiene through the mass media.

## 2. Community Orientation Program

*this  
is  
real.* } The stated goal in the Sector is to maximize the involvement of the community in the process of developing and maintaining water and sanitation facilities. The initiative is to prepare and orient the community to assume this responsibility.

Technical Initiatives

## 3. Rehabilitation of Existing Schemes

The initiative would involve establishing the process for undertaking the rehabilitation of the schemes, assessing the rehabilitation needs and organizing the works. The options

proposed for consideration are:

- . PHED task force
- . consultant task force; and
- . community based organization.

#### 4. Pilot Schemes in Brackish Water Zone

This initiative would determine the most appropriate water supply technology for the brackish water zone of the irrigated area. The extent of sweet water lenses within the brackish water zone would be determined and the feasibility of exploiting them would be assessed. The options proposed for consideration are:

- . engage consulting firms to work with the community based organizations with the Rural Development Department acting as a counterpart and facilitator;
- . task force in PHED with a donor agency providing technical and financial support; and
- . task force in Rural Development Department with donor agency support.

#### 5. Drainage Schemes in Communities with Piped Water Systems

This initiative would address the need for improved drainage in the larger settlements in the irrigated zone, in particular those that have pipe borne water supplies. The options proposed for consideration are:

- . supporting the current efforts of the PHED;
- . implementation through community based organizations, and
- . engaging a consulting engineering firm for design and supervision.

## 6. Support to Hand Pump Suppliers

The initiative would be to improve the quality of hand pumps and the hand pump installations through expansion and acceleration of the existing RDD/UNICEF program to introduce improved hand pumps and enforcement of minimum construction standards for tubewells.

## 7. Latrine Promotion Program

The initiative would be to establish a program to support the privet sector in the promotion and installation of latrines through demonstration installations and credit schemes.

## 8. Water Resources Development in Arid Zone

This initiative would involve delineation and development of water supplies in the Arid Zones. The options to be considered are:

- . supporting current exploration efforts by the German/WAPDA team and SAZDA;
- . conducting a tubewell construction program in the potential water bearing zone identified by others; and
- . undertaking a separate exploration program.

## 9. Operation and Maintenance of Existing Schemes

This initiative would involve strengthening operation and maintenance of existing and future pipe borne water supply schemes. The options proposed for consideration are:

- . community based operator with technical support from the PHED, RDD, private sector or the District Council;
- . PHED to establish an Operation and Maintenance Cell;
- and

Private Sector firms hired by the community.

### Cost Recovery

#### 10. Community/Government Cost Contribution

This initiative is intended to establish the basis for government contribution to water supply schemes and to establish the community means of contributing to capital costs and bearing the full cost of operation and maintenance. The options to be considered are:

- . allocation by need;
- . indirect mechanism for cost recovery; and
- . community contribution in kind rather than cash.

#### 11. Administration of Community Contribution to Operation and Maintenance

This initiative would establish a mechanism for administration and disbursement of community generated funds for operation and maintenance. The options proposed for consideration are:

- . placement of the funds with the District Councils;
- . placement with the Union Council; and
- . placement in a fund operated by the community and monitored by the Union Council or the Local Government Department.

### Institutional Roles

#### 12. Roles for Servicing Community Based Organizations

Increasing the responsibility of the community for the management of their water and sanitation schemes will

require modification of the roles of the agencies presently involved in the Sector. There is potential for expansion of the role of the Private Sector. The options proposed for consideration are:

RDD Option - Rural Development Department mobilizes the community through the Union Councils and provides all the necessary technical support.

RDD/PHED Option - Rural Development Department mobilizes the community through the Union Council provides technical support for simple systems and calls on the Public Health Engineering Department for more demanding technical inputs.

Competitive Option - Rural Development Department mobilizes the community through the Union Council provides technical support for simple systems and obtains technical support for more demanding designs from PHED and the Private Sector on a competitive basis.

District Council Option - The District Council mobilizes the community through the Union Councils and provides all the necessary technical support.

In all cases the Planning and Development Department would provide the macro planning.



### 13. Coordination of Effort Among the Departments

The initiative is intended to improve coordination among the agencies assigned responsibilities for the provision of water supply and sanitation facilities. The options proposed for consideration are:

- . creation of a new coordinating agency for the Sector;
- . strengthening of the Sind Regional Development Planning Organization; and
- . strengthening and expanding the present coordinating role of the P&DD.

### Human Resources Development

#### 14. Training in Appropriate Technology for Professionals

This initiative would be aimed at professionals in the government agencies and in the private sector and would involve presentation of material on appropriate technology, community development and communication.

#### 15. Skills Training Program for Rural Based Artisans

This initiative would establish training programs for artisans who have a role in the Sector and would involve establishment of the training delivery mechanism, recruiting and training master trainers, promoting the training program, assembling the training aids and monitoring the implemented program.

#### 16. Training Program for Water System Operators

This initiative would upgrade the capability of the operators of existing water supply schemes and provide training for operators of future water supply and drainage

schemes.

17. Appropriate Technology Training in Universities and Polytechnical Schools.

This initiative would involve expanding the coverage of appropriate technologies and the social sciences related to community development in the engineering courses at the universities and polytechnical schools. This initiative would be integrated with a national level program within the framework of the International Technical Network Centres (ITN).

18. Other initiatives are expected to be identified as a result of further evaluation and discussions.

The foregoing initiatives will form the basis for projects. Each project is likely to consist of a number of individual initiatives which in combination will enhance the overall benefits to the rural communities. As an indication of the types of projects that may evolve from the process several possibilities are identified in the following section.

#### IV. INDICATIVE PROJECTS

Five indicative projects are presented for initial consideration. These are:

(1) Rehabilitation of existing pipe borne water supply schemes through community based organizations and including hygiene education and human resources development components;

(2) Pilot projects for water supply schemes in communities in the brackish water area through community based organizations and including hygiene education and human resources development components;

(3) Drainage schemes in communities with pipe borne water supplies through community based and including hygiene education and human resources development components;

(4) Latrine promotion program with demonstration installations, credit schemes, hygiene education and human resources development components; and

(5) Support for upgrading hand pumps and hand pump installation in the sweet water zone with credit schemes, and human resources development components.

## 1. INTRODUCTION

The Government of Pakistan has embarked on an ambitious program to improve the country's rural infrastructure. To assist in developing the rural water supply and sanitation component of the program, a World Bank and Canadian International Development Agency (CIDA) mission undertook a preliminary evaluation which culminated in the presentation of the Sector Review for Rural Water, Health and Sanitation to the Government in June, 1988.

As a result of the Sector Review, the World Bank, initiated a process of Strategic Provincial Investment Planning and Project Preparation to assist the Government of Sind in the development of an investment strategy for projects to be implemented starting in 1990. The goal of the projects is to contribute to the improvement of health and overall quality of life of the rural populace through more cost effective and sustainable water supply, sanitation and hygiene education initiatives while maximising community involvement.

In late 1988, the World Bank, with the financial support of CIDA, engaged the Project Team of Wardrop-Acres in association with NESPAK, and Cowater International to develop the investment strategy and formulate projects for funding by international financial institutions and donor agencies.

The purpose of this report is to provide a preliminary indication of the likely direction for investment in the sector as a basis for discussion among the Government of Sind, the World Bank and the Project Team. An outline of the project organisation and methodology is presented and critical issues in the sector and their root causes are

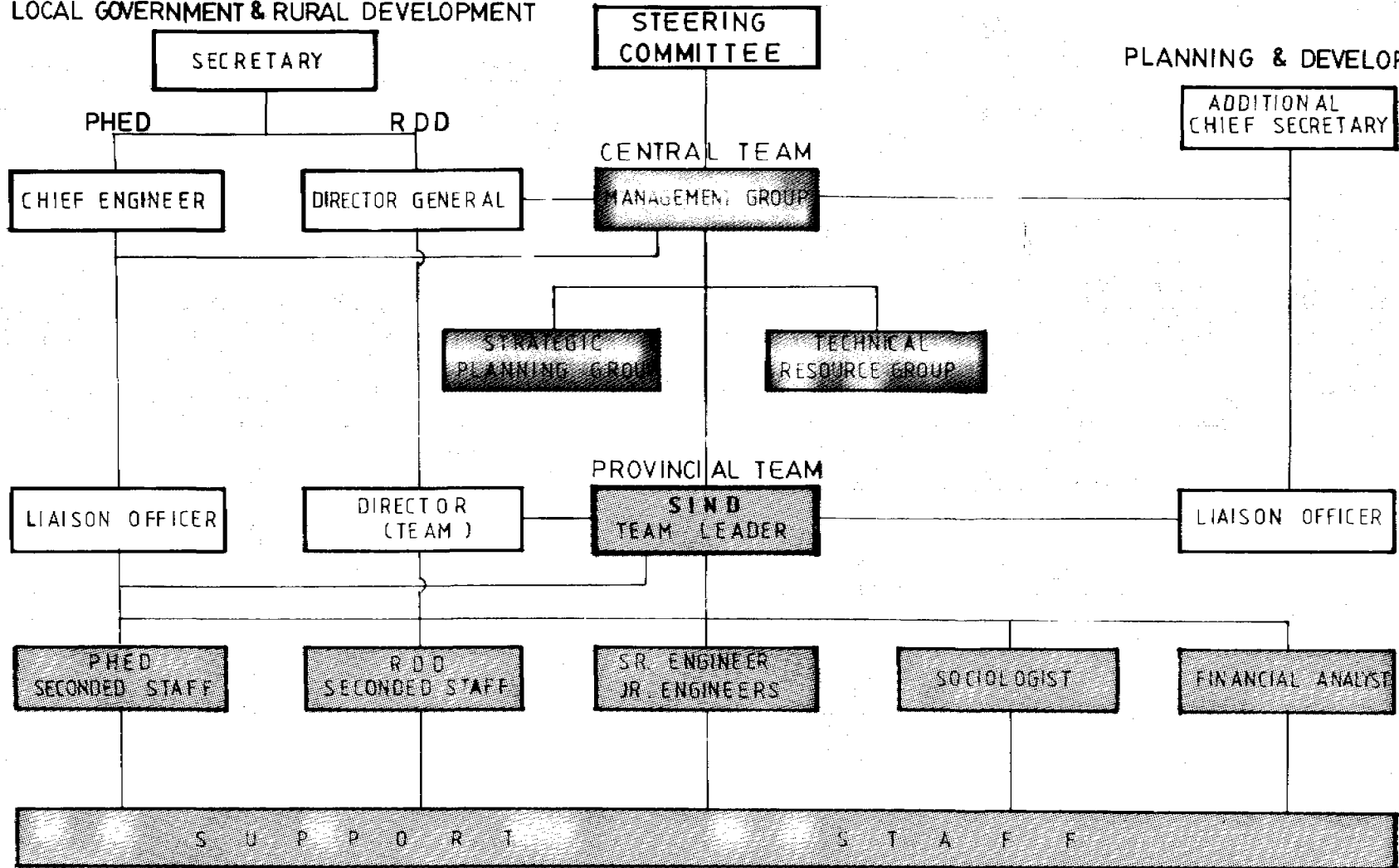
identified. A set of preliminary initiatives with potential implementation options is proposed for consideration. Outlines of several projects are presented as an indication of the likely direction of sector investments.

A workplan is included to indicate the scope of activities over the remainder of the Project. The focus in the next phase will be on refinement of the issues and initiatives discussed in this report. This will involve more detailed examination of existing data, some limited field checks and on-going discussions with GOP staff. The preliminary initiatives will be re-evaluated and additional initiatives will likely emerge. The specific initiatives that evolve will form the basis for the investment plan and for the formulation of projects.

# PROJECT ORGANISATION FOR SIND PROVINCE

HOUSING TOWN PLANNING  
LOCAL GOVERNMENT & RURAL DEVELOPMENT

PLANNING & DEVELOPMENT



## 2. PROJECT ORGANIZATION AND METHODOLOGY

### 2.1 Project Organization and Management

The Sind Provincial Team is responsible for developing the investment plan and identifying projects for implementation. It is made up of Project staff (a Team Leader, at Senior Engineer, a Sociologist and a Financial Analyst) and seconded staff from the Public Health Engineering Department and the Rural Development Department as shown in Figure 2.1. The Team reports to, and is guided by, the Provincial Steering Committee which is proposed to be made up of:

- . Chairman - Additional Chief Secretary,  
Planning and Development Department;
- . Member - Additional Secretary,  
Housing, Town Planning and Rural  
Development Department;
- . Member - Chief Engineer,  
Public Health Engineering Department.
- . Member - Chief Economist,  
Planning and Development Department;
- . Member - Director General,  
Rural Development Department;
- . Member - Director General,  
Sind Arid Zone Development Authority;
- . Member - Director, Health Services; and
- . Member - Director, Department of Education.

The Sind Provincial Team is supported by a Central Team based in Islamabad. The Central Team takes the lead in developing methodologies for the Project, establishes goals and their schedules, and provides technical support to the Provincial Team.

Details of Project staffing and individual responsibilities are presented in Appendix I.

## 2. Methodology

The Team is using a Strategic Planning approach in developing Sector initiatives. Key critical issues and root causes are identified and are used to focus initiative and project formulation activities. The process is designed to quickly lead to an investment plan which can be implemented with a reasonable likelihood of success.

The approach involves an iterative process of data collection and analysis to achieve an understanding of the strengths to build on, weaknesses to overcome or avoid and interrelationships among the components of the Sector. As the process proceeds, gaps in information will be identified which will trigger another round of data collection, analysis and synthesis to further refine the initiatives.

The following is an indication of the major activities to be undertaken over the Project time frame:

. Reconnaissance Survey	- Dec. 1 - Feb. 15, 1989;
. Data Collection	- Feb. 15 - Sept. 30;
. Data Analysis	- March 1 - Sept. 30;
. Synthesis of Information	- March 15 - June 30;
. Formulation of Initiatives	- March 1 - Oct. 30; and
. Preparation of Outputs	- June 1 - Oct. 30, 1989.



The outputs of the Project will be a recommended Strategic Provincial Investment Plan and Project Identification documents in both draft and final form. A National Summary Investment Plan will also be prepared. The schedule for submission of these reports will be as follows:

- . June 11, 1989 - Draft Strategic Provincial
- . Sept. 10, 1989 - Final Strategic Provincial Investment Plan;  
- Draft Project Identification Report; and
- . Nov. 5, 1989 - Final Project Identification Report;  
- National Summary Investment Plan.

A detailed discussion of the methodology is presented in Appendix II.

### 3. THE RURAL WATER SUPPLY, SANITATION AND HEALTH SECTOR

In this section a brief overview of conditions in the Province and the status of the Sector are presented. More complete information is provided in the Appendices covering the topics of: Physical Environment (physiography, geology, and hydrogeology), Demographics, Socio-cultural, Economics, Health, Water Supplies and Sanitation/Drainage, and Hygiene and Health related practices.

#### 3.1 The Physical Environment

For the purpose of discussing physical characteristics the Province was divided into three major areas: the Irrigated Indus Plain, the Thar Arid Zone, and the Kohistan Arid Zone. Rainfall is very low throughout the area and most occurs in the period July to September. The mean annual rainfall varies from 221 mm at Karachi to 88 mm at Jacobabad. However the amount varies considerably from year to year, particularly in the Thar where there have been years with practically no rain.

##### 3.1.1 Irrigated Zone

Sind is dominated by the irrigated flat alluvial plain of the Indus River which forms a broad strip down the centre and covers over 60 per cent of the Province. The three major barrages (Guddu, Sukkur and Kotri) command an area of 14 million acres. The Indus Plain is underlain by alternating layers of alluvial sands, silts and clays which reach a thickness of over 300 meters.

In the northern part of the irrigated area the near surface alluvial deposits are mainly sands with interbedded clays and silts. The thickness of the clay and silt layers increases toward the Indus Delta and the sand layers become

progressively thinner and the sands become finer. The water table is within 3 meters of the surface over 80 percent of the area and within 1.5 meters in 20 percent of the area. As shown on Figure III-5 the high water table has lead to waterlogging and excessive soil salinity.

In about 62 percent of the area the ground water in the alluvial sands is brackish and unsuitable for domestic use. A sweet water zone occupies a strip along the Indus River where recharge is sufficient to prevent the encroachment of the underlying brackish ground water. This sweet water zone is up to 50 km. wide in Upper Sind but is almost non-existent in Lower Sind (Appendix III). In the sweet water zone most rural people use hand pumps fitted on shallow tube wells. In the brackish water zone most of the people draw water directly from the canals.

### 3.1.2. Thar Arid Zone

The Thar Arid Zone forms a sand dune covered plain of about 47,000 sq. km. along the eastern side of the Province. The Zone is also underlain by alluvial deposits but these are generally thinner than near the Indus and in much of the area are underlain by sandstones and shales within 25 meters of surface with some granitic rocks in the south eastern part of the area.

Water supplies in the Thar area are mainly obtained from hand dug wells completed in the alluvial sands and in the underlying sedimentary formations and from ponds (tarais) formed in depressions between the sand dunes during the infrequent rains. Water from the wells is brackish in most cases and often unfit for human consumption. Moreover in extended periods of drought the wells go dry or previously acceptable water becomes excessively brackish.

### 3.1.3 Kohistan Arid Zone

The Kohistan Arid Zone consists of a series of north-south trending ranges of barren hills 200 to 700 meters in elevation. In the broad intervening valleys alluvial sands and gravel occur along the major streams. Sedimentary formations of sandstone, shale and limestone are at surface on the hillsides.

Most water supplies are obtained from hand dug wells completed in the alluvial deposits and in the sedimentary formations. The water in many of these wells is brackish and during periods of drought many of the wells go dry. Small dams are being used in some locations to capture the intermittent flow in the main streams.

### 3.2 Administrative Divisions

Sind is divided into 14 Districts and each district is subdivided into talukas. There are a total of 74 talukas. The lowest level of government is the Union Council which is composed of 10 to 20 members each representing 1000 to 1500 people. There are 620 Union Councils in Sind.

The next level of local government is the District Council which is composed of 60 to 80 members each representing 20,000 to 25,000 people.

### 3.3 Demographics

The rural population of Sind is close to 13 million and the growth rate is estimated to be 3.6 percent. Most of the people live in the irrigated area where the rural population density reaches nearly 300 per sq. km. in some talukas. For some talukas in the Arid Zones the population density is as low as 15 per sq. km. About 46 percent of the population is

in the age group below 15 years.

There are over 66,000 rural settlements in Sind. An estimated 43 percent of the people live in the 53,000 settlements with a population of less than 200.

The rural population of Sind has a low literacy rate with 61 percent of males and 90 percent of females considered to be literate.

#### 3.4 Economics

The economy of rural Sind is based on agriculture in the irrigated areas (mainly wheat, rice, sugar cane cotton, onions, mangoes and bananas). In the Arid Thar Zone the economy is based primarily on livestock. The average per household income is in the order of Rs. 1420 per month which is significantly below the national average of Rs.1540. An estimated 34 per cent of the rural population is below the poverty line of Rs. 1000 per month per household.

In terms of ability to pay for water supply services it appears that, if the tariff is not to exceed 2 percent of income, 95 percent of households could accommodate a charge of Rs.10 per month. But at Rs.20 per month only 66 percent of the households could afford the service.

#### 3.5 Health

A key health indicator is infant mortality rate which is estimated to be in the range 100 to 120 per 1000 births in rural Sind but may be as high as 200 in some areas. An estimated 40 percent of infant deaths are due to diarrhoea. Diarrhoea is caused by ingestion of organisms which are transmitted by the faecal oral route i.e. contact with human

or animal excreta without proper hygiene and consumption of water contaminated with human or animal excreta.

The rural people have little appreciation of the link between disease and improper disposal of human wastes. Excreta of children, in particular, is believed to be harmless. Proper disposal of human wastes and appropriate hygiene practices are not common in the rural areas.

Experience gained on water and sanitation projects undertaken in many parts of the world indicate infant diarrhoeal mortality can be reduced by as much as 50% through combined improvements in water quality, water quantity, excreta disposal and hygiene education.

### 3.6 Water Supplies

According to the 1980 Housing Census an estimated 38 percent of the rural households had access to a hand pump water supply, 24 percent depended on wells and 32 percent used water taken directly from canals and ponds. Only 6 percent had access to a pipe borne supply based on either a ground water or a surface water source. The situation is not likely to have changed significantly since 1980.

Most well and pond water supplies are considered to be unacceptable because of bacteriological contamination. Moreover the results of surveys in the Punjab suggest that a large portion of hand pump tube wells may also be contaminated and therefore unacceptable as a water supply.

The current level of coverage of the rural population with acceptable water supplies is ill defined, however, there is little question that the majority of rural people do not have an acceptable water supply from either a quality or quantity stand point. The situation is particularly serious

in the brackish water zone of the irrigated areas and in the Arid Zones. In the brackish water zone up to 75 percent of the people are consuming water taken directly from the canals. In the Arid Zones the well waters are both excessively brackish and bacteriologically contaminated (Appendix VIII).

### 3.7 Sanitation (Disposal of Human Wastes)

The majority of rural residents in Sind do not have access to acceptable human waste disposal facilities. In small rural settlements most of the male population uses the fields for defecation while the women use a designated area near the house.

In the larger settlements there are some pit latrines but these are used mainly by the women and are preferred because of privacy. Dry latrines are also used in larger communities where sweepers are available. Young children are often allowed to defecate on the floor in the house.

### 3.8 Sanitation/Drainage

In Sind sanitation is interpreted to be drainage. Drainage is a problem mainly in the irrigated areas where the water table is close to the surface and the topography is flat. Drains are used to dispose of runoff from the infrequent rainfall and for disposal of sullage water. Generally the waste water is directed to a pond on the edge of the community. In most villages there are unlined (katcha) drains, but in general, these are poorly maintained. In only a few villages have lined (pucca) drains been constructed.

### 3.9 Institutions in the Sector

Overall responsibility for investment in the Sector rests with the Planning and Development Department. Projects are undertaken and services delivered through the following institutions:

- . Public Health Engineering Department (PHED);
- . Local Government and Rural Development Departments (LGD and RDD);
- . District Councils and Union Councils;
- . Sind Arid Zone Development Authority (SAZDA);
- . Health Services Section of the Department of Health;
- . Water and Power Development Authority (WAPDA); and
- . Irrigation and Power Department.

#### 3.9.1 Public Health Engineering Department

The Public Health Engineering Department (PHED) is involved in the provision of pipe borne water supplies to larger rural communities, usually with populations over 1000. The Department is reported to have commissioned about 220 schemes and is the process of implementing another 230. The intention was that these schemes be handed over to the Union Councils for operation and maintenance. However because the constraints being faced by the Union Councils this has not happened in most cases and the PHED is now operating and maintaining most of the completed schemes.

The schemes are based on either a tube well or an intake in a canal. The average capital cost per capita for tube well schemes is in the order of Rs.350 based on the design population. The capital cost for canal sourced schemes is about Rs.620 per capita. However these are only the direct costs and do not include overhead costs for PHED operations.



Maintenance of the schemes is estimated to cost in the range Rs.15 to Rs.50 per household per month. This cost is understated because it is based on gross population rather than actual population served and does not allow for overheads. About 40 percent of the operation and maintenance cost is for establishment and another 40 percent for electricity.

The Department is also involved in the construction of lined drains. Between 50 and 60 schemes are reported to have been completed. PHED has assumed responsibility for the maintenance of these schemes as well.

The Department has an engineering staff of about 100 located in offices at the district and sub-district level.

### 3.9.2 Local Government and Rural Development Departments

The Local Government Department provides administrative and managerial support to the District and Union Councils while the Rural Development Department (RDD) provides technical support to the Union Councils and to Town Committees.

RDD has assisted the Union Councils with a number of hand pump schemes in the past. Currently the Department is involved with UNICEF in a project to supply 2300 improved hand pumps in six districts and rehabilitate hand dug wells in the Thar. The Department is also undertaking UNICEF assisted pilot projects in six villages in which hand pumps and latrines are being installed.

The RDD has a staff of 35 Assistant Engineers each of whom are responsible for 2 or 3 talukas. However these engineers are heavily involved with roads and buildings and devote only 5 to 10 percent of their time to water supply and sanitation.

### 3.9.3 District and Union Councils

An indicted responsibility of the District Councils is the provision of water supplies. However because of other commitments and limited funds the Councils have only been involved in hand pump schemes. Each council has a technical wing staffed with engineers.

The Union Councils also have an indicated responsibility for development of community water supplies. However most Union Councils are not able to generate sufficient funds to undertake any significant water supply schemes. A few hand pumps have been installed with the assistance of the Rural Development Department.

### 3.9.4 Sind Arid Zone Development Authority

SAZDA is recently formed agency which has a broad scope of responsibility in the Thar and Kohistan Arid Zones. The Authority has undertaken limited works involving rehabilitation of reservoirs, construction of wells and water tank, and drilling of several deep tubewells with the assistance of the Overseas Development Agency. The Authority has also fielded a few mobile medical units and established a few dispensaries.

### 3.9.5. Health Services

The Health Services Section of the Department of Health has an extensive program to deliver medical aid to the rural communities through a network of over 300 Basic Health Units and 15 mobile units staffed by medical doctors, medical technicians, Lady Health Visitors, and dispensers. Major activities include promoting the use of Oral Rehydration Salts, the Expanded Program of Immunization, and the Dais

Training Program. There are over 6600 trained Dais (Traditional Birth Attendants) in the Province.

### 3.9.6 Water and Power Development Authority and the Irrigation and Power Department

Normally WAPDA is not directly involved in the provision of community water supplies. However the Authority has a significant influence in that most of the PHED water schemes rely on electricity supplied by the Authority. WAPDA has compiled a large amount of information on the water resources of the Province and has been undertaking an geophysical surveys of the Thar desert area with the assistance of the German aid agency.

The influence of the Irrigation and Power Department is also great in that the Department controls the abstraction of water from the canals. Many PHED schemes are based on a canal water source.

### 3.10 Private Sector

The main contribution of the Private Sector has been in the provision of hand pump water supplies. Thousands of locally made hand pumps have been installed by hundreds of artisans. These one or two man operations construct the shallow tube wells, supply and install the pumps and carry out repairs as needed. A typical artisan would install about 50 hand pumps per year.

Private Sector contractors are also active in the construction of piped water schemes and the construction of tube wells for mechanization. Manufacturers produce the necessary pipes, hand pumps and some of the mechanical and electrical components. On the other hand, consulting firms have had no significant involvement in rural water supply and sanitation.

## 4.0 CONSIDERATION OF SECTOR ISSUES

### 4.1 Scope of Considerations

At the time of preparing this Inception Report a preliminary identification of the issues in the Sector had been completed. These issues were identified through evaluation of existing reports, discussions with staff of the departments involved in the Sector and intensive discussions among Project staff. As a focus for the discussion the Sector is reviewed in relation to four main segments, namely; economic, institutional, socio-cultural and technology. Each segment is further subdivided as follows:

<u>Segment</u>	<u>Subsegments</u>
Economic	Cost Recovery Private Sector
Institutional	Government Departments Local Government Non-Government Organizations Provincial Elected Bodies
Socio-Cultural	Communities Practices, Taboos, Beliefs Community Organizations Women in Development Demographics Health/Hygiene Education Human Resources Development
Technology	Water Resources Water Supply Sanitation/Drainage Sanitation/Human Waste Disposal

In a series of meetings with the Central Team in Islamabad the main issues related to each of these subsegments were

identified and analyzed with respect to root causes of constraints and strengths. This identification of issues, root causes and strengths was based on a preliminary review of existing data compiled during the first month of the Project and on the combined experience of Project staff members in the Sector in Sind and elsewhere in Pakistan. Within the Project Team there are Pakistani specialists with extensive knowledge of the full range of the considerations to be dealt with in the Sector.

As a follow up to the Islamabad discussions the Sind Team members conducted further interviews with persons active in the Sector in Sind to verify, modify and amplify perceptions. Through this process our initial perceptions of the key critical issues, root causes and strengths related to each subsegment were developed. These are outlined in the following sections. However it must be borne in mind that this is only a preliminary evaluation of the Sector. The importance of this assessment is that it provides a starting point for discussion, focuses attention on key items to be addressed, and provides direction for further data collection and analysis.

## 4.2 The Issues

### 4.2.1 Cost Recovery

The stated aim of the Government of Sind is to place water supply schemes on a full cost recovery basis at least for operation and maintenance. At present there are few schemes in which operation and maintenance costs are effectively recovered from the users. Four main issues were identified in this respect. These are:

knowledge and awareness of the importance of clean water to health;

- . affordability of an acceptable water supply;
- . willingness to pay; and
- . mechanism for collection of water tariffs.

a) Knowledge and Awareness

There appears to be little awareness on the part of the rural people of the link between use of polluted water and poor health. This is particularly true in the brackish water zone of the irrigated area where water is taken directly from the canals and consumed without any form of treatment other than perhaps short term settling. We consider this lack of appreciation of the benefits of clean water as one of the key constraints to obtaining community support and participation in the provision of acceptable water supply systems.

b) Affordability

The majority of the people in the rural communities have little economic means and are barely able to provide the necessities. As indicated in Appendix VI on Economics, if water tariffs are set at Rs 20 per month per household and a limit of 2% of income were established as a reasonable portion to spend on water per month over 40 percent of the rural population of Sind could not afford the service.

In the irrigated areas where water is generally readily available it has relatively low priority when making decisions for improvements in living conditions. Many of the rural poor are seasonal agricultural workers who place a low value on the time taken to collect water from a nearby canal. Thus contribution to the development and support of a scheme providing a clean water supply is expected to be viewed as a relatively low priority. This low value attributed to clean water stems from the lack of awareness

of the health hazard posed by polluted water.

In the Arid Zones water has a much higher value because of the difficulty in locating sufficient quantities. The people appear to be more willing to participate in efforts to develop a water supply. However this is not to say that they have an appreciation of the benefits of clean water. Their focus is on quantity rather than quality.

Another aspect of affordability is the technology on which the scheme is based. Given the low economic levels of the users many of the existing schemes are considered to be technically inappropriate and too costly to construct and to operate. Most schemes are installed without reference to the ability of the users to pay for their operation and maintenance.

Given the stated desire of the government to maximize cost recovery in future schemes the users must be involved in the selection of the level of service provided to ensure that it is compatible with their ability to pay for it. Moreover in the past there appears to have been little attention given to developing schemes which maximize participation of the community in kind rather than in cash.

#### c) Willingness to Pay

Although there appears to be a general indication that rural residents are prepared to pay for the operation of a water supply scheme this has not translated into significant collections. There appear to be several causes for reluctance to pay. Among them are:

users do not see a direct connection between payment and provision of service because the water tariff goes

to general revenues and may or may not be allocated to the operation and maintenance of their particular scheme in direct proportion;

perception on the part of users that water should be provided free, a perception that is reinforced by promises made by politicians seeking election; and perception on the part of the users that funds are being wasted by the provider of the water supply service.

#### d) Mechanism for Cost Recovery

The Public Health Engineering Department has been assigned responsibility for the operation and maintenance of over 200 schemes completed under the Annual Development Programme over the years and is currently developing over 200 more. However the Department does not have the mandate to collect tariffs. The Union Councils have the mandate to collect, but there is a lack of coordination with PHED as the provider of the service. Moreover there appears to be no accountability in the system in that non-performance of assigned responsibility for tariff collection has no effective penalty.

#### 4.2.2 Private Sector

The Private Sector is an important provider of goods and services in the development of water supply and sanitation facilities. The greatest contributions are in the installation and maintenance of hand pumps and tubewells, supply of materials associated with hand pumps, construction of pipe borne water schemes and the construction of drainage works. There appears to have been little involvement of consulting firms in the provision of design and project management services in the sector.



Two key issues have been identified in considering the Private Sector with respect to rural water supply, sanitation and health/hygiene education:

- . quality of goods and services; and
- . capability and capacity.

a) Quality of Goods and Services

~~materials~~ used in water supply schemes such as piping, hand pumps and mechanical equipment are perceived to be of low quality in general. Standards appear inadequate and those that exist are not enforced. There are no construction standards for the installation of tubewells. The absence of properly enforced standards appears to be a significant factor in the problems being experienced with the pollution of the ground water supplies.

The locally manufactured hand pumps are of poor quality and require frequent repair. Acceptance of substandard products is of course related to the desire to keep capital costs to the minimum. This is achieved in the case of locally manufactured pumps but with consequent high maintenance cost.

b) Capability and Capacity

The capacity of the Private Sector in the provision of hand pump and mechanized tube wells in the central Indus plain is quite significant. Thousands of such installations have been completed by small contractors and artisans using locally manufactured materials.

The main constraint in the Private Sector in terms of capability is in the provision of consulting services relevant to the Sector. A survey of the main consulting

engineering firms indicated that most have little or no experience in the design of small rural water supply and drainage schemes. There appears to have been virtually no involvement of consultants in the provision of health/hygiene education. The main reasons for this appear to be:

- . consultants have no clear perception as to the role that they could play in the Sector;
- . demand for these services has not materialized and therefore the industry has not invested in the acquisition of capability in the appropriate technologies; and
- . demand for these services appears to have been constrained by the public perception that the government departments should provide these services, that costs are likely to be prohibitive if consultants become involved and that consultants are not likely to be interested in any case.

#### 4.2.3 The Departments

Departments refers to primarily to the Public Health Engineering Department (PHED), the Rural Development Department (RDD) and the Health Services Department. The main issues identified with respect to these organizations are:

- . capacity and capability;
- . coordination of effort; and
- . links with the community.

a) Capacity and Capability

The Public Health Engineering Department has a strong engineering capability which appears to be more suitable for the design of urban water supply schemes than for small rural water schemes. There appears to be lack of knowledge of technology appropriate to the design of low cost small water schemes. The root cause of this appears to be that engineers are not exposed to these technologies in their university studies. As a result solutions appropriate to urban centres are often simply down scaled for the small rural communities with the resulting excessive capital and operating costs.

The Rural Development Department (RDD) has some experience in dealing with the small scale schemes appropriate for rural communities but the Department is under staffed with engineers adequately qualified in the Sector. The capacity of the RDD to participate effectively in the Sector is quite limited because support services such as transport are not available. For example the assistant engineers responsible for supervision of the works have no transport. Moreover, water supply and sanitation are only a small part of their responsibilities. This is compounded by the fact that RDD staff are also responsible for providing technical support to town committees.

The Health Services Department has significant capability in the delivery of health messages and has successfully undertaken large programmes promoting the use of Oral Rehydration Therapy and vaccinations as disease control measures. However the promotion of proper hygiene has not received adequate attention, primarily because the field workers are already fully committed to satisfying other more immediate demands.

## b) Coordination of Effort and Overlapping Responsibilities

The budgetary process of the Planning and Development Department is the main mechanism for coordination among the departments at the top level. The Secretaries of Local Government and Rural Development and of the Public Health Engineering Department are closely involved in the process thus avoiding duplication of effort in the provision of services to specific communities. However the overlapping responsibilities among the Public Health Engineering Department, Rural Development Department, Sind Arid Zone Development Authority and the local councils makes it difficult to achieve satisfactory coordination on a broad scale.

All three levels (Provincial, District Councils, and Union Councils) have responsibility for the provision of water supply and sanitation services. Although each level is constrained by the level of funding and the source of funding as to the initiatives that it undertakes the lack of clearly defined levels of responsibility results in passing responsibility to another level and also allows politicians to intervene and assign projects that would be better undertaken by another level. Without clearly defined roles and measures of accountability it is difficult to match funding with the scope of assigned responsibility.

## c) Links Between Departments and the Communities

The Rural Development Department has significant experience in dealing at the community level although the focus appears to have been on larger settlements where demand is more strongly expressed. In the past these links have been through the Union Councils and not generally directly to the community organizations. The recently started UNICEF assisted water and sanitation project is now involving the

## RDD with Village Development Organizations.

The Public Health Engineering Department has weak links with the community organizations. Because the Department is heavily engineering oriented and dealing with larger communities and more complex schemes, the need for involvement of community organizations and direct participation of the community in the process has not received an appropriate level of attention. The schemes are normally delivered through the elected representatives whose interests may not coincide with those of the community.

### 4.2.4 Non-Government Organizations

There are a large number of non-government organizations (NGO's) active in Sind, however most are based in the major urban centres. Moreover many are not active in undertaking significant or appropriate initiatives relevant to rural water supply, sanitation and health/hygiene education. However there are a significant number that are making efforts to contribute and these NGO's may be a suitable avenue for delivery of some aspects of future programs in the Sector. The main issues identified with respect to NGO's are:

- . coordination with others;
- . links with the communities;
- . roles of the NGO's; and
- . capacity and capability.

#### a) Coordination with Others

The prescribed mandates of many NGO's overlap and as a result the target groups selected are often the same. The NGO Coordination Council has the mandate to prevent duplication of effort. The main activity of the Council

appears to be a lobbying government for funding. It assists in the formal presentation of projects to government, and facilitates training and orientation programmes. The Council is made up of high profile non-elected representatives of the NGO's. The effectiveness of the Council in coordinating activities of the NGO's is questionable.

b) Links with Rural Communities

Most NGO's with significant resources are composed of urban residents and thus the organization is not seen as being part of the rural community. As a result links with the community are often not strongly formed. Moreover there is a perception that, because they come under the jurisdiction of the Social Welfare Department, NGO's are another arm of the government.

c) Role of NGO's

Urban based NGO's have not been effective in the process of rural development. To effectively contribute directly to community development efforts requires a commitment to spend significant periods of time working with the rural residents. Members of urban NGO's cannot devote the amount of time needed. However they could support rural based NGO's.

d) Capacity/capability

Lack of resources, both financial and human, is a fundamental cause of poor performance of most NGO's that endeavour to undertake meaningful projects. The NGO's are heavily dependent on funding agencies and most have not attracted people with appropriate skills, particularly women. Another factor is the failure to select initiatives that are realistic given human and financial constraints.

#### 4.2.5 Provincial Level Elected Bodies (MNA's, MPA's, Senators)

A key issue with respect to the senior elected representatives is the failure to appreciate the significance of perpetuating the idea that water should be provided free or at nominal cost to users. Another issue is the disparity in allocation of funding within the Sector. Because water supply projects are more visible and easier to relate to, there is a strong tendency for politicians to consider water supply projects in preference to lower profile sanitation and hygiene education initiatives

#### 4.2.6 Local Government

Local Government refers to the District and Union Councils. There are several issues related to the involvement of these bodies in the Sector, namely:

- . low priority on acceptable water supply and sanitation facilities;
- . capacity and capability; and
- . structure of local government.

##### a) Low Priority on Acceptable Water Supply and Sanitation Facilities

In general Local Government representatives do not fully appreciate the importance of clean water and proper sanitation to achieving better health for their constituents. The emphasis is on the quantity of water rather than quality. This bias is forced in significant measure by a scarcity of funds to provide even the basic requirements. Moreover, sanitation with respect to excreta disposal is not seen as public responsibility. Sanitation is normally interpreted as being drainage and perhaps disposal

of solid waste. Disposal of human excreta is seen as a private matter and not part of the public responsibility.

b) Capacity and Capability

Most of the local councils have limited capacity to undertake projects within their jurisdiction. Shortage of financial resources is cited as the main constraint. Most Union Councils are able to generate little if any funds for development and are dependent on grants from the provincial government (Appendix IX).

c) Structure of Local Government

Each Union Councillor represents a minimum of 1000 constituents who are spatially dispersed. Thus the Councils often do not address the real needs of individual communities. The overlapping mandates of Union Councils, District Councils and line departments results in transfer of responsibility from one level to another.

The scope of responsibility of the Union Councils is quite broad and is not compatible with the available financial and human resources.

4.2.7 The Communities

The communities refers to the people in rural settlements as a group. The main issues related to water supply sanitation and health/hygiene education are:

- . knowledge and awareness;
- . leadership; and
- . ethnic segmentation.



a) Knowledge and Awareness

Lack of understanding of the link between health and clean water and proper disposal of human excreta is considered to be the key critical issue with respect to the community. Low levels of education, which results in a high proportion of illiterates is the root cause. There has not been a suitable mobilizing force to raise the level of awareness. Moreover the structure of society in some respects is a constraint to achieving a better understanding which limits access of women to sources of information consistent with their prescribed responsibilities with respect to the welfare of the family.

b) Leadership

In general the real as opposed to the manifest leaders in the community are not readily identifiable. There is a strong dependence on political leadership rather than informal leadership. The feudal and religious structure of rural society appears to restrict the rise of community leaders. Moreover the low level of education results in potential leaders not being aware of the issues and possible plans of action to address the needs. There is insufficient access to facilities to upgrade skills.

c) Ethnic Segmentation

Most smaller settlements are composed of clans with shared cultural and social characteristics. Thus cooperation in terms of sharing resources and facilities is not a difficulty. In larger settlements or where more than one settlement is to be served by the same scheme, ethnic differences can be a significant constraint to achieving cost effective solutions. In the past this has led to duplication of facilities or failure of the scheme to

benefit all of the target group. The roots of this situation are in the strongly established social structure and behaviour and are not likely to be modified significantly over the investment period under consideration.

#### 4.2.8 Practices, Taboos and Beliefs

The prevailing practices, taboos and beliefs of the rural people are important considerations in formulating potential interventions. These are addressed in some detail in Appendix X which deals with Hygiene Education. The main issues are discussed here.

An important aspect is the perception of rural people towards excreta, both human and animal. Animal excreta is used for fuel and for fertilizer and therefore is considered to be harmless. The excreta of children is also considered to be harmless. Another important belief is that running water is pure. This stems from religious teachings and at the time of its origin most running water was pure. However, under present circumstances wherein canal waters and streams are polluted this belief has no validity.

Another significant trend in rural villages is the increasing importance placed on privacy for women with respect to defecation. This trend has important implications in stimulating interest in latrines.

#### 4.2.9 Community Organizations

Community organizations may be formal or informal. Informal organizations that are receiving considerable attention currently are Village Development Organizations. However every village has an informal organization which comes together periodically to deal with issues of communal

importance. The issues related to both formal and informal community organizations are:

- . resources and capability;
- . perceptions and understanding of community organizations; and
- . leadership performance.

a) Resources and Capability

Community organizations are severely constrained with respect to financial resources and equipment to undertake initiatives. However they do have the benefit of human resources, if they can be motivated and harnessed for the common benefit. The people are self reliant and accustomed to solving their own problems. In this respect a mobilizing force is most often lacking. Although the members of the community have the will to undertake small projects a common constraint is inadequate experience and training. Moreover, credit facilities are not available to provide funds for purchase of materials and outside expertise.

b) Perceptions and Understanding of Community Organizations

Reluctance of people to participate in and support community organizations appears to stem from a sense of apathy and belief that the situation is pre-ordained. There is often an over dependence on leaders. Another factor with respect to informal organizations is the perception that informal equals ineffective. Community organizations can also be seen as a threat to established power structure in that their interests may not be compatible with the vested interests of holders of political, economic, and religious power.

### c) Leadership Performance

The performance of community leaders has not been satisfactory in many cases. Some of the causes are:

- . reluctance on the part of the leader to delegate with the result that he becomes overloaded;
- . reluctance to admit lack of understanding of an issue or lack of requisite skills;
- . leadership selection process which emphasizes status rather than capability and commitment which may result in the selection of an inappropriate leader; and
- . lack of understanding of the community as to the role and skill requirements of the leader with the result that expectation levels of performance are unrealistically high.

#### 4.2.10 Women in Development

The collection of water and the maintenance of family health is primarily the responsibility of women in rural communities. Thus their situation is of significant importance in considering development initiatives in the water, sanitation and health sector. In the male dominated society of rural Sind women have little outward influence in community affairs but are believed to have significant indirect power. However in general women have a low perception of their capability. This is reinforced by religious teachings, tribal laws, low literacy levels and economic dependence.

Females have significantly fewer opportunities to attain an education in the rural areas as attested by the significantly fewer girls that advance beyond primary school (Appendix IV). As a result they have limited possibilities

of becoming involved in economically productive activities. Because of the social structure of rural communities participation of women in income earning pursuits is severely constrained and normally is restricted to raising small animals and fabrication of handicrafts.

Because women are seen as an economic burden their household activities such as carrying water are perceived to have no value which translates into little value being attached to the water itself where it is readily available and does not require the involvement of men.

#### 4.2.11 Demographics

There are several aspects of demographics that have an important impact on the Sector, namely:

- population growth rate;
- population distribution and settlement pattern;
- population migration; and
- size and number of households.

##### a) Population Growth Rates

The population of rural Sind is currently estimated to be close to 13 million and the growth rate is about 3.6%. If the current coverage with acceptable water supplies is 25 percent then the backlog is nearly 10 million people. Thus during the planned investment period 1990 to 1993 the backlog plus an additional 2.0 million people will require water supply and sanitation facilities. Consideration of the full range of causes and effects of the high rate of population growth in rural Sind is beyond the scope of this Project. However the impact on efforts to develop satisfactory water supply and sanitation facilities is very significant. The provision of water supplies and sanitation

facilities must accelerate dramatically to both satisfy the backlog and provide for the increase in population that occurs during the investment period.

b) Population Distribution and Settlement Patterns

The Bureau of Statistics identified nearly 67,000 rural settlements in Sind. About 40 percent of the rural population of Sind live in settlements of less than 200 population. These settlements are scattered, particularly in the Arid Zones. The main factor causing the dispersed population pattern is the location of economic resources to sustain life. Settlements in the irrigated zones depend on agriculture for a livelihood whereas in the Arid Zones the cattle raising tribes depend on scanty pasture lands. Other significant factors are physiographic conditions which limit choice of building sites, location of suitable sources of water and the ethnic structure of society.

The significance of dispersed settlement is that the majority of the population requires quite small water supply schemes and the economies of scale associated with the provision of large water supply systems in large centres of population are not available. Moreover the logistics of dealing with such a large number of settlements is formidable.

c) Population Migration

Population migration in Sind is generally of three types: rural to urban, seasonal workers and nomads. The migration of rural people to urban centres is of importance when considering overall socio-economic impacts. The causes of rural to urban migration are lack of access to acceptable quality and quantity of services.

Seasonal shifting of agricultural workers has a direct bearing on the level of services required in the communities affected. The nomadic migrations of tribes in the Arid Zones of the province require innovative water supply solutions to accommodate intermittent usage by peoples not situated in a established location.

d) Size and Number of Households .

Aside from the effect of increasing population there is also a trend toward fewer people per household. The result is that the number of households is increasing at a faster rate than the population growth rate. This means that the number of households to be serviced with water supply and sanitation services with the consequent implications to the design of schemes.

4.2.12 Health and Hygiene Education

The main issues identified with respect to health and hygiene education are:

- . knowledge and awareness; and
- . resource allocation.

a) Knowledge and Awareness at Community Level

The evidence indicates that the community has a low level of awareness with respect to the health implications of using polluted water and of improper disposal of excreta (Appendix X). As discussed earlier in this report two of the most important root causes are lack of education and cultural practices. There are few effective programs in place to increase awareness levels. For example people are seldom made aware of the cause for their sickness. Moreover there appears to be an indifference to changing the

situation with respect to water supply and sanitation as people focus on their more immediate need which they perceive as being to raise their economic status.

b) Resource Allocation

Although efforts are being made at the provincial and national level to increase investment in preventive medicine in rural areas there is still a decided bias toward curative measures. In a situation of limited resources such as that being experienced in Pakistan the focus is on the immediate need which is to deal with the sick rather than the potentially sick. However the long term benefits of preventive medicine are very substantial. Other factors that influence the allocation of resources between preventive and curative medicine are:

- . curative has more direct and visible effect on patient;
- . professionals see curative as having higher prestige than preventative;
- . lack of effective incentives for medical people to go out into the villages where the preventative medicine must be delivered; and
- . curative facilities are more visible and can be centralized to places where the medical staff prefer to live i.e urban centres.

4.2.13 Human Resources Development

There is a recognized need for training in the Sector at all levels. Earlier in this report we discussed the lack of skills in appropriate technology in the Private Sector and in the government departments. However, the most significant need is expected to be skills training at the community level. Thus the issues discussed in this section focus on this need.



The issues identified with respect to skills training at the community level are:

- . relevant training programs;
- . quality of training; and
- . local perceptions of need and value of training.

#### a) Relevant Training Programs

Within the education system the tendency is to emphasize general education rather than acquisition of specific skills. Thus the demand for the type of training relevant to the needs of the rural community has attracted little attention up to now. As a result investment in facilities and trainers has been at a low level. Most existing programs have focused on urban needs, where there has been some demand expressed, rather than on rural needs.

Other factors that appear to have influenced the situation are language and cultural barriers and the reluctance of trainers to go out to the communities where the training can most effectively be done.

#### b) Quality of the Training

Because the need for the type of training now being considered, there are insufficient numbers of available trainers with the requisite skills. This is not only true of trainers to transfer specific skills but is also true of the staff needed to train trainers. Existing training programs suffer from poor design, particularly in that often the trainees do not have opportunity to immediately apply newly acquired skills. There is a perceived low receptiveness to training which suggests that the material being delivered is not relevant to the needs of the trainees.

### c) Local Perception of Need and Value of Training

Rural people are self sufficient and thus do not appear to put a high value on training. Generally there is a low awareness of the potential opportunities available through training. This is compounded by the perception among rural people that adults possess adequate knowledge to survive in their environment. The social structure is also a constraint in that the heads of households often perceive education of offspring as potentially disrupting traditional roles.

When training is considered, there is an expectation that it will lead to employment in the more attractive urban centres. This is not the desired outcome of the community level training which is expected to form part of the Sector development programmes.

#### 4.2.14 Water Resources

The water resource issues are both general in nature and specific to particular areas. They are identified as:

- . availability of water of suitable quality and quantity;
- . management of ground water resource; and
- . excess of water.

##### a) Availability of Water of Suitable Quality and Quantity

In general the availability of suitable quality and quantity of water is an issue throughout the Sind but the conditions vary in accordance with the area under consideration. The discussion will relate to conditions in four different physiographic situations; the irrigated sweet water zone, the irrigated brackish water zone, the Arid Thar Zone and the Arid Kohistan Zone.

#### i) Irrigated Sweet Water Zone

The sweet water zone has an abundance of readily available ground water that is being exploited by large numbers of relatively low cost tube wells. Most of these tube wells are fitted with hand pumps but many are fitted with mechanized pumps for domestic and irrigation water supplies. There appears to be a trend toward reduction in the area underlain by sweet water. The withdrawal of sweet water from tube wells is moving the brackish water interface closer to surface. As a result tube wells which formerly provided sweet water are gradually becoming brackish and unacceptable sources of water.

Moreover many of the tube wells are contaminated by surface pollution. This pollution appears to stem either from inadequate sealing around the casing during construction or from infiltration of polluted surface water as recharge to the aquifer where there is no protective clay or silt layer at the surface.

#### ii) Irrigated Brackish Water Zone

Surveys conducted by WAPDA indicate that approximately 62% of the irrigated area in Sind has brackish water (over 3000 ppm) within 37 meters of the surface. Within the zone designated as brackish there are pockets of near surface sweet water but these occurrences appear to be controlled to a large degree by local geological conditions and recharge from irrigation canals. Where there are clays overlying the aquifer recharge from canals is very limited and thus replacement of extracted sweet water does not occur at a rapid enough rate to prevent encroachment of the brackish waters. On the other hand where the canal passes over sandy

surficial deposits recharge to near surface aquifers creates pockets of sweet water that can be exploited with appropriately designed systems. The areas where there is a potential sweet water supply in the brackish water zones appear not to have been fully documented.

Within that portion of the brackish water zone that has no conveniently available sweet water lenses the people are taking water from the canals generally with little or no treatment. The situation is further complicated by the fact that approximately 25% of the area does not have perennial irrigation (Appendix III). In these areas the rural residents depend on storage to carry them through the four to six months of the year when canal water is not available.

#### iii) Arid Thar Zone

Location of sufficient quantities of water of acceptable chemical quality is the prime issue in the Thar Zone. A drilling programme conducted by the Public Health Engineering Department resulted in most deep tube wells having to be abandoned because of either inadequate quantity or excessively brackish water. Although the recently reported findings of the German/WAPDA program suggest that there are some areas underlain by potentially sweet water aquifers there is still insufficient information available on the ground water resources of the Zone.

#### iv) Arid Kohistan Zone

The Kohistan area appears to have a similar scarcity of suitable quality ground water as the Thar Zone. However the potential for developing suitable sources is considered to be somewhat better. The hilly topography and the prevalence of relatively low permeability rock at surface is more

conducive to the development of surface water storage facilities. In some areas water bearing zones have been identified in the alluvial deposits and bedrock sedimentary formations. However there is still insufficient information on the ground water and the surface water resources of the area.

b) Management of Ground Water Resource

Although ground water is a very important source for both domestic and irrigation supply there is no effective control over its use and protection. Over exploitation has occurred because of inappropriate design apparently based on insufficient or incorrect data on the aquifer characteristics. There is also appears to inadequate interagency coordination in the exploitation of the resource; for example, development of residential areas on the assumption of an adequate ground water supply. Competition for the resource results in adverse impact of new users on existing users.

c) Excess of Water

The main issues with respect to excess water are water logging and flooding. The issue of water logging has been the subject of extensive investment over the past thirty years under the SCARP program being executed by WAPDA. Within the scope of this project water logging is an issue with respect to the design of drains and latrines. Local flooding due to excessive irrigation water and inadequate drainage of agricultural lands creates a health hazard by preventing proper drainage of residential areas.

#### 4.2.15 Water Supply

Three important issues associated with water supply have been identified thus far. These are:

- . operation and maintenance;
- . skills and know how; and
- . design and service levels.

##### a) Operation and Maintenance

The issue here is that schemes often do not achieve their design performance in terms of providing a reliable water supply of acceptable quality. A root cause appears to be the lack of appreciation on the part of the users and even the system operators of the importance of a bacteriologically safe water supply. From this stems the lack of support to properly operate the schemes and to the acceptance of a water of substandard quality. Other contributing factors appear to be lack of a sense of community ownership of schemes that are provided by others, poor construction and unskilled operators.

Even where there schemes have been developed at the Union Council level using hand pumps as an appropriate technology the users have failed to provide maintenance to the degree needed. This has occurred in the irrigated zone where there is a alternative source and thus less value placed on community water supplies.

##### b) Skills and Know How

This issue was addressed to some extent in the section of this report dealing with the Departments. Most skills and know how are acquired on the job and through in-house training. However neither the Public Health Engineering

Department nor the Rural Development Department have formal training programs for entering engineers working in water supply and sanitation. In PHED there is a three month orientation period for entering engineers but no organized training beyond that.

#### c) Design and Services Levels

Many of the existing pipe borne water supply schemes are considered to be inappropriate for the communities served considering long term sustainability. Current design manuals are considered to be outdated and design engineers are not fully aware of the available appropriate designs for rural water supply schemes. Moreover schemes are designed without the participation of the potential users and without adequate consideration of the long term sustainability of the facility.

#### 4.2.16 Sanitation/Drainage

Drainage refers to both pucca (lined) and katcha (unlined) drainage ways. At this point in the project the issues related to drainage have not been fully identified. The main issue identified so far is the usage of drains.

Drains are intended to be used for disposal of runoff water during rainy periods and for the disposal of sullage water (waste water from washing and cooking) but not for human excreta. This is based on the perception that sullage water does not pose as great a health risk as human excreta. This distinction has been challenged in other jurisdictions and there is good reason to consider sullage water as a significant health risk.

Of immediate concern however is that drains (pucca and katcha) are being used for disposal of human excreta via

pour flush latrines and by direct defecation. As a result drains often become open sewers.

Although there is an appreciation of the inconvenience caused by overflowing drains there appears to be little appreciation of the health hazard posed by polluted water flowing through the community in open drains.

#### 4.2.17 Disposal of Human Waste

As indicated in Section 3 of this report a relatively small percentage of the rural population have access to latrines. Where they exist, rural latrines consist of crudely constructed pits covered with a wooden platform. These latrines are considered to be of substandard design. The constructors are unaware of alternative appropriate designs. In some cases availability of artisans is a constraint even where there is a desire to construct an acceptable facility.

Demand for latrines is expected to stem from a desire for privacy for women rather than a concern regarding safe disposal of human wastes.



#### 4.3 Summary Statement of Conclusions

The following is a summary statement of the conclusions reached with respect to the issues discussed for each subsegment.

##### 4.3.1 Cost Recovery

- . there is insufficient appreciation of the benefits of clean water;
- . low value is placed on water in the irrigated areas;
- . technology is not always compatible with the user's ability to pay;
- . the tariff is not seen to contribute directly to the upkeep of the water scheme for which the monies were collected; and
- . the mechanism for cost recovery is ineffective.

##### 4.3.2 Private Sector

- . standards for materials and workmanship are either absent or not properly enforced; and
- . Pakistani consulting firms lack the requisite skills in appropriate technology and community development.

##### 4.3.3 The Department

- . the engineering capability of PHED is better suited to urban schemes rather than small rural schemes;
- . RDD is understaffed with engineers and lacks adequate material resources; and
- . there is excessive overlap in roles among the agencies working in the Sector.

#### 4.3.4 Non-Government Organizations

. there are few rural based NGO's and the urban based NGO's are unable to effectively contribute directly to community development.

#### 4.3.5 Provincial Elected Officials (MNA's, MPA's and Senators)

. many perpetuate the idea that water should be free.

#### 4.3.6 District and Union Councils

. many Council members lack awareness of the importance of clean water and the proper disposal of human wastes; and

. the Councils lack financial and technical resources to meet prescribed responsibilities with respect the Sector.

#### 4.3.7 The Communities

. there is a lack understanding of the links between health, water and human wastes; and

. they are constrained by a low literacy rate, lack of a mobilizing force, and suppressed leadership.

#### 4.3.8 Practices, Beliefs and Taboos

. there is a belief that infant excreta and cow dung are harmless and that all running water is pure.

#### 4.3.9 Community Organizations

. there are inadequate technical resources within the village;

. there is a sense of apathy;

. there is an over dependence on status leadership; and  
. in some cases there is opposition by vested interests  
in the community.

#### 4.3.10 Women in Development

. women are responsible for the health of the family and  
the collection of water;  
. women are constrained from direct involvement in  
decisions regarding the Sector issues; and  
. women are constrained by low levels of education and a  
low perception of their capability.

#### 4.3.11 Demographics

. there is high population growth rate and a trend toward  
smaller household sizes; and  
. 40 percent of the population live in scattered  
settlements of less than 200 people.

#### 4.3.12 Hygiene and Health Education

. there is a low level of awareness of the links among  
health, water quality and contact with human wastes;  
and  
. there is a bias toward curative rather than preventive  
medicine.

#### 4.3.13 Human Resources Development

. there is a shortage of properly qualified artisans and  
community workers at the village level;  
. there is a lack of suitable training programs;  
. the quality of existing training programs is poor; and  
. heads of households resist education of their children.

#### 4.3.14 Water Resources

- . the extent of the sweet water zone is diminishing;
- . many hand pump tube wells are contaminated bacteriologically;
- . many people consume untreated canal water;
- . pockets of sweet water occur in the brackish water zone but their extent is not well defined;
- . in Arid Zones many water sources provide inadequate quantity and unacceptable quality water and information on the location of suitable ground water supplies is incomplete; and
- . there is no effective mechanism for management of the ground water resource.

#### 4.3.15 Water Supply

- . there is a general lack of appreciation of the importance of clean water;
- . beneficiaries lack a sense of ownership for the schemes serving their community;
- . -operators need training;
- . there is insufficient in-house training of technical staff in the government departments; and
- . many existing schemes are inappropriate considering the ability of the beneficiaries to pay for the service.

#### 4.3.16 Sanitation/Drainage

- . open drains are used for disposal of sullage water;
- . some drains are used for the disposal of human wastes; and
- . sullage water collects in unprotected ponds on the edge of the communities and creates a health hazard.

#### 4.3.17 Human Waste Disposal

- . there are very few latrines in small settlements;
- . the few latrines used in larger settlements are substandard;
- . latrines are demanded for reasons of privacy and status rather than a real concern for proper disposal of human excreta.

#### 4.4 Proposed Critical Issues

Based on the analysis completed to this point in the project it is proposed to address the following key critical issues:

- (1) lack of awareness of the impact of poor quality water, inadequate drainage and improper disposal of human wastes on health;
- (2) incompatibility between level of service and system design and the ability of the users to meet operation and maintenance costs;
- (3) absence of an effective mechanism for cost recovery;
- (4) consumption of untreated water from the canals and distributaries in the brackish water zone of the irrigated area;
- (5) shortage of water supplies of acceptable quantity and quality in the Kohistan and Thar Arid Zones;
- (6) substandard quality of most locally made hand pumps and insufficient number of properly qualified Pakistani consulting firms to contribute effectively to the Sector;
- (7) insufficient acceptable facilities for disposal of human waste;
- (8) inadequate provision for drainage in most larger settlements particularly where pipe borne water supply schemes have been installed;

- (9) overlapping roles and insufficient coordination of agencies working in the Sector;
- (10) line Departments, District Councils and private sector consultants have limited knowledge of appropriate technologies for rural water supply and sanitation facilities and in working with community based organizations;
- (11) insufficient number of community based organizations to participate in the development, operation and maintenance of their water supply, drainage works and sanitation facilities; and
- (12) inadequate performance of existing water supply schemes.

#### 4.5 Strengths in the Sector

The discussion of issues has emphasised the limitations and constraints in the Sector and their root causes. To counterbalance these weaknesses there are very significant strengths. The most significant are:

- . rural people themselves are self reliant and when convinced of the benefits of an initiative they can be expected to come together and support properly conceived endeavours to the extent possible within their means ;
- . the Indus irrigation system is a strength in that it carries fresh water to within reach of a large portion of the rural population;
- . the Public Health Engineering Department has a large complement of engineers and located in an extensive network of offices throughout the Province;
- . ties that the Rural Development Department has formed at the Union Council level are significant in considering the delivery of technical support to the communities and the Department has a well developed and

extensive organization throughout the Province;  
extensive data on the physical environment and on socio-cultural aspects of the province have been compiled by the various agencies and organizations active in the Sector;  
a well developed private sector providing most of the water supply facilities through installation of hand pumps and mechanised tubewells; and  
recognition on the part of many government officials of the benefits obtainable through community level participation in the development of water and sanitation facilities.

#### 4.6 Linkages Within the Sector

The most significant linkage within the Sector is understanding the impact on health of bacteriologically unacceptable water supplies and of improper disposal of human and animal excreta. The significance of this link is that until the rural peoples recognize its importance there will be continue to be difficulty in achieving sustainable water supply and sanitation facilities. Affordability is a question of perceived benefits and until the people are convinced that real benefits will accrue to them through support of improved water supply and sanitation initiatives they will continue to place a low value on clean water and proper disposal of excreta.

Another significant link is the increased need for drainage when a pipe borne water system is installed in a settlement. The increased use of water and resultant increased waste water create a health hazard unless proper drainage facilities are also provided. The Public Health Engineering Department has recognized this link by endeavouring to put a priority on developing drainage schemes in communities that have a pipe borne water scheme.

The linkage between excreta disposal and protection of the ground water resource is important to recognize. This is particularly relevant where shallow tube wells are the main water source in areas of shallow water table and near surface sands as is the case in the sweet water areas of the Indus Plain.

There are important links among the structure of rural society, the agriculture base of the economy, and the beliefs and practices of the people as they impact on the strategies used to achieve change.



## 5.0 POTENTIAL INITIATIVES AND PROJECTS

Within the context of the overall goal set out in the introduction to this report and considering the critical constraints in the Sector a set of potential initiatives is presented in this section. From these preliminary initiative a general outline of potential projects is formulated to provide an indication of the expected types of investments that might flow out of the planning process and are in effect a preview of what is likely to be presented in Phase III. Where we prepare the financial investment plans.

### 5.1 Preliminary Initiatives

This preliminary set of initiatives in intended to provide a starting point for consideration of an investment strategy for the Sector. The initiatives are identified under five headings:

- . Community Development;
- . Technical;
- . Cost Recovery;
- . Institutional Roles; and
- . Human Resources Development.

For most of the initiatives, two or three options for implementation are presented for consideration. Some of these options may be unrealistic in the context of the situation in Sind. The intent is to select the most promising options through discussions among Government of Pakistan, World Bank and Project Team personnel and pursue these in more detail in the next phase of the planning process.

### 5.1.1 Community Development Initiatives

#### a) Community Hygiene Education Program

The analysis of the root causes of Sector constraints repeatedly identified the lack of appreciation of the benefits of clean water, proper disposal of human wastes and hygiene to achieving health. Until rural residents understand this link a low priority will continue to be placed on development of water of acceptable bacteriological quality and the installation of latrines. The options to be considered for raising awareness levels in the communities are:

- . expanding and strengthening teaching of hygiene and safe water usage in the schools;
- . using promoters or animators to deliver hygiene and safe water usage messages in the communities;
- . strengthening the role of the Health Services field staff as promoters of hygiene and usage of clean water; and
- . promoting safe water usage and hygiene through the mass media.

The initiative would be to raise awareness levels of the importance of clean water and hygiene through one or a combination of the foregoing methods. Particular emphasis would be placed on messages to reach women because of their roles with respect to family health and the collection of water.

To identify the most promising options the following tasks will be undertaken as part of the next phase of this planning project:

- . review of previous efforts in rural education (health, agriculture, housing, agricultural mechanization,

fertilizers) to identify what has been successful and what has been unsuccessful;

- . examination of school curricula and texts to determine whether or not there is a basis for building on existing messages;
- . assembly of material used elsewhere in similar conditions for delivery of health messages through the schools;
- . analysis of previous experience with community health promoters or animators in Sind, Pakistan and elsewhere under similar conditions;
- . determine the processes and messages that might be appropriate for delivery of hygiene education messages through the schools;
- . review mass media programs presently being used for dissemination of health messages and determine if the format is suitable for extension or modification to meet Sector needs; and
- . discuss with staff of mass media agencies to determine the prevalence of radio and television access in the rural communities and conduct sample surveys to verify the information obtained.

(b) Community Orientation Program

The stated goal of the Sector investment program is to maximize the involvement of the community in the process of developing and maintaining water and sanitation facilities. The community must be prepared and properly oriented to assume this new responsibility. The proposed initiative is to recruit and train a cadre of promoters to undertake this community orientation program. These promoters will be attached to the implementing agency and will work in the communities, probably one for each two Union Councils.

The promoters must be familiar with social, communication and technical aspects of project delivery. They will provide the community with the details of the water and sanitation program such as guidelines, ways of working with the government agencies, and the roles of the various parties in the process. Among the responsibilities of the promoter will be social surveys, organizing planning meetings, contributing to feasibility studies, training members of the community based organization and providing a link between the community and the government agencies.

To further develop this initiative the Team will examine previous programs which have involved delivery of rural development initiatives through community workers in Sind and elsewhere in Pakistan to determine the mode of operation, successes and failures and the causes. The training needs of community leaders will be determined through interviews with leaders of existing Community Based Organizations.

#### 5.1.2 Technical Initiatives

Several technical initiatives are being considered. These are:

- . rehabilitation of existing schemes;
- . pilot schemes in brackish water zone;
- . development of drainage schemes in communities with piped water systems;
- . support to hand pump installers;
- . promotion of latrine installation;
- . water resources development in Arid Zone; and
- . operation and maintenance of existing schemes.

## a) Rehabilitation of Existing Schemes

There are over 200 existing PHED schemes and some Union Council water supply schemes that require varying levels of rehabilitation. The initiative would involve establishing the process for undertaking the rehabilitation, assessing the rehabilitation needs of specific schemes and organizing the works.

The options considered for achieving the rehabilitation are:

- PHED task force;
- consultant task force; and
- community based organization.

Under the PHED task force option the Department would form a rehabilitation cell which would evaluate each scheme, prepare detailed plans for rehabilitation and then contract out the work.

The consultant option would involve contracting an engineering firm through PHED to undertake the evaluation of rehabilitation needs, prepare a plan of action and supervise contractors undertaking the works.

The community based organization option would involve turning the schemes over to the community as a first step. The Rural Development Department would then assist each community based organization to assess the rehabilitation needs of their scheme and arrange for the work to be undertaken through the private sector. This option would tie into the initiatives in community based operation and maintenance and community mobilization. The cost of the rehabilitation would be borne by government on the understanding that the community will take on the responsibility for the on-going maintenance costs perhaps

with some subsidy where by the nature of the scheme design the costs of O&M are deemed to be beyond the means of the community. This might be determined based on the basic level of service that would have been appropriate at the time the scheme was conceived.

The tasks that will be undertaken to further pursue this initiative include:

- . preliminary evaluation of rehabilitation needs through questionnaire and field verification;
- . discussion with selected community organizations regarding the possibility assuming increased responsibility for the operation and maintenance of the existing schemes; and
- . assessment of the appropriateness of level of service and design of representative existing schemes in view of possibility of community assuming control.

#### b) Pilot Schemes in the Brackish Water Zone

The intent of this initiative is to determine the most appropriate water supply schemes for various size communities in the brackish water zone of the irrigated area. The extent of sweet water lenses within the brackish water zone would be determined and the feasibility of exploiting them would be assessed. Various methods of improving the quality of water from canal sources would be investigated. The technology options that might be considered are infiltration galleries adjacent to the canals, skimmer wells and brackish water control well combinations, slow sand filter and disinfection, sand filter separator in a pond.

The options proposed for consideration for undertaking this initiative are:

- . consulting firm is engaged to assess needs, identify potentially suitable technologies and establish pilot schemes in selected communities working with the community based organizations and the Rural Development Department acting as a counterpart and facilitator;
- . the PHED forms a task force to undertake these pilot projects with a donor agency providing one or two specialists and some financial support; and
- . the Rural Development Department forms a task force to undertake these pilot projects with a donor agency providing one or two specialists and some financial support.

The tasks to be undertaken within the Strategic Planning program would include documentation of past efforts to develop innovative water supply systems in the brackish water areas of Sind and elsewhere, assembly of all available data on the extent of the sweet water lenses within the brackish water zone and assemble data on pertinent technologies that may be applicable.

c) Establishment of Drainage Schemes in Larger Communities

This initiative would address the need for improved drainage in the larger settlements in the irrigated zone, in particular those that have pipe borne water supplies. The option to be considered are:

- . supporting the efforts of the PHED through provision of technical assistance, contribution of funds for equipment, and training in appropriate technologies;
- . undertaking the schemes through community based organizations with the Rural Development Department providing the materials and assisting in the design and

the community undertaking the portion of the works within their capability; and engaging a consulting engineering firm to design the works and supervise the construction to be undertaken by contractors.

The tasks to be undertaken to pursue this initiative would include detailed examination of technologies presently being applied, further documentation of the drainage conditions and discussion of the feasibility of the community to assume a larger role in the provision of drainage works.

#### d) Support to Hand Pump Installers and Manufacturers

There are two main difficulties with the present hand pump supply industry. One is the poor quality of the hand pumps and the other is the lack of adequate measures to protect the ground water from contamination. Poor quality of the hand pumps is reflected by low capital cost but leads to relatively high maintenance cost. However the big advantage of the locally made pump is that spare parts are readily available within a short distance (usually less than 5 miles).

The difficulty with introducing a better quality pump is that at the beginning the spare parts and the expertise will not be readily available and therefore people will be reluctant to adopt the improved model.

The initiative would be to improve the quality of hand pumps and hand pump installations. The options to consider are:

accelerate introduction of improved Bangladesh Cast Iron No.6 hand pump on a saturation basis in vicinity of Hyderabad using a promotional campaign aimed at pump purchasers and installers and offering inducements such



as short term credit to finance the purchase of the improved hand pumps;  
introduce another pump yet to be identified which would involve conducting assessments of other potential models and facilitating the establishment of a manufacturing plant in Sind;  
establish minimum construction standards for tubewells, in particular the seal around the casing and introduce a construction monitoring unit into the Union Council to enforce compliance; and  
assign trainers of handpump artisans to visit groups of artisans in each community to promote proper construction practices and to promote adoption of improved pumps.

The tasks to be undertaken to follow up on this initiative will include an assessment of the performance of the Bangladesh No.6 pump through field visits and discussions with RDD/UNICEF representatives, installers and users and determine the likely impact of a credit scheme to accelerate introduction of the improved pump.

#### e) Latrine Promotion Program

The installation of latrines is a household and private sector matter. The promotion, sale and installation of latrines requires marketing and delivery that the private sector is best suited to provide. The government role should be to support the efforts of the private sector. The initiative would be to establish such a support program. The options to consider are:

credit to householders to purchase a latrine;  
establishment of a sanitation (latrine) cell in the Rural Development Department; and  
pilot latrine installation program.

The credit scheme would involve establishing a credit facility for the householder to use to finance construction. The local artisan would then become the promoter of the program. The initiative would involve a campaign to make local artisans aware of the program and train them how to conduct the promotional efforts.

A sanitation (latrine) cell in the Rural Development Department would investigate appropriate technologies, set up training and licensing program and conduct a mass media promotion program.

The pilot latrine installation program would involve constructing latrines in public places using local artisans and in the process train the artisans in the necessary skills. A second phase would involve construction of latrines for a few of the poorest families on a 100% subsidy for materials with the householder providing all labour. This is the UNICEF model for latrine dissemination.

Within the scope of this Strategic Planning exercise we will pursue this initiative further by examining previous rural credit schemes, interviewing masons to determine their training and support needs and interviewing prospective purchasers to assess potential response to promotional activities and credit schemes.

#### f) Water Resources Development in the Arid Zones

Considerable attention is being focused on improving water supplies in the Arid Zones of Sind through programs being undertaken by Sind Arid Zone Development Authority, Water and Power Development Authority, the Rural Development Department, and the Public Health Engineering Department with the support of donor agencies. This initiative is

intended to further assist in the addressing the water needs of the area. The proposed options for intervention are:

- . supporting current exploration efforts of the agencies already involved through financial inputs to the purchase of equipment, materials and specialist services;
- . assisting the PHED or RDD to undertake a tubewell construction program in the water bearing zones identified by others (eg. WAPDA/German Team); and
- . initiating a major exploration program through SAZDA as the implementing agency using a project management team composed of Pakistani and international consultants.

To pursue this initiative further will require more detailed documentation of the status of knowledge of the ground water resources of the arid zones and determination of future activities of those agencies already involved.

#### g) Operation and Maintenance of Water Supply Schemes

This initiative would involve the establishment of the organizational structure for the operation and maintenance of existing and future pipe borne water supply schemes. At present the PHED is providing this service on an ad hoc basis. The options to be considered are:

- . community to hire an operator and call on technical support as needed either from the PHED, private sector or the District Council;
- . the PHED to continue to provide this service through an Operation and Maintenance Cell established in the Department on a hire charge basis; and
- . Private Sector firms to be hired by the community to operate and maintain the scheme with the Union Council

acting as a facilitator and Local Government providing an advisory and monitoring service and establishing rates.

The tasks to be undertaken to assess this initiative will include documentation of the activities involved in the operation and maintenance of schemes, identification of sources of support inputs, assessment of the potential role of the private sector and assessment of the likelihood of the communities assuming some of the required duties.

### 5.1.3 Cost Recovery

#### a) Establish Basis for Communities to Contribute to Capital Operating Cost of Water and Sanitation Facilities

The stated policy for the Sector is that "service levels should reflect the expressed demand of the beneficiaries and that they should receive the level of service that they can sustain in the long term. In order to accelerate equitable coverage the government should assist in the provision of a basic level of service. Users should bear the full cost of operation and maintenance".

The ability of Union Councils to contribute to the capital cost of local initiatives varies considerably throughout the Province. Most are able to generate little if any revenue whereas others generate quite substantial amounts. The concept is to assist those that have the greatest need by providing the basic level of service and to contribute only part of the cost to those that are in a position to support a higher level of service. In either case the community would be responsible for the full cost of operation and maintenance.

This initiative is intended to establish the level of government contribution to the provision of the service and to establish the community means of contributing to capital and operation and maintenance costs.

The options to be considered are:

- . allocation by need;
- . indirect mechanism for cost recovery; and
- . community contribution in the form of undertaking a portion of the works, supplying locally made materials and supporting operation and maintenance staff.

The next phase of the allocation by need initiative would involve classifying each Union Council according to relative level of development and level of external and internally generated funds. In view of the limited financial resources available to the Sector, a second level consideration in the allocation process will be the indicated responsiveness of the local councils. Priority would be given to those which demonstrate cooperation and responsiveness as these are likely to produce the most cost effective investments. The capital cost contribution from government could then be graduated on a scale of 100% for responsive least developed areas to 50% for most developed areas. The implementation phase would involve establishing the mechanism on a trial basis in one of the districts and monitoring the results.

For the next phase of the initiative attached to the indirect mechanism for cost recovery option, a field investigation of rural fiscal structure of Union Councils and District Councils would be undertaken to assess where there is scope for levying surcharges. Existing practices applied by communities in financing local initiatives would be examined in particular source of funds, mechanism, motivation, and control. In the implementation phase this

initiative would involve selection of one district for implementation of the findings of the investigation. A central monitoring unit would be established to assess the success of this trial.

The next phase of the option to maximize community contribution in kind would involve a review of previous projects in Sind and elsewhere which have involved direct participation of the community in the form of works and provision of materials (eg. RDD) to determine why some worked and others did not. The potential for the community to assume some of the operation and maintenance tasks would be examined and the type of training required determined. For example it would be preferable that the operator be from the community. The implementation phase would involve self help projects perhaps on drainage schemes or development of simple water supply systems.

b) Establish Basis for Community Contribution to Operation and Maintenance and for the Administration of Funds

This initiative would address the issue of effective mechanism for collection and disbursement of the funds for operation and maintenance. The options to be considered are:

- placement of the funds with the District Council which disburse them through the local council to the communities on an as needed basis;
- placement with the Union Council in a fund for all of the communities within its jurisdiction and disbursement by the Union Council on an as needed basis; and
- placement in a fund operated by the community and monitored by the Union Council or the Local Government Department.

The study phase of these initiatives would involve examination of the present methods being used by communities to administer funds to undertake works in Sind rural communities and elsewhere in Pakistan. The capability of rural communities to administer in on a long term basis the level of funding necessary to support O&M would be determined. The implementation phase would consist of pilot projects on selected existing schemes.

#### 5.1.4 Institutional Roles

##### a) Establishment of Roles to Service Community Based Organisations

The implications of the process of transferring responsibility for the management of water and sanitation schemes to the community will be modified roles for the agencies presently involved in the Sector. There is potential for expansion of the role of the Private Sector and this should be examined. The macro planning role would continue to reside with the Planning and Development Department. The initiatives discussed in this section will establish the new roles related to provision of technical support and mobilization of the communities.

The review of the existing organizations determined that the Public Health Education Department has strong technical capability. The Rural Development Department and the Local Government Department have good capability to deal with the non-technical aspects of community development but have limited capability to deal with the technical considerations. The District Councils have a community development capability and some technical capability but that technical capability is weak with respect to development of water supplies and human waste disposal. The Union Councils are closest to the communities but have

little capability to deliver community development services. For macro-planning the recognized entity is the Planning and Development Department. The Private Sector consulting firms have had little input in the Sector and at this time has limited capability to deliver.

The options proposed to be considered are:

- (1) Local Government and Rural Development Department Option;
- (2) Public Health Engineering Department and Rural Development Department Option;
- (3) Competitive Option; and
- (4) District Council Option.

Option (1)- Local Government/Rural Development Department

In this option the Local Government staff would be assigned the role of mobilizing the community using the Union Council as a facilitator and also providing any technical assistance needed by the community. A cadre of promoters would be fielded by the Local Government Service. These community mobilizers would be attached to the Union Councils to promote the benefits of clean water and sanitation/drainage and to assist the community in the formation of Community Based Organizations or the strengthening of existing organizations.

Where the community does not have the technical capability to plan or implement a project it would call on the technical wing of the Rural Development Department which would have to be strengthened to meet this demand.

For small communities the works are likely to be within the capability of the community based organization to deal with. This would generally occur in communities below 1000. The



Union Council would act as a facilitator in this case.

For larger communities where more complex system components are likely to be needed the community will need outside technical support. In this option that support would come from the technical wing of the Rural Development Department.

#### Option (2) - PHED/RRD

This option would have the RRD assume the role of community mobilizer with the Union Council acting as a facilitator. For simple systems (usually meaning smaller communities) the Rural Development Department would provide the technical support to the community through the Union Council. The PHED would be called upon for technical input in those cases where the community cannot act on its own. In general this would occur for larger communities. In this option the PHED would require strengthening in appropriate technologies.

#### Option (3) - Competitive/RDD

In this case the Local Government Department would assume the role of community mobilizer and the Rural Development Department would provide technical support for simple schemes and act as a technical advisor to the communities for the more complex schemes. For design and implementation of larger systems and for technically demanding problems on small schemes the community would call on the services of either the PHED, District Council or the Private Sector.

The services of the PHED and District Council technical wings would be on a hire charge basis. A special cell could be created in both the PHED and in the District Council to meet this demand. This option would require strengthening the capability of PHED, District Councils and Private Sector firms in appropriate technology and rural development.

#### Option (4) - District Council

Under this option the District Councils would be assigned the role of mobilizing the communities through the Union Councils and providing any technical assistance needed by the communities. A cadre of promoters would be fielded by the District Council to promote the benefits of clean water and sanitation/drainage and to assist the community in the formation of Community Based Organizations. Where the community does not have the technical capability to plan or implement a project it would call on the technical wing of the District Council. The technical wing of the District would have to be strengthened to meet this demand.

Consideration was also given to the possibility of a Private Sector Turn Key Operation wherein the community through the Union Council would hire a firm to plan, design and implement a water supply or sanitation/drainage scheme and operate the scheme for a specified time period. Selection of the firm and the monitoring of the performance would be assigned to the Local Government Department who would be supported by the Rural Development Department on technical matters. This option may have merit but it may be premature to consider further.

The following table summarizes the options.

Roles	Options			
	(1)	(2)	(3)	(4)
Technical Support	RDD	PHED/RDD	Competitive	District
Planning	P&DD	P&DD	P&DD	P&DD
Community Mobilization Implementation	RDD/UC	RDD/UC	RDD/UC	District

## b) Coordination of Effort Among the Departments

The initiative would address the perceived need for improvement of coordination among the agencies assigned responsibilities for the provision of water supply and sanitation facilities. The options proposed for consideration are:

- . creation of a new coordinating agency for the Sector;
- . strengthening of the Sind Regional Development Planning Organization; and
- . strengthening and expanding the present coordinating role of the P&DD.

The next phase of the initiative would be to examine the organizational structure and capability of the existing organizations to undertake the role, define the role to be undertaken by the agency, determine where existing staff would have to be augmented or trained and establish the mechanism for the organization to relate to the sector agencies.

The implementation stage would involve undertaking the indicated strengthening in the case of an existing agency and the establishment of a new organization if that is the option selected.

### 5.1.5 Human Resources Development

Four initiatives are considered in the area of human resources development:

- . training in appropriate technology for professionals;
- . skills training program for rural based artisans;
- . training program for water system operators; and

enhancement of appropriate technology training in university and polytechnical schools.

a) Training in Appropriate Technologies for Professionals

This initiative would be aimed at professional in the government agencies and in the private sector. It would involve presentation of material on appropriate technology community development and communication to existing staff of the Sector institutions and to consulting firms. The options to be considered are:

*Process*

- seminars at the Institute of Appropriate Technology in Karachi using staff of the Institute augmented by individual specialists;
- series of in-house seminars presented specifically in the head office of each institution and each firm using consultants to organize the program and drawing on specialists from private sector, university, and institutions and from outside Pakistan to deliver the material;
- series of seminars presented at each District capital and open to participants from all interested institutions and firms using consultants to organize the program and drawing on specialists from private sector, university, and institutions and from outside Pakistan to deliver the material; and
- establishment of a training wing in PHED and draw on specialists from private sector, university, and institutions and from outside Pakistan to deliver the material.

The initiative would be to establish the appropriate format for the training program, identify and arrange for the participation of the trainers, identify the trainees and arrange for their participation, assemble the pertinent

material and training aids and implement and monitor the training program.

The tasks to be undertaken within the scope of this planning exercise include discussions with the Departments, District Councils and private sector regarding an appropriate format, canvas the potential training institutions regarding interest and capacity and examine previous efforts of a similar nature undertaken in Sind and elsewhere.

b) Skills Training Program for Rural Based Artisans

This initiative would involve establishing training programs for artisans who have a role in the Sector such as masons, pipe fitters, plumbers, electricians, and mechanics. There are hundreds of these individuals scattered throughout the rural areas. The options to be considered for delivery of this training program are:

- . . . . . conduct in High Schools at Union Council Level using mobile training units as an outreach program of existing technical training institutes;
- . . . . . conduct at District level as an outreach program of existing technical training institutes;
- . . . . . conduct in High Schools at Union Council level with mobile training unit using private sector trainers; and
- . . . . . conduct in District centres using private sector trainers.

The initiative would involve establish of the training delivery mechanism, recruiting and training master trainers, promoting the training program, assembling the training aids and monitoring the implemented program.

To further examine this initiative the Project Team will review past efforts of a similar nature in Sind and

elsewhere, interview prospective trainee to determine interest level and current skill levels, determine the availability of trainers, and assess in more detail the capacity and capability of potential training institutions.

c) Training Program for Water System Operators

This initiative would address the need for upgrading the capability of the operators of existing water supply schemes. The program would also serve the training needs of operators for future water supply schemes and for drainage schemes. The drainage schemes for larger communities include lagoons for settlement and oxidation and pumping stations to dispose of the waste water to irrigation drains.

The options to be considered for the delivery of the training program are:

- establish a training wing in PHED using in-house trainers and specialists from the private sector and technology training institutions to deliver the material;

- conduct the training in the Local Government training Academy at Tando Jam and draw on specialists from private sector and technology training institutions to deliver the material; and

- establish an on-the-job training program using mobile training units staffed by experienced operator trainers.

To take this initiative to the next stage of consideration the Project Team will interview operators of existing schemes to further evaluate their training needs, discuss with pertinent individuals the most appropriate format for the training, evaluation of previous and current training programs of a similar nature (eg. in the agricultural

sector) undertaken in Sind and elsewhere.

d) Appropriate Technology and Community Development Training  
in the Universities and Polytechnical Schools

This initiative would involve expanding the coverage of appropriate technologies and the social sciences related to community development in the engineering courses at the universities and polytechnical schools. The capability of these institutions to deliver the training is expected to be deficient to some degree therefore a training program for the teaching staff is expected to be a necessary prerequisite for the introduction of the new material.

This initiative would be integrated with a national level program of appropriate technology training being considered for the NED University at Karachi and the University of Science and Technology at Lahore within the framework of the International Technical Network Centres (ITN).

The tasks to be undertaken to further evaluate this initiative include more detailed examination of curricula, discussion with university and polytechnical school staff regarding potential expansion of coverage of topics of importance to the Sector, and assess the availability of potential trainers and training material in the Institute for Appropriate Technology, the universities and the polytechnical schools.

## 5.2 Indicative Projects

As an indication of some of the projects that are likely to flow out of the investment planning process the outline of five potential projects are presented in this section. The basis for these projects is the preliminary initiatives discussed in Section 5.1. Thus the details of the implementation will depend on the particular options that are ultimately selected for the initiatives.

Normally a project is formulated to include portions of a number of specific initiatives which are intended to address individual issues. Appropriate integration of initiatives will enhance overall benefits to the Sector. Before outlining the projects, we will first consider what might be appropriate components of integrated project.

### 5.2.1 Consideration of Integrated Sector Initiatives

The linkages discussed in the previous section are a critical element in the evaluation of appropriate combinations of initiatives. However there are several other factors that should be considered, such as:

- . compatibility in terms of timing, for example, introduction of latrines to a community is often requires a longer time frame than developing a clean water supply;
- . sequencing of initiatives, for example, the community must be properly motivated and oriented before consideration can be given to turning a scheme over to there management;
- . compatibility of location in terms of target group and delivery point; and



skill requirements not so diverse as to be difficult to deliver by the implementing agencies.

The matrix presented below was used to evaluate which components are likely to be suitable to combine into integrated initiatives based on our preliminary evaluation of linkages and compatibility criteria. The following components appear to be compatible if appropriate sequencing is adopted:

- . rehabilitation of water supply schemes combined with mobilization of community based organizations, promotion of clean water, training of operation and maintenance personnel and development of a drainage network;
- . construction of pipe borne water supplies combined with design and construction of drains, hygiene education, mobilization of community based organizations, and training in the design of appropriate technology systems, and in operation and maintenance;
- . improvement of hand pump water supplies in combination with promotion of latrine construction, hygiene education, mobilization of community based organizations, and training in design of appropriate technology systems, low level skills and in operation and maintenance; and
- . water supply surveys and installation of trial hand pump water supplies and pipe borne water supplies.

DECISION CHART FOR COMPONENT INTEGRATION

Main Initiatives	Potential Associated Activities (Numbers refer to list on left)											
	1	2	3	4	5	6	7	8	9	10	11	12
<i>A</i> 1. Rehabilitation of water supply schemes	X	M	M	D	E	D	F	E	D	F	O	O
<i>B</i> 2. Construction of pipe borne water supplies	D	X	D	M	E	D	F	E	F	F	E	O
<i>B</i> 3. Construction of drains	O	O	X	D	E	E	F	E	F	F	O	O
4. Promotion of latrine construction	O	O	M	X	E	E	F	E	F	F	O	M
<i>(A)</i> 5. Training in O&M	P	P	P	P	X	E	F	O	F	F	O	D
6. Skills training in low level technology	O	P	P	P	O	X	O	O	O	P	O	P
7. Realignment of institution roles	F	F	F	F	O	O	X	O	F	F	F	F
8. Training in appropriate technology	D	D	D	D	O	O	O	X	O	O	O	D
<i>A</i> 9. Hygiene Education	F	F	F	F	O	O	F	O	X	F	O	F
<i>A</i> 10. Develop village based organizations	F	F	F	F	F	D	F	D	E	X	O	O
11. Water supply surveys	O	D	O	O	D	D	O	O	O	O	X	O
12. Support to hand pump artisans	M	M	M	M	E	E	F	E	E	D	O	X

CHART LEGEND

X=major initiative

P=essential prerequisite

M=potential minor complementary initiative

D=Desirable but not essential support function

E=essential support function

O=either not essential or not appropriate

F=facilitates achievement of initiative

*A* Maintenance management systems.  
*A* Public stand posts + hand pumps.

## 5.2.2 Outline of Indicative Projects

The five indicative projects are:

- (1) Rehabilitation of pipe borne water supply through community based organizations;
- (2) Pilot projects for water supply schemes in the brackish water area through community based organizations;
- (3) Drainage schemes in communities with pipe borne water supplies;
- (4) Latrine promotion program; and
- (5) Support for upgrading hand pumps and hand pump installation in the sweet water zone.

### (1) Rehabilitation of Pipe Borne Water Supply Schemes

This project would involve upgrading some of the 220 schemes completed by PHED and some of those that have been completed by local councils. This rehabilitation would be undertaken through community based organizations. The objectives would be to rehabilitate these systems so that they achieve their design capacity, make minor extensions to the system where necessary and initiate a cost recovery program for operation and maintenance.

The intent would be transfer responsibility for the schemes to the community based organizations who would effectively become the owners of the systems. The implementing agency would provide the community mobilization staff and technical support where appropriate. The local council would facilitate the formation of the water user organization. The role of consultants might be to provide the training and project management inputs. Private sector suppliers and contractors would provide materials and works.

The establishment of a cost recovery program would be integral part of the endeavour and a mechanism for collection and administration of the funds through the community based organization would be implemented. The human resources component would include training of operators, training of community promoters, and training of members of the community based organization.

There would be three phases of the project cycle:

Phase 1-recruitment and training of community promoters, formation of community organizations in a few pilot villages, detailed survey of rehabilitation needs of the schemes, and establishment of training program for community based system operators and community based organization personnel.

Phase 2-promoters move out to remaining communities to form community based organizations and rehabilitation of schemes is undertaken, tariff collection and administration mechanism is established.

Phase 3-continued training of operators and monitoring of scheme performance.

## (2) Pilot Projects for Water Supplies in Brackish Water Area

This project would involve establishing pilot water supply schemes in larger rural communities in the brackish water zone. The intent would be to mobilize the communities to form water user organizations as a prerequisite for involvement in the program.

The intent would be to establish a cost recovery mechanism for operation and maintenance which would not necessarily be based on direct cash payments. Other indirect means would be explored with an emphasis on the community undertaking as many of the tasks as possible.

An integral part of the community mobilization effort would be a program to raise awareness levels in the targeted communities so that majority of the residents recognize the benefits of improved water and sanitation facilities.

Coupled with the water supply project in each community would be the establishment of acceptable latrine facilities in public places (Union Council, schools, mosques, basic health units) and in some of the poorest households in the communities as a pilot scheme to stimulate interest in safe disposal of human wastes.

The intent would be to implement the Project through the community based organizations. These organizations would effectively become the owners of the systems. The implementing agency would facilitate the establishment of the community based organizations and develop designs for the schemes. Consultants would provide project management and develop the training program, and private sector suppliers and contractors would provide materials and works.

The main components and their sequencing would be;

Phase 1-recruitment and training of community promoters, formation of community based organizations in selected pilot communities, promotion of health aspects of improved water supply and sanitation, development of plans for water supply schemes, establishment of training program for community based system operators, rural based artisans and initiation of latrine construction.

Phase 2 -community promoters move out to remaining communities to form community organizations and promote the health aspects of an improved water supply, technical personnel from implementing agency and

consultant evaluate water needs and sources and prepare plans, and manage construction of schemes using community inputs as much as possible.

Phase 3-continued training of operators and monitoring of scheme performance.

### (3) Drainage Schemes in Communities with Piped Water

The intent of this project would be to augment current efforts of the PHED in the development of drainage systems in communities with pipe borne water supply schemes.

Essential components of the project would be:

- . establishment of community based organizations;
- . promotion of hygiene and proper disposal of human wastes;
- . skills training for local artisans; and
- . training in operation and maintenance of drainage system facilities.

The emphasis would be on community involvement in the process in order to set the stage for village based operation and maintenance. The phasing would be similar to that outlined for the water supply projects.

### (4) Latrine Promotion Program

This Project would involve installation of latrines in public places on a demonstration basis followed with a program promoting the use of latrines. The components of the Project would be:

- . establishment of community based organizations in pilot communities and conducting hygiene education to stimulate interest in latrines;

- . installation of demonstration latrines in public places such as Union Council offices, schools, and Basic Health Units;
- . establishment of a credit scheme to facilitate purchase of latrines by householders; and
- . skills training for rural artisans, in particular, masons.

#### (5) Support for Upgrading Hand Pumps in Sweet Water Areas

The intent of this Project would be to support current efforts to upgrade the quality of hand pumps and to improve the completion of hand pump tube wells to reduce the incidence of bacteriological contamination of ground water supplies. The target groups would be purchasers of hand pumps and the hand pump artisans. The components of the Project would be:

- . establishment of a credit scheme to facilitate the purchase of the improved pumps;
- . introduction of the improved pumps on a saturation basis in selected areas to overcome concerns regarding availability of spare parts;
- . skills training and education of hand pump installers in the saturation areas on the benefits of the improved hand pump and on its maintenance; and
- . promotion of the improved hand pumps through the installation artisans and public forum.

#### (6) Other Projects

The foregoing is only an indication of the types of projects that are likely to form part of the investment strategy. They will be formulated in more detail as part of the Phase III financial investment planning activity. Other projects are also apparent based on the preliminary set of

initiatives and others will emerge as the initiatives are refined and additional initiatives are identified.



## 6. WORKPLAN

Project activities have been divided into categories as outlined in Section 2. Each category is discussed below and is supported by detailed lists of activities presented in Appendix II.

The Project time span has been divided into five phases. At the end of the discussion below, a schedule of the main tasks the team expects to accomplish in each phase is presented. The schedule is a guideline for the development of expanded plans being compiled during the first half of March.

### 6.1 Data Collection

Preliminary data collection began in December, 1988 and was completed February 15, 1989. Readily available secondary data were identified and collected to form the basis for:

- . the division of the sector into sub-segments;
- . the definition of data bases, outlining data to be collected during the detailed data collection phase; and
- . the focus of project activities during the coming months.

The second round of data collection activities began in late February and will continue until June 15. During this period:

- . secondary data will be collected to assist in refining the issues and initiatives presented in this Report;

- . limited field studies will be undertaken to verify secondary data; and
- . some primary data collection will be undertaken using sampling techniques where secondary data are not available.

In the schedule at the end of this section, data collection will be related to:

- . Phase II activities 2 to 7 which are controlled by the analysis carried out for the preparation of this Inception Report; and
- . Phase III activities 11 and 13 which will be influenced by the discussions of the Inception Report.

## 6.2 Data Analysis

Analysis of the detailed data collected will take place in parallel with the collection from March 1 - June 21.

Key critical issues, identified in the analysis of the initial data will be reviewed as more detailed information is collected. They will be confirmed as stated, or refined to reflect the new data. Issues judged to have an effect on the other issues, i.e. to "drive" the rest, will be given the highest priority.

In-depth analysis of each issue will determine:

- . the root causes of each issue - why the issue is important;
- . strengths which can be built on and weaknesses which must be overcome; and

conclusions reflecting types of action which can be taken.

The strengths and weaknesses will then be prioritized in order to identify actions of the greatest likelihood of success and areas in which the need is the greatest.

Through the analysis of the data, gaps will be identified. The process of data collection will start again, leading to more analysis using the methodology outlined above.

The conclusions reached will form the basis of the investment strategy. Projects will then be identified, and it may follow that needs for additional data will once again result in additional collection and analysis.

Analysis of data will take place in the schedule:

- . Phase II activities 2 to 6; and
- . Phase III activities 11 to 13.

### 6.3 Synthesis of Information

As data is being analyzed, the results are being evaluated for linkages. This synthesizing process will be carried out in parallel with data analysis, from March 15 until June 30. It will occur in Phase II activities 2 to 6, Phase III activity 11 as well as the subsequent phases.

Key interrelationships and constraints identified earlier will be verified by analyzing the conclusions reached in the analysis phase.

Strengths and weaknesses which overlap in several issues will be deemed to be of critical importance and will be given top emphasis.

#### 6.4 Formulation of Initiatives

The formulation of initiatives is the last step in the process before identification of potential projects.

Goals will be developed for actions which will build on the available strengths and lessen the effects of the weaknesses.

For each goal, a set of specific objectives which are quantifiable and measurable will be established. The objectives will include a time element. They will be prioritized in terms of most pressing needs, having the broadest anticipated impact and short-term visible impacts and long-term benefits.

A set of strategies on how the goals and objectives are to be met will be set for each objective or set of objectives. Development of the strategies will be guided by the major issues and the overall project goal of developing projects which lead to affordable and sustainable water supply, sanitation, drainage and hygiene education projects while maximizing community participation. Criteria for evaluating the strategies will be defined and used to select ones which offer the appropriate impact, benefit, and likelihood of success. These strategies will be rolled into initiatives which will form the basis of the investment plan and from which projects will be identified.

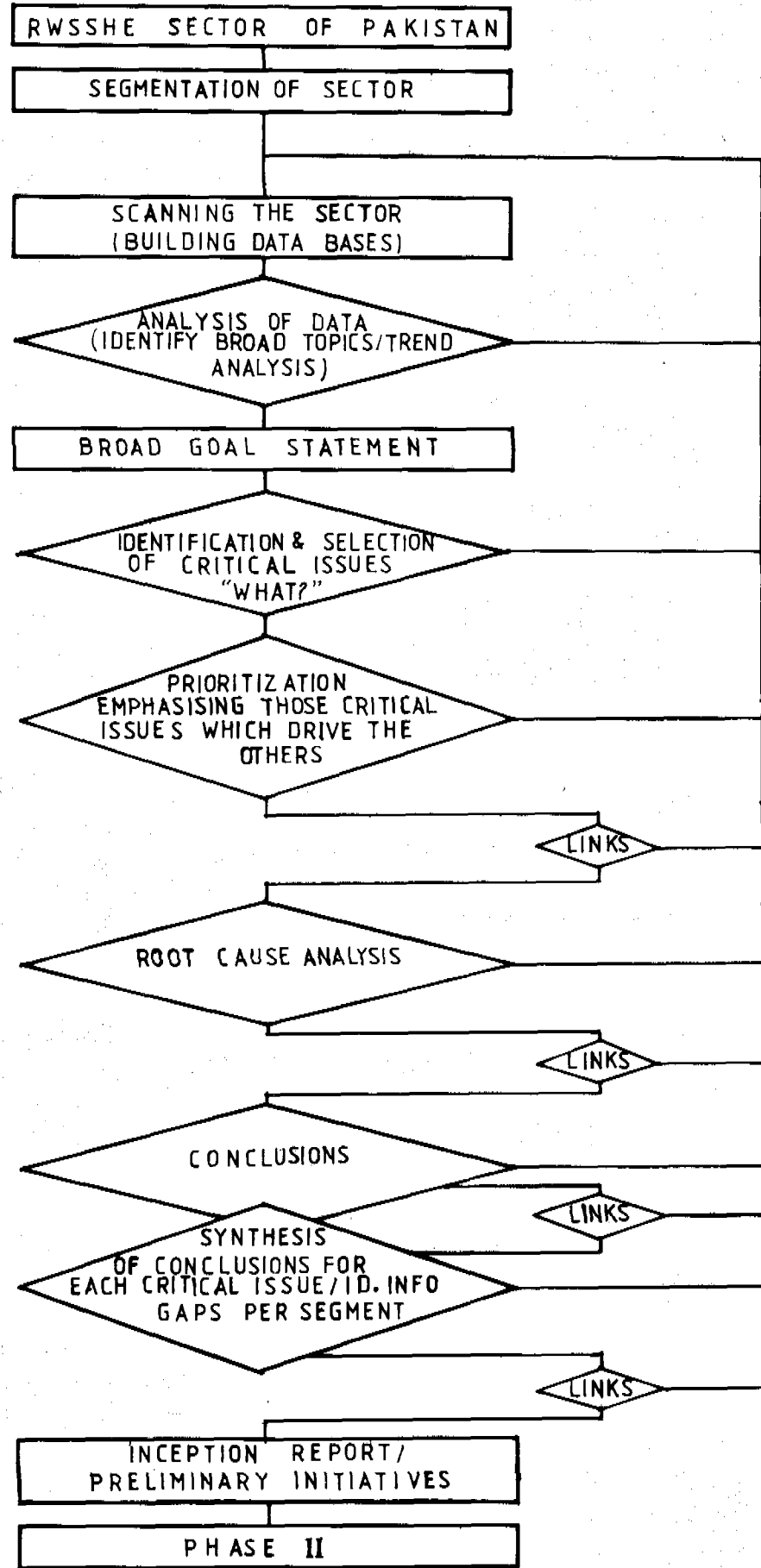
Phase I activities concluded with a formulation process which produced a preliminary set of initiatives. These will be refined following the discussions of this report. Phase II activities 6 and 8 will narrow the refined initiatives to a specific set and Phase III activities 11 and 12 will lead to the selection of final initiatives for the investment plan and subsequent project identification.

## 6.5 Project Outputs

The project outputs include a Strategic Provincial Investment Plan, Project Identification Reports and a National Summary Investment Plan as discussed in Section 2.

# STRATEGIC PLANNING METHODOLOGY

## PHASE I-JAN 6 TO FEB 25



WORKPLAN PHASE I - JAN 6 to FEB 28

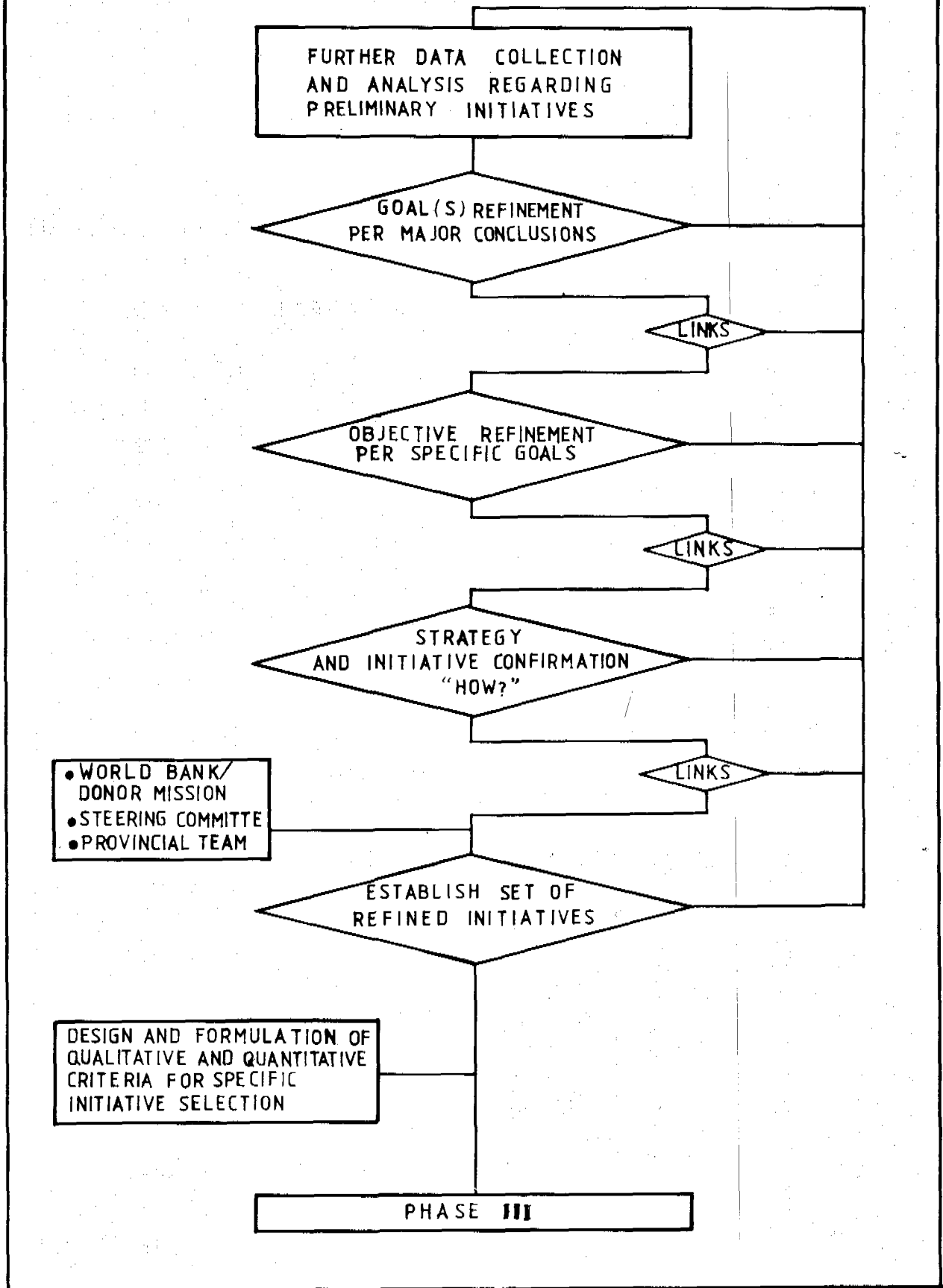
Initial reconnaissance of data and issues leading up to the Inception Report and a set of preliminary initiatives and indicative projects.

WORKPLAN PHASE II - MAR 1 to APR 1

Enhancement of data and refinement of preliminary initiatives identified in the Inception Report in order to establish the set of refined initiatives:

ACTIVITY	APPROX. TIME REQUIRED	COMPLETION DATE	RESPONS- IBILITY
1. PREPARATION OF DETAILED WORKPLAN FOR PHASE II		05/03/89	
-----			
Prepare detailed workplan for Phase III and review with MG	02 days		PT/CT
2. REVIEW AND ENHANCEMENT OF STRATEGIC ANALYSIS BASED ON INCEPTION REPORT		14/03/89	
-----			
2.1 Review conclusions of inception report and identify data gaps for each key issues of each subsegment	01 day		PT
2.2 Prioritise data gaps and collect highest priority data	10 days		PT
2.3 Analyse data and identify new trends	10 days		PT
2.4 Revise root causes and refine conclusions for each key issue	01 day		PT
3. GOAL REFINEMENT		15/03/89	
-----			
3.1 Refine goals and formulate new ones in light of new data and conclusions	01 day		PT
3.2 Review linkages between goals and synthesise into major goals for each subsegment	01 day		PT

**STRATEGIC PLANNING METHODOLOGY**  
**PHASE II - FEB 26 TO MAR 31**





<u>4.Objective Refinement</u>		16/03/89	
4.1 Refine objectives and formulate new ones for each major goal	01 day		PT
4.2 Review linkages between objectives and synthesise into major objectives for each major goal within each subsegment	01 day		PT
<u>5.STRATEGY CONFIRMATION AND REFINEMENT</u>		26/03/89	
5.1 Confirm formulated strategies and establish new ones that will best achieve major objectives	02 days		PT
5.2 Review linkages between strategies and synthesise into major strategies for each subsegment	01 day		PT
5.3 Compare major strategies with strategic options in the Inception Report .	01 day		PT
<u>6.INITIATIVE CONFIRMATION AND REFINEMENT</u>		26/03/89	
6.1 Refine preliminary initiatives and if needed formulate new ones	03 days		PT
6.2 Review linkages between initiatives of each goal and synthesise for each subsegment	02 days		PT
<u>7.WB/DONOR MISSION</u>		12/03/89	
7.1 Meeting with Steering Committee, WB and prospective donors to review contents of Inception Report	02 days	to	PT/CT
7.2 Confirmation by WB of order of magnitude of expected foreign investment into the sector		26/03/89	
8. ESTABLISH A REFINED SET OF INITIATIVES IN CONSIDERATION OF STEERING COMMITTEE/ WB-DONOR MISSION RECOMMENDATIONS	02 days	31/03/89	PT

## 9. FORMULATION OF INITIATIVE SELECTION CRITERIA

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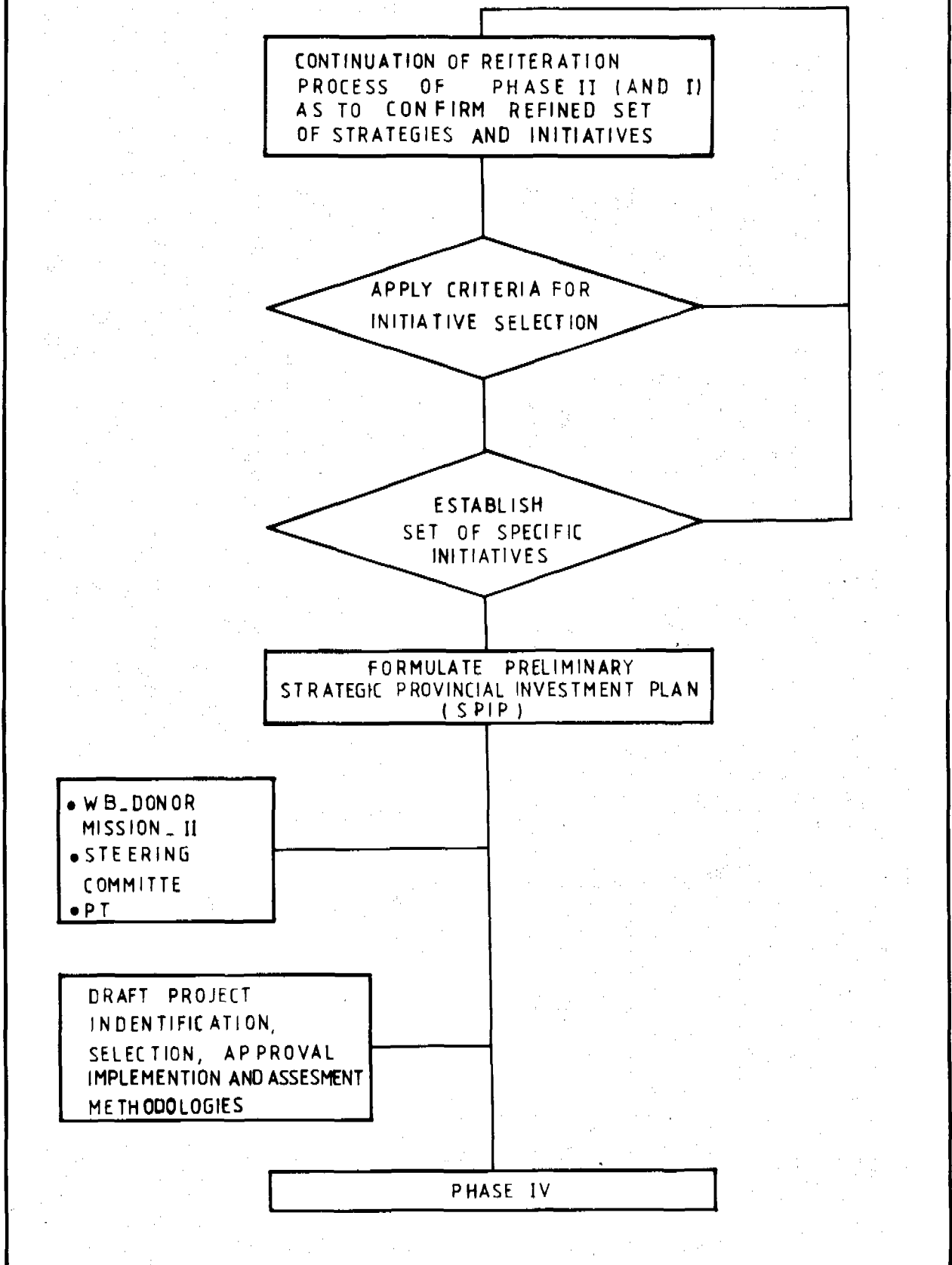
Design qualitative and quantitative criteria for the selection of specific initiatives                      07 days    31/03/89                      CT

## 10. PREPARATION OF DETAILED WORKPLAN FOR PHASE III

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Prepare detailed workplan for Phase III and review with MG                      02 days    31/03/89                      PT

STRATEGIC PLANNING METHODOLOGY  
PHASE III APRIL - JUNE



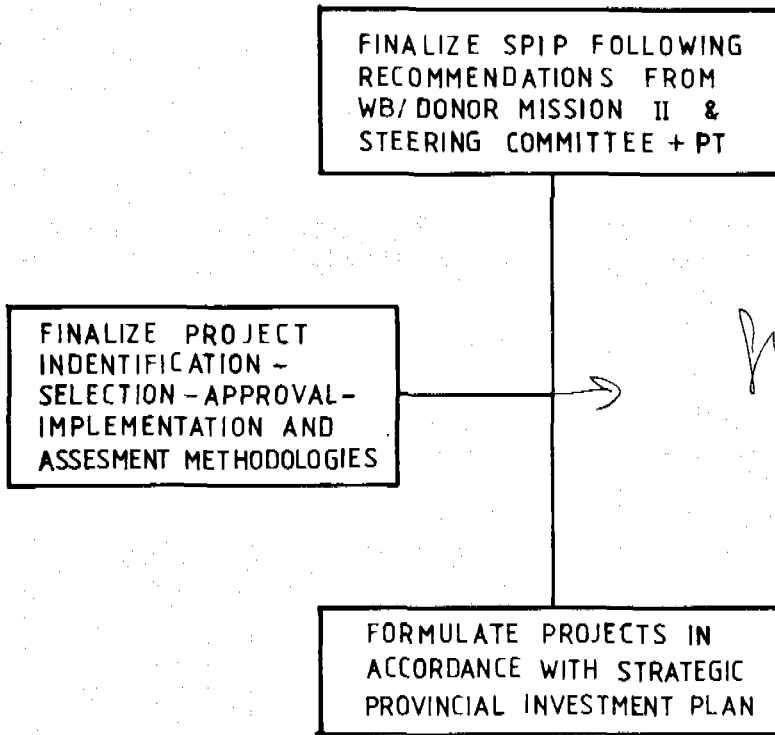
WORKPLAN PHASE III - APRIL 2 to JUNE 11

Selection of most appropriate and feasible of the refined initiatives to be developed into a preliminary strategic provincial investment plan

ACTIVITY	APPROX. TIME REQUIRED	COMPLETION DATE	RESPONS- IBILITY
<b>11. CONTINUATION OF STRATEGIC ANALYSIS</b>			
-----			
11.1 Collect additional data in support of refined initiatives and to meet selection requirements	10 days		PT/CT
11.2 Refine strategic analysis, goals, objectives, strategies and initiatives in light of latest data	05 days		PT/CT
<b>12. SPECIFIC INITIATIVE SELECTION</b>		13/05/89	
-----			
12.1 Apply qualitative criteria to refined initiatives to select a short list of initiatives	02 days		PT/CT
12.2 Apply quantitative criteria to the short list of refined initiatives to select final set of specific initiatives	05 days		PT/CT
<b>13. PRELIMINARY STRATEGIC INVESTMENT PLAN FORMULATION</b>			
-----			
13.1 Group specific initiatives into programmes	01 day		PT
13.2 Assess resource requirements and time frames for each programme	04 days		PT/CT
13.3 Allocate resources for the '90-'93 and '94-'97 planning periods	10 days		PT/CT
13.4 Produce preliminary strategic provincial investment plan	15 days	20/05/89	PT/CT
13.5 Deliver Preliminary Strategic Investment Plan		11/06/89	PT
14. DRAFT METHODOLOGIES FOR PROJECT IDENTIFICATION, SELECTION, APPROVAL, IMPLEMENTATION AND ASSESSMENT FOR FUTURE USE BY LOCAL EXECUTING AGENCIES	10 days	11/06/89	CT
-----			
15. PREPARATION OF DETAILED WORKPLAN FOR PHASE IV AND REVIEW WITH MG	02 days	11/06/89	PT/CT

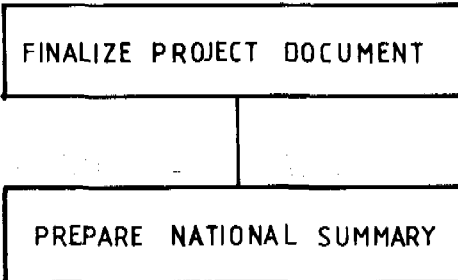
STRATEGIC PLANNING METHODOLOGY

PHASE IV JUNE - AUGUST 1989



*Finalists (?)*  
↓  
*Maximum flexibility*  
*Consistency*  
*Mix of components*

PHASE V  
SEP - NOV 1989



**WORKPLAN PHASE IV - JUNE 12 to SEPT 10**

Finalisation of strategic provincial investment plan and preliminary project document preparation:

ACTIVITY	APPROX. TIME REQUIRED	COMPLETION DATE	RESPONS- IBILITY
16. REVIEW OF PRELIMINARY STRATEGIC INVESTMENT PLANS WITH WB AND STEERING COMMITTEE	02 days	25/06/89 to 09/07/89	PT/CT
-----			
17. FINALISATION OF STRATEGIC INVESTMENT PLAN			To be defined
-----			
18. FORMULATION OF RELATED PROJECTS WITHIN STRATEGIC INVESTMENT PLAN FRAMEWORK			
-----			
19. FINALISATION OF METHODOLOGIES FOR PROJECT IDENTIFICATION, SELECTION, APPROVAL, IMPLEMENTATION AND ASSESSMENT			
-----			
20. PREPARATION OF DETAILED WORKPLAN FOR PHASE V AND REVIEW WITH MG			
-----			

**WORKPLAN PHASE V - SEPT 11 to NOV 05**

Finalisation of projects and preparation of national summary report

ACTIVITY	APPROX. TIME REQUIRED	COMPLETION DATE	RESPONS- IBILITY
21. PREPARATION OF FINAL PROJECT DOCUMENTS			To be defined
-----			
22. PREPARATION OF NATIONAL SUMMARY REPORT			To be defined
-----			

STRATEGIC PROVINCIAL INVESTMENT PLAN AND PROJECT PREPARATION  
FOR RURAL WATER SUPPLY SANITATION AND HEALTH  
OF PAKISTAN  
WORK PLAN BAR CHART

ACTIVITY TITLE	ACTIVITY DESCRIPTION	COMPLETION DATE	MARCH 1989					
			WK.1	WK.2	WK.3	WK.4	WK.5	
1. PREPARATION OF DETAILED WORK PLAN FOR PHASE II	Prepare work plan and review with central team	05/03/89	*****					
2. REVIEW AND ENHANCEMENT OF STRATEGIC ANALYSIS BASED ON INCEPTION REPORT	2.1 Identify data gaps 2.2 Collect additional data 2.3 Analyse new data 2.4 Refine conclusions	14/03/89	*****	*****	*****			
3. GOAL REFINEMENT	3.1 Refine goals and formulate new ones 3.2 Review links and synthesise	15/03/89	*****	*****	*****			
4. OBJECTIVE REFINEMENT	4.1 Refine objectives and formulate new ones 4.2 Review links and synthesise	16/03/89	*****	*****	*****			
5. STRATEGY CONFIRMATION AND REFINEMENT	5.1 Confirm strategies and establish new ones 5.2 Review links and synthesise 5.3 Compare strategies with Inception Report and refine	26/03/89	*****	*****	*****	*****	*****	*****
6. INITIATIVE CONFIRMATION AND REFINEMENT	6.1 Refine preliminary initiatives. Formulate new ones 6.2 Review links and synthesise	26/03/89	*****	*****	*****	*****	*****	*****
7. WORLD BANK/DONOR MISSION and STEERING COMMITTEE MEETINGS	7.1 Meetings to review Inception Report to 7.2 Confirmation of order of investment	12/03/89 to 26/03/89					*****	*****
8. ESTABLISH REFINED SET OF INITIATIVES		31/03/89				*****	*****	*****







STRATEGIC PROVINCIAL INVESTMENT PLAN AND PROJECT PREPARATION  
FOR RURAL WATER SUPPLY SANITATION AND HEALTH  
OF PAKISTAN  
WORK PLAN BAR CHART

ACTIVITY TITLE	ACTIVITY DESCRIPTION	COMPLETION DATE	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER		OCTOBER		NOVEMBER													
			1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3
19. FINALIZE PROJECT METHODOLOGIES		10/09/89								■	■	■	■	■	■	■														
20. PREPARATION OF DETAILED WORKPLAN FOR PHASE V		31/08/89										■	■	■																
21. PREPARATION OF FINAL PROJECT DOCUMENTS		05/11/89															■	■	■	■	■	■	■	■	■					
22. PREPARATION OF NATIONAL SUMMARY REPORT		05/11/89																										■	■	■



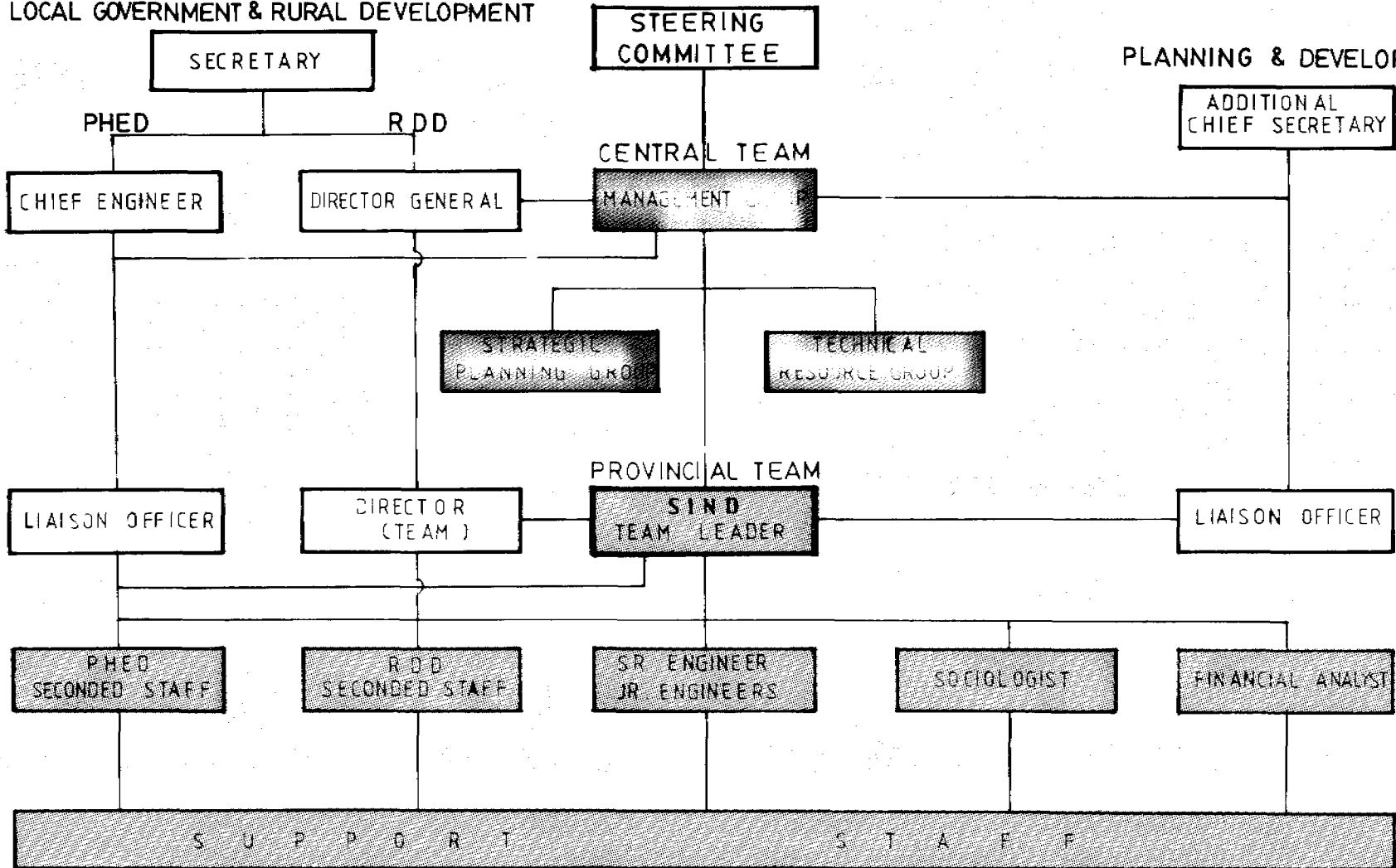


APPENDIX-I

# PROJECT ORGANISATION FOR SIND PROVINCE

HOUSING TOWN PLANNING  
LOCAL GOVERNMENT & RURAL DEVELOPMENT

PLANNING & DEVELOPMENT



## PROJECT ORGANIZATION AND MANAGEMENT

1. Organization and Management

Project Staff are organized into the Provincial Teams and a Central Team support group made up of the Management, Strategic Planning and Technical Resources staff as illustrated in Figure I-1. The Provincial Teams are based in the respective Public Health Engineering Department offices and the Central Team support staff are based in Islamabad.

Provincial Teams are charged with formulating initiatives, developing the investment plan and identifying projects for implementation. Team Leaders are responsible for day to day operations and take the lead in liaising with the Provincial Government. All staff assigned to the Team are directed by the Team Leader, including short-term members of the Technical Resources Group when they work in the Province.

The Public Health Engineering Department has nominated two junior engineers, draftsmen, typists, and driver to work with the Sind Team. The Rural Development Department has also been requested to assign at least one person on a full time basis to work with the Team.

The Provincial Team reports to, and is guided by, the Provincial Steering Committee as outlined in Section 2 of this Report. At the National level, the Project is overseen by a Federal Steering Committee made up of:

Chairman - Secretary,  
Ministry of Local Government and Rural  
Development;

APPENDIX I

- . Member - Joint Secretary,  
Ministry of Local Government and Rural  
Development;
- . Member - Joint Secretary, R.D.L.P. Section,  
Planning Commission;
- . Member - Physical Planning and Housing Section,  
Planning Commission;
- . Member - Joint Secretary, Ministry of Education;
- . Member - Joint Secretary, Ministry of Health;
- . Member - Joint Secretary,  
Ministry of States and Frontier Region;
- . Member - Joint Secretary,  
Ministry of Kashmir Affairs and Northern  
Areas;
- . Member - Director (Technical), WAPDA;
- . Member - Chief, Health and Nutrition Section,  
Planning and Development Division; and
- . Member - Deputy Secretary,  
Ministry of Local Government and Rural  
Development.

The Islamabad based staff are responsible for the overall direction of the Project and provide support to all four Provincial Teams. The Management Group monitors the day to day management process and its extension to the Provincial level, ensures goals are reached on time and provides



liaison with the Federal Government and the World Bank. The Project Director and Co-Director are based in Canada and visit the project from time to time to ensure it operates within contractual guidelines and to provide management and technical advice. The Project Manager has overall operational responsibility for the project and all staff report to him. He is supported by two Deputy Project Managers who provide guidance and technical support to the Sociologists and Engineers on the Provincial Teams and by an Advisor - Management/Engineering on short-term assignments.

The Strategic Planning Group takes the lead in developing methodologies and criteria and works with the Provincial team to apply and to modify them as necessary to meet local conditions. All of the staff in this group are on long term assignments.

The Technical Resources Group is comprised mainly of short-term staff who provide technical inputs in their area of expertise to both the Islamabad and Provincial Teams.

## 2. Methodology

The project uses a Strategic Planning approach to the work. Strategic Planning differs from Comprehensive Planning in that it focuses on key issues and interrelationships in order to quickly arrive at appropriate programmes for implementation while the latter is much more broad based and attempts to identify all components of a specific subject. For example it is necessary to review the economy of the province. Using a strategic approach, only those items of the economy which have a direct bearing on the water supply, sanitation and health sector will be considered - eg. income levels, ability to pay for services, income generating

activities which affect the way water is used. In a comprehensive study, all aspects of the economy would be studied.

The methodology is comprised of six categories of activities:

- . Project Initiation - Series 100 activities;
- . Data Collection - Series 200 activities;
- . Data Analysis - Series 300 activities;
- . Synthesis of Information - Series 400 activities;
- . Initiatives Formulation - Series 500 activities;
- . Outputs - Series 600 activities.

Since the project initiation activities related only to project start up and this phase is now complete, they are not discussed in this report.

## 2.1 Data Collection

Data collection activities are divided into three categories. The preliminary data collection began in December before the project was formally initiated and was completed by February 15, 1989. This work identified the availability of secondary data, collected what was readily available and formed the basis for:

- . the division of the sector into sub-segments to be studied:
  - water resources;
  - water supply;
  - sanitation and drainage (disposal of sullage and storm water);
  - disposal of human waste;

- institutions subdivided into:
    - . government departments;
    - . District and Union Councils;
    - . Elected Representatives; and
    - . Non-Governmental Organizations (NGOs);
  - economy;
  - financial resources;
  - cost recovery;
  - private sector;
  - social/cultural subdivided into:
    - . communities;
    - . role of women;
    - . practices, beliefs, and behaviours; and
    - . community organizations;
  - population;
  - health; and
  - human resources development;
- . the definition of data bases, outlining data to be collected; and
- . the focus of project activities in the coming months.

Further detailed data collection began mid February and will continue until June 15. Activities are aimed at collecting the information defined by the data bases. Selected secondary data will be verified by independent field studies and some primary data collection will be undertaken using sampling techniques where secondary data are not available. It is anticipated that investigation may be needed to gain an understanding of the rural communities - the beliefs and behaviours of the populace, the availability and strength of village organizations which could be involved in project implementation, and the ability and willingness of people to pay for services.

During the period July 1 - September 30, data collection will be focused on project identification. Analysis of the data collected and identification of potential initiatives will both highlight data gaps to be filled, resulting in the final phase of data collection.

## 2.2 Data Analysis

Analysis of the data collected will also be an ongoing activity.

The preliminary analysis phase ended February 15, 1989 and provided:

- . preliminary identification of issues to be studied in each subsegment;
- . preliminary selection and prioritization of the key critical issues (those which drive the rest) for each subsegment;
- . preliminary analysis of the key critical issues, including their root causes and identification of data gaps; and
- . conclusions reached.

Analysis of the detailed data collected will continue in parallel with the collection activities and will end June 30, 1989. During this phase the following activities will be carried out:

- . review of the preliminary identification of key critical issues in the light of the additional data collected;

. prioritization of key critical issues and an in depth analysis of them identify:

- factors which are the basis of the issue being of critical importance (root causes);
- strengths which can be built on and weaknesses which must be addressed; and
- conclusions reached;

. prioritization of strengths and weaknesses; and

. identification of data gaps, collection of the data and analysis of it using the same methodology outlined above.

In the final phase, July 1 - September 30, additional data collected for project identification will be analyzed in the same way.

### 2.3 Synthesis of Information

As a result of the analysis of data, conclusions will be reached based on quantitative and qualitative assessment of root causes. These conclusions will then be studied or synthesized to identify the key interrelationships and constraints. Strengths and weaknesses which overlap in several issues will be given top emphasis.

Synthesis is an ongoing activity, tied into the collection and analysis of data. The major effort will end June 30, but conclusions reached as the result of the more focused project identification data collection will also be checked for interrelationships with other conclusions.

## 2.4 Formulation of Initiatives

In order to formulate initiatives which will lead to projects, specific objectives and strategies must be devised and criteria to select the most appropriate ones developed.

Within the overall goals of the project, specific objectives will be set based on the interrelationships identified among the conclusions. The objectives will define in broad terms initiatives which will build on existing strengths and opportunities and lessen the effects of weaknesses.

For each goal, a series of objectives will be set which are quantifiable, measurable, and include a time element. The objectives will then be prioritized in terms of:

- . most pressing needs;
- . broadest anticipated impacts; and
- . short-term visible impacts and long-term benefits.

The objectives serve to further quantify the goals.

A set of strategies for meeting each objective or set of objectives will then be formulated. The overall project goal of developing projects to improve the health and quality of life of the rural population through more cost effective and sustainable water supply, sanitation and hygiene education initiatives while maximising community involvement, will focus the development of the strategies as it did in the analysis of issues.

Criteria to evaluate the different strategies will be developed. Criteria which could be used include:

- . likelihood of success;
- . potential for community involvement;
- . potential for the involvement of women; and
- . coverage to be achieved and impact expected.

Using the criteria, the best strategies will be selected and result in recommended projects.

## 2.5 Project Outputs

The outputs of the project include this Inception Report, a Strategic Provincial Investment Plan, National Summary Investment Plan and Project Identification Reports.

The Inception Report is being submitted March 4, 1989, two months after the project was initiated.

The Strategic Provincial Investment Plan will be presented to the Government in draft form three months later, June 10, 1989, and in final form, September 9, 1989.

### 2.5.1 Report Format for Strategic Provincial Investment Plan

The formulation of objectives outlined in the previous section will form the basis of the investment strategy. The contents of the report defining the strategy will be finalised in the coming months, but the initial outline is:

- . Rural Water Supply, Sanitation and Health Sector
  - current situation;

## APPENDIX I

- Government priorities and targets for increased coverage (Seventh Five Year Plan, 1988 - 1993 and Perspective Plan, 1993 - 1998; and
- sector issues.

### Population and Demand

- overall and rural population projections;
- present and future demand for services;
- population to be served; and
- proposed service levels.

### Investment Strategy

- objectives;
- analysis of alternative strategies; and
- investment criteria.

### The Investment Plan

- size and components of investment plan by sub-sector (based on order of magnitude cost estimates;
- Provincial Investment Plan;
- types of investments - 1990 - 1993; and
- types of investments - 1994 - 1997.

### Financing

- prospects of overall macro resource availability;
- projections of Government allocations to the sector;
- involvement of donor agencies;
- future operations and maintenance cost requirements;



- affordability and willingness to pay of beneficiaries;
- mechanisms for cost recovery; and
- overall financing plan.

#### Project Management and Implementation

- institutional arrangements;
- organization and management;
- involvement of communities;
- operation and maintenance; and
- personnel/training requirements.

#### 2.5.2 Outline of Identification Reports for Projects to be Implemented 1990-93

Draft project identification reports will be submitted September 9, 1989 and in final form, November 4, 1989. The format of the reports will also be developed during the coming months, but the initial outline for a water/sanitation project to be implemented in the period 1990 - 1993 includes:

#### The Water Supply, Sanitation and Health Sector

- provincial background;
- economic and health indicators;
- water resources and control;
- present service coverage and standards;
- sector goals;
- staffing requirements and training needs;
- financial implications; and
- involvement of international agencies.

## The Project Area and the Need for a Project

- planning horizon;
- project area;
- population patterns;
- economic and social conditions;
- regional development prospects;
- existing and future land use patterns;
- sector institutions;
- available water resources;
- existing water supply systems and population served;
- existing sanitation systems and population served;
- existing drainage and solid wastes removal systems and population served; and
- need for a project.

## Strategic Plan for Water Supply, Sanitation and Hygiene Education

- objectives;
- water supply service standards;
- sanitation and drainage service standards;
- community preferences and affordability;
- capital availability;
- future demands for water services;
- future demands for sanitation services;
- future demands for drainage services; and
- strategic plan for water supply, sanitation and drainage, and hygiene education.

Proposed Project

- project definition;
- institutional responsibilities; and
- financial aspects.

Conclusions and Recommendations

- conclusions;
- issues; and
- recommended actions.

2.5.3 Outline of Identification Reports for Projects to be Implemented 1994-98

The outline of water supply projects which could be considered for the subsequent period, 1994 - 1998 is:

- . a map showing the project area and definition of the intended beneficiaries;
- . explanation of how the project complies with the strategic investment plan;
- . description of the present services in the project area with an outline of the deficiencies of the services;
- . summary of the main objectives of the project, indicating the number of people to be served, anticipated standards of service and expected conditions in the project area after the project is completed;

## APPENDIX I

- . outline of the proposed project components in terms of physical facilities and supporting activities - e.g. hygiene education, training;
- . estimate of the local and foreign costs of implementing the projects and proposals for cost recovery;
- . description of the institutional responsibilities for the future project feasibility study, detailed design and implementation; and
- . recommendations for future actions regarding the project.

Both project identification report outlines suggested above are for integrated water supply, sanitation and hygiene education projects. They will be modified as needed for other types of projects - human resource development, community development.

APPENDIX-II

## APPENDIX - II DRAFT DETAILED WORK PLAN

200

Data Collection

The focus for the Data Collection component in Phase II will be on verification and refinement of the critical issues, root causes, and strengths. The main topics on which data collection will focus are:

- . Water Resources, Rural Water Supply, Sanitation and Drainage;
- . Institutional Assessment ;
- . Economy;
- . Socio-Cultural;
- . Demographics;
- . Health;
- . Human Resource Development;
- . Government Policy; and
- . Assessment of Past Investments.

210

Water Resources, Rural Water Supply, Sanitation and Drainage

211 Collect additional information on the ground water and surface water resources, in particular:

- . extent of the sweet water lenses in the brackish water zones of the irrigated area (WAPDA is expected to be the main source of information);
- . details of the surficial geology in the irrigated zone to identify areas of high and low recharge to the aquifer (soils maps are expected to be suitable);

hydrological data for the Kohistan Arid Zone;

- . hydrogeological reports and data for the Thar Arid Zone;
- 212 Refine information collected to date on coverage in terms of the number of villages with water supply, sanitation and drainage services. This will include:
- . obtaining a print out of the settlement survey data from the Bureau of Statistics which compiled information on the sources of water for rural communities with populations 200 to 500 and 500 and above;
  - . completing the compilation of data on PHED water supply and drainage schemes;
- 213 Identify technologies used in water supply, sanitation, and drainage through:
- . conducting additional interviews with hand pump installers to obtaining information on procedures, materials and equipment used;
  - . compiling data on the types of mechanized equipment used by PHED in water supply and drainage schemes;
  - . visiting manufacturers and suppliers of local hand pumps, Bangladesh No.6 hand pumps, mechanized pumps, motors, and pipes;

214 Examine arrangements for operation and maintenance of PHED water supply and drainage systems by:

. conducting a survey using a questionnaire to be completed by PHED engineers and following up with selective sampling;

. visiting a selected number of the few water supply schemes being operated by Union Councils and District Councils;

215 Gather further information on criteria used by PHED and RDD for design of water supply and drainage schemes focusing particularly on:

. selection of level of service;

. sizing of system components;

. project identification and selection process; and

. design manuals and design procedures.

216 Determine contract award procedures, contractor supervision procedures.

220 Institutional Assessment

221 Obtain additional information on institutions involved in the Sector including PHED, LGD, RDD Department of Education, Health Services, WAPDA Social Welfare, District and Union Councils, Non Government Organizations, Private Sector and special projects.



222 Refine information on the institutions' organizational structure:

- . organization chart;
- . basis for making promotional appointments; and
- . scheme of service.

223 Further examine the institutions' management philosophy, policy and guidelines.

224 Examine funding mechanisms:

- . source of the funds, financial year, and operating budget (salaries, expenses and revenues);
- . method of establishing operating budgets and justifications used; and
- . review of funds transfer mechanisms in the province vis-a-vis urban and rural.

225 Further examine training institutions.

226 Identify the Provincial/National linkages:

- . composition of the coordinating body and frequency of meeting;
- . guidelines, mandate, and authority/approval levels of staff;
- . how staff are appointed to the coordinating body; and
- . appraise the effectiveness of the linkages.

227 Examine staff development/training:

- . training policy;
- . scope of development - i.e. is it limited to specific groups;
- . performance appraisal procedures;
- . assessment and licensing of teachers in schools and training institutions;
- . job opportunities after graduation and promotion policy;
- . incentives for staff to take training and opportunities available - training courses, seminars, workshops, study tours, fellowships, scholarships or training of trainers;
- . facilities;
- . instruction level and quality, equipment and training aids;
- . locations; and
- . hostel/accommodations and allowances, and costs involved.

228 Assess the capacity to undertake an accelerated development programme.

230 Economy

- 231 Examine the rural economy, focusing on level of prosperity and ability to pay for services.
- 232 Identify regional development at the district level:
- . income levels and affordability;
  - . demand for water supply, sanitation, and drainage;
  - . production indicators - number of tube wells, tractors; and
  - . service indicators - number of roads, banks, schools.
- 233 Review sources of funds for provincial departments and recent government statements leading to a forecast of the likely future funding.
- 234 Review cost recovery experience in this and other service sectors.
- 235 Determine the magnitude of capital costs of civil, mechanical and electrical components of water supply, sanitation and drainage facilities, and operation and maintenance costs.
- 236 Study the Private Sector in terms of:
- . technologies, designs, and standards used by the private sector; and

the sector's role as:

- a consultant;
- a contractor;
- a supplier of hand and mechanized pumps and construction materials;
- a manufacturer of pumps, drill rigs and supplies, and construction materials;
- a participant in operation and maintenance activities;
- a financier for hand pumps; and
- an owner or operator of a community water supply system.

240 Social/Cultural

241 Study communities in terms of:

- . community leadership and its relationship with water related issues;
- . ethnic segmentation in the community;
- . level of experience with water and sanitation issues; and
- . knowledge and awareness of water, sanitation and health.

## 242 Review the role of women in the community:

- . perceptions regarding women which are held by the women themselves and by others;
- . general levels of knowledge women possess;
- . restrictions placed on women by the purdah system;
- . women's access to independent economic means;
- . their role in water issues; and
- . skills available to women and the opportunity to gain new skills.

## 243 Determine local practices and attitudes:

- . allocation of responsibility with respect to waste and sullage collection and disposal;
- . defecation practices;
- . solid waste disposal;
- . hygiene including care of children and preparation of food;
- . understanding of linkages between hygiene and health;
- . responsibility for the maintenance of rural water supply and sanitation facilities and health education delivery; and

. . . perceptions of how well their needs are being met.

244 Review the existence, activity level and experience of community based organizations:

- . number of formal and informal groups;
- . level of activity;
- . past involvement with water supply, sanitation, drainage and hygiene education;
- . numbers of people involved; and
- . the quality of the groups.

245 Define community involvement:

- . current situation; and
- . what villagers want and are capable of with respect to planning, construction, management, operation, maintenance and financing of water supply, sanitation and drainage facilities.

250 Population

251 Estimate the population and population growth rate from existing data in terms of:

- . village size - number of people living in villages of the following size categories on a district basis:
  - 200 - 500 people;
  - 500 - 1000 people;
  - 1000 - 2000 people;
  - 2000 - 5000 people; and
  - 5000 - 10000 people; and
- . population densities.

252 Identify the physical pattern of rural settlements and numbers in different population.

260 Health

261 Obtain health indicators, especially the incidence of water related diseases.

262 Review existing health services and allocation of resources.

263 Assess past experience in hygiene education indicating the goals of the programme and coverage achieved.

270 Human Resources Development

271 Inventory all training organizations and efforts:

- . school system, including mosque, primary, secondary, polytechnical and universities - numbers, number of students and teachers, number of lady teachers and curricula;
- . institutional or job related training at the Union and District Council, line department and private sector level; and
- . village level training in project management, community organization and operations and maintenance.

272 Identify recipients of present human resource development programmes:

- . staff in institutions;

- . local government officials; and
- . villagers.

280 Government Policy

281 Identify government priorities and sector objectives on a national and provincial basis.

282 Define cost recovery policies:

- . tariffs and collection mechanisms for public utility managed schemes;
- . community financing mechanisms for user-managed schemes; and
- . recurrent expenditure shortfalls and their impact on operation and maintenance.

283 Identify present investment criteria.

290 Data Collection Associated with Assessment of Past Investments

291 Assemble data on recent investments in the sector, criteria for selection of project investment priorities, and present plans.

300 Data Analysis

310 Analysis Process

311 Assess the reliability of data being collected.



312 Review the preliminary identification of the Key Critical Issues in light of more data collected. Prioritize the Key Critical Issues.

313 Analyze the Key Critical Issues:

- . identification of root causes;
- . identification of strengths and weaknesses; and
- . conclusions.

314 Prioritize strengths and weaknesses.

320 Water Supply, Sanitation and Hygiene Education

321 Assess the implications of the physical pattern of rural settlements for the design of systems.

322 Establish the causes of present systems being inoperative.

323 Evaluate current technologies being used from the point of view of appropriateness, sustainability, acceptability, affordability, ease of operation and maintenance, and potential for community participation.

324 Establish design criteria:

- . service levels and technology options to be used for each socio-economic module;
- . daily production requirements per capita of each water supply technology type.

325 Determine the number of communities by population category who need:

- . no change to the existing system;
- . repair/rehabilitation of existing system;
- . expansion of existing system; or
- . a new water supply, sanitation or drainage system.

330 Institutional Development

331 Establish the commonality of mandates among PHED, LGRDD, DH, DE, WAPDA, and the private sector.

332 Propose an allocation of responsibility within the agencies, identifying which agency has:

- . sole responsibility; or
- . joint responsibility - prime or sub.

333 Assess where strengthening would be desirable for each organization.

344 Establish what data WAPDA possesses which could be made available to other institutions.

340 Economy

341 Assess the likely magnitude of future funding for the sector.

342 Establish affordable and acceptable tariff structures.

343 Assess the technologies being used by the private sector for construction, operation and maintenance, and capital and recurrent cost recovery.

- 344 Evaluate construction materials available and needed and their costs.
- 345 Establish the availability of water supply system equipment, costs, local manufacturing, quality control and distribution mechanism.
- 346 Assess the financial needs of the private sector.

350 Social/Cultural

- 351 Evaluate communities' desire and ability to participate in planning, design, construction, management, operations and maintenance, and financing capital and recurrent costs.
- 352 Assess the need for external community motivation and mobilization.
- 353 Evaluate the special needs of low income areas and develop relevant mechanisms.
- 354 Establish the presence of community organizations which may be used in project implementation.
- 355 Evaluate the need for hygiene education.

360 Human Resources Development

- 361 Assess the status of water resources knowledge affecting the choice of technology, competing demands, and water system management and control methods, and their adequacy.

362 Evaluate technical and financial training needs in institutions, the private sector, the community and local politicians.

363 Assess the role of schools, TBA's, and other health workers.

364 Establish staff shortages by institution and category.

370 Government Policy

371 Assess the impact of recurrent expenditure shortfalls on water supply, sanitation, drainage and determine its financial needs.

380 Review Sector Investments

381 Compare the past rate of investments made in rural water, sanitation and hygiene systems to the targets set.

382 Identify reasons for variances.

400 Synthesis of Information

410 Identify Key Inter-relationships and Constraints

411 Assessment of the relationships and constraints by the Provincial team.

412 Review with the Project Central Support Group.

413 Review with the Provincial Government.

420 Define Initiatives

- 421 Assessment by the Provincial Team.
- 422 Input from the Project Central Support Group.
- 423 Preparation of proposals.
- 424 Review with government staff to reach consensus.

430 Establish Community, Private Sector, and Institutional Roles

- 431 Examine issues in provincial meetings with inputs from community groups, private sector representatives, line departments and project central support staff.
- 432 Prepare proposals.
- 433 Achieve consensus to provide guidelines for the formulation of projects.

440 Determine Human Resources Development Approach

- 441 Identify alternative training approaches.
- 442 Prepare proposals for method of delivery.
- 443 Review with government staff and obtain consensus.

500 Formulation of Initiatives

510 The Planning Process

- 511 Strategic Planning Group develops seminars for Provincial Planning Teams.

512 Strategic Planning Group monitors and evaluates the process in each province to achieve consistency in its application.

520 Provincial Investment Plans

521 Strategic Planning Group establish levels of investment in conjunction with GOP authorities and discusses them with Provincial Teams.

522 Provincial Teams prepare a draft investment plan based on the conclusions reached.

523 Finalize the investment plan.

530 Initiative Identification and Selection

531 Establish goals, objectives and evaluation criteria:

- . formulate potential goals, objectives and criteria through meetings with Provincial Teams;
- . Provincial Teams present proposed goals, objectives and criteria to GOP authorities for approval;
- . Provincial Teams identify high priority geographic areas and target groups and ensure initiatives being considered are representative of the views and wishes of the communities.

532 Identify potential initiatives and prioritize in a workshop format through advocacy bargaining approach.

533 Select initiatives through goals achievement process.

540 Provincial Project Documentation

- 541 Strategic Planning Group develops format and methodology for project documentation.
- 542 Strategic Planning Group holds seminar to familiarize Provincial Planning Teams with the documentation preparation process.
- 543 Provincial Teams prepare project documentation.
- 544 Economic and financial analysis of proposed projects.

550 National Summary Investment Plan

- 551 Review of Provincial Investment Plans by Strategic Planning Group
- 552 Feedback of national level analysis to Provincial Teams.
- 553 Preparation of National Investment Plan by Strategic Planning Group.

600 Project Outputs610 Inception Report

- 611 Write Inception Reports based on preliminary analysis of data gathered and identifying:
- . present situation;
  - . objectives;
  - . options to be considered; and
  - . methodology for the study duration.

612 Review the report with GOP officials and refine.

613 Prepare the final report.

620 Strategic Provincial Investment Plans

621 Prepare a preliminary first draft of one provincial investment plan.

622 Review the report with appropriate Government and World Bank personnel and refine having had this additional input.

623 Prepare draft provincial investment plans based on the format of the approved preliminary report.

624 Review the report with appropriate Government and World Bank personnel and refine as appropriate.

625 Submit the final investment report.

630 Project Identification Reports

631 Prepare draft project identification reports and discuss with Government and World Bank staff and refine as appropriate.

632 Submit final reports.

640 National Summary Investment Plan

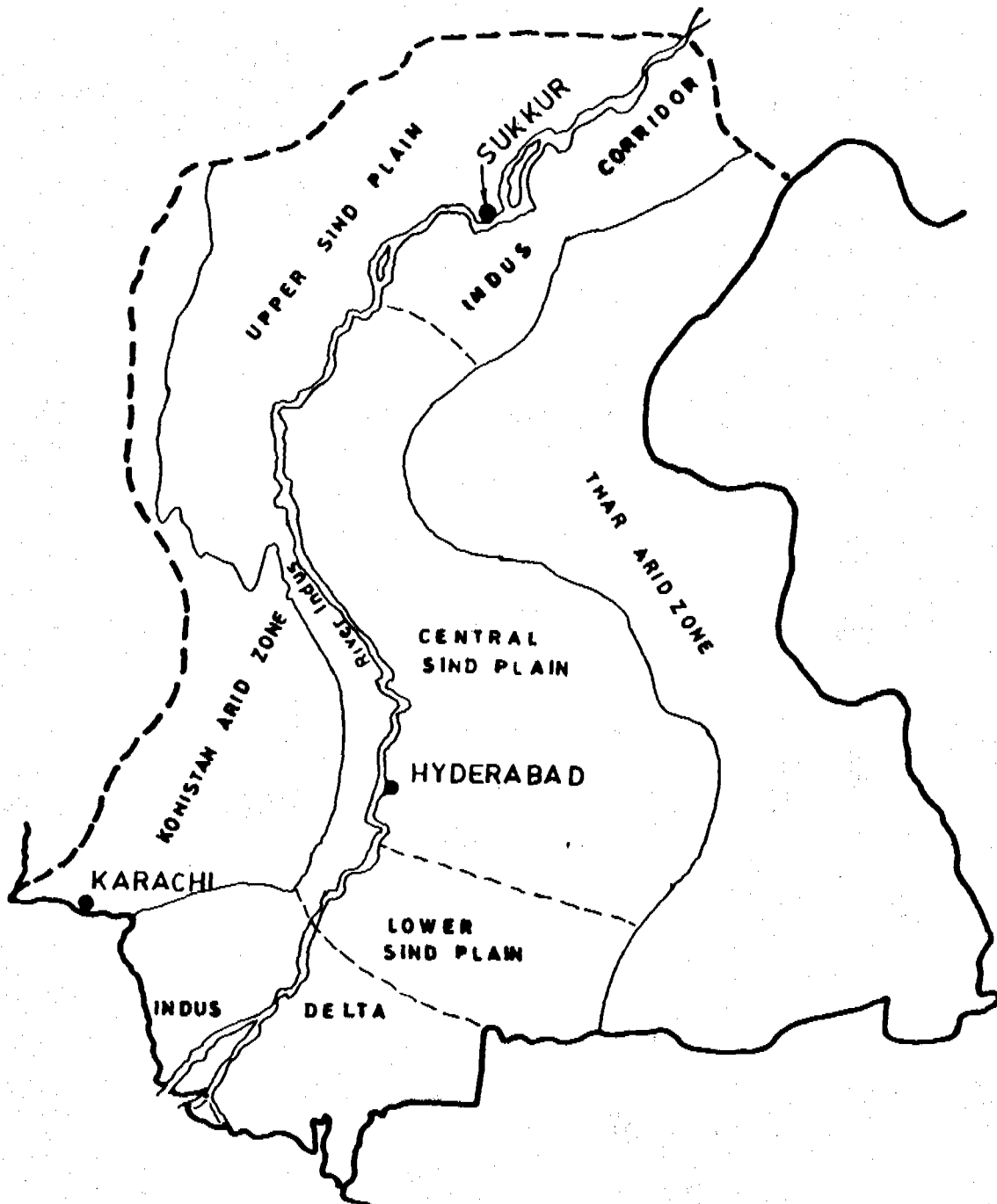
641 Prepare and submit a national summary of the provincial investment plans.



642 Develop proposed implementation programmes identifying local, Provincial, National and foreign components.

APPENDIX-III

# PHYSIOGRAPHIC ZONES OF SIND



Scale 1 Cm = 30 Kms

FIGURE 1-1

## APPENDIX III - THE PHYSICAL ENVIRONMENT

## 1. Physiography

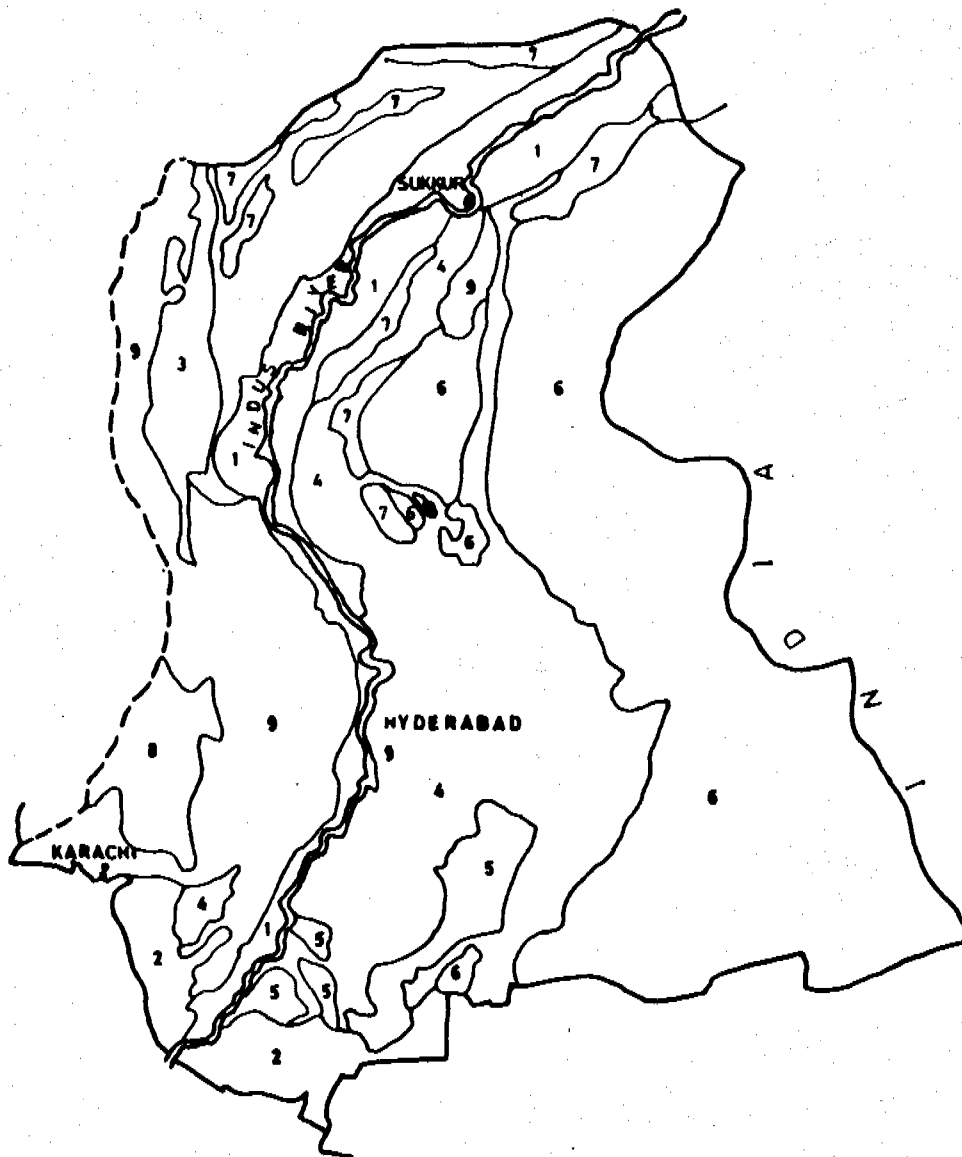
Except for a few isolated ridges in the vicinity of Hyderabad and in the Tharparkar area the whole eastern Sind consists of a vast sandy plain. The main hill ranges are to the west of the Indus River. The province may be divided into three main physiographic areas; the central Indus Plain, Thar Arid Zone and the Kohistan Arid Zone.

The Indus Plain occupies about 75,000 sq. km and varies in elevation from sea level at the mouth of the delta to 80 meters elevation at the Gudu Barrage on the northern edge of the Province. The entire area is under irrigation and is divided into five subareas as shown on map Figure III-1; the Indus Corridor in the north, the Upper Sind Plain, the Central Sind Plain, Lower Sind Plain and the Indus Delta.

The Thar Arid Zone is a dry sandy plain covering an area of about 47,000 sq. km. Most of this desert area consists of sand dunes separated by small flat depressions on which some agricultural activity is possible, mainly livestock grazing.

The Kohistan Arid Zone occupies an area of about 16,000 sq. km. and is comprised of a series of parallel hill ranges which trend in a north south direction and are separated by broad undulating valleys. The elevation of the ranges increases toward the west. Near the Indus the ridges attain a maximum elevation of 210 meters above sea level. The Lakhi Range further to the west rises to over 700 meters and the Khiathar range along the border with Baluchistan reaches to over 1800 meters in places in the northern portion. Most of the area consists of barren stony waste land with scattered patches of low scrub brush.

# GEOLOGICAL MAP OF SIND



## LEGEND

Scale 1 Cm = 30 Kms

- |   |  |
|---|--|
| 1. RECENT STREAM DEPOSITS, MAINLY SAND                                | 7. OLDER TERRACE DEPOSITS, MAINLY LOESS, LATE PLIESTOCENE              |
| 2. DELTAIC TIDAL DEPOSITS, MAINLY SILTS                               | 8. MIOCENE SEDIMENTARY ROCKS, MAINLY SHALES, SANDSTONES AND LIMESTONES |
| 3. PIEDMONT SLOPE WASH, MAINLY COARSE POORLY SORTED DETRITAL MATERIAL | 9. EOCENE SEDIMENTARY ROCKS, MAINLY LIMESTONES AND SHALES              |
| 4. DEPOSITS OF EXTINGUISHED STREAM, SANDS, SILTS AND CLAYS            |  |
| 5. OLDER DELTAIC SILTS  |  |
| 6. OLDER EOLIAN DEPOSITS, LATE PLIESTOCENE                            |  |

FIGURE III-2

2. Geology

The main geological units occurring at or near the surface in Sind are indicated on Figure III-2. The Indus plain is underlain by a thick sequence of alluvial deposits which are over 300 meters thick in places. These alluvial deposits range in age from late Pleistocene to recent. They are predominately coarse to fine sands in the northern part of the area. The occurrence of clay in the sequence increases toward the Indus Delta. Increased thickness of clay in some parts of the central plain is thought to be related to bedrock ridges which traverse the area at right angles to the Indus beneath the alluvial deposits.

In the Thar Arid Zone the near surface materials are mainly alluvial sands, silts and clays deposited in former channels of the Indus. These are underlain by a sequence of sedimentary formations, mainly sandstones and shales and in some areas by granite. There are a few isolated outcroppings of granite.

The Kohistan Arid Zone is underlain by a thick sequence of sedimentary formations of Miocene to Pliocene Age. These rocks are folded so that the anticlinal structures correspond to the ridges and the synclinal structures to the intervening valleys.

3. Precipitation

All of the precipitation occurs as rain. Total annual rainfall in the Sind is very low and quite variable from year to year. Table III-1 indicates monthly mean values for selected stations based on the observations over the period 1931-60. Most of the rainfall occurs in July and August and generally occurs as short intense thunderstorms.

TABLE III-1

## PRECIPITATION DATA FOR SIND PROVINCE

## MEAN MONTHLY TOTAL RAINFALL IN MILLIMETERS (PERIOD 1931-60)

Station No.	Station Name	Jan.	Feb.	Mar.	Apr.	May	June
1	Badin	2.5	4.8	3.3	1.0	2.8	9.1
2	Chhor	1.3	3.8	2.0	0.3	2.8	8.4
3	Hyderabad	4.1	4.8	1.0	1.5	4.1	6.3
4	Jacobabad	7.1	8.6	7.6	2.3	3.6	6.1
5	Karachi/Airport	7.6	12.7	4.6	2.3	1.3	8.9
6	Nawabshah	2.3	4.1	3.8	2.5	1.3	6.3
7	Pad Idan	4.6	6.1	4.1	1.0	0.8	3.8
8	Reti	4.1	3.0	9.9	1.5	1.0	2.8
9	Sukkur	5.3	6.6	5.6	2.0	2.0	3.3
10	Umer Kot	1.3	2.5	0.5	0.8	1.3	10.4

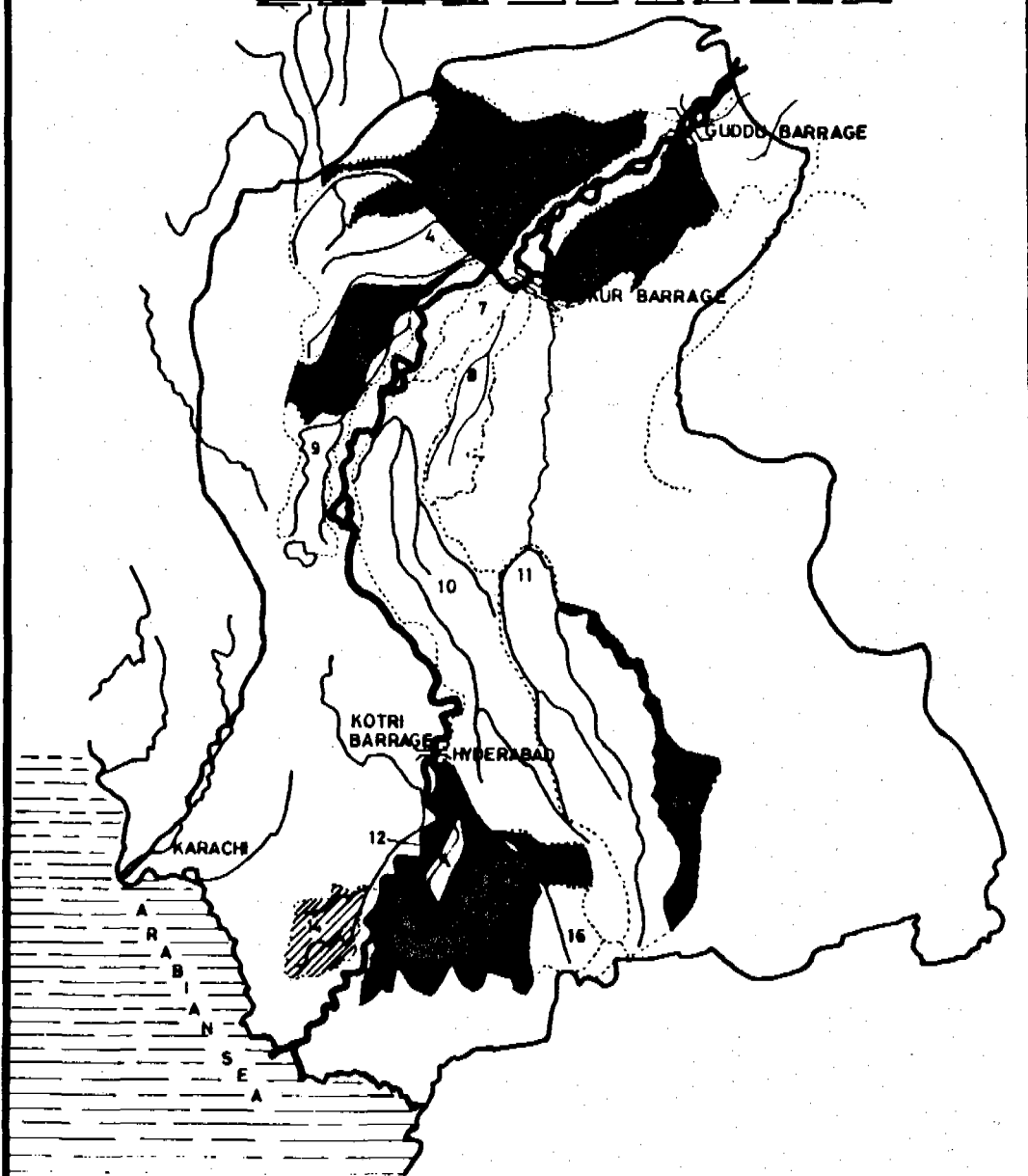
Station No.	Station Name	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean Annual
1	Badin	106.9	62.5	38.5	0.8	2.0	2.0	236.2
2	Chhor	62.5	50.3	23.8	2.5	2.0	1.8	161.5
3	Hyderabad	68.1	43.7	14.8	2.8	1.0	2.5	154.7
4	Jacobabad	26.9	21.8	0.8	0.3	0.5	2.8	88.4
5	Karachi/Airport	101.1	47.5	23.3	3.3	3.0	5.6	221.2
6	Nawabshah	81.8	52.1	35.3	4.8	2.3	1.8	198.4
7	Pad Idan	55.4	47.2	13.3	0.3	0.5	2.3	139.4
8	Reti	35.6	37.8	8.7	0.0	0.0	0.8	105.2
9	Sukkur	33.0	23.4	4.4	2.3	1.0	1.3	90.2
10	Umer Kot	50.3	76.4	23.1	4.6	0.8	0.5	172.5

## EXTREMES

Station No.	Station Name	Wettest Month		Wettest Year		Driest Year		
		Month	Amount	Year	Year	Year	Amount	
1	Badin	Sep	321.8	1959	1959	570.0	1939	24.6
2	Chhor	Aug	207.5	1953	1959	406.1	1939	51.1
3	Hyderabad	July	401.6	1908	1913	546.7	1915	25.7
4	Jacobabad	July	333.4	1956	1956	406.9	1922	3.3
5	Karachi/Airport	Aug	359.4	1944	1944	745.5	1931	17.5
6	Nawabshah	July	326.4	1956	1956	470.9	1957	28.2
7	Pad Idan	July	207.0	1956	1949	321.3	1951	24.9
8	Reti	Aug	133.1	1944	1956	238.0	1951	56.1
9	Sukkur	July	198.9	1956	1956	315.2	1931	6.6
10	Umer Kot	Aug	294.6	1953	1959	536.2	1960	23.6

In every station except Karachi there has been no rainfall in each month in at least one year out of the 30 year period (1931-60)

# IRRIGATION COMMAND AREAS OF SIND



## LEGEND

- PERENNIAL
- PART PERENNIAL - PART NON-PERENNIAL
- NON PERENNIAL

## COMMAND AREAS

1. PAT
2. DESERT FEEDER
3. BEGARI SIND FEEDER
4. NORTH WEST
5. GHOTKI FEEDER
6. RICE
7. KHAIRPUR WEST FEEDER

8. KHAIRPUR EAST FEEDER
9. DADU
10. ROHRI
11. EASTERN NARA
12. GAJA
13. FULELI
14. KALRI BEGHAR FEEDER
15. PINYARI CANAL
16. TANDO BAGO

Scale 1 Cm = 30 Kms

FIGURE III-3



TABLE III-2

## IRRIGATION COMMAND AREAS IN SIND

Canal Name	Full Supply Discharge (Cusecs)	Commanded Areas (1000 acres)	
		Perennial	Non-Perennial
Right Bank Sukkur Barrage			
North-West	5,150	928	-
Rice	10,660	-	520
Dadu	3,150	549	-
Left Bank Sukkur Barrage			
Rohri	10,890	2,604	-
Eastern Nara	13,650	2,237	-
Khairpur West Feeder	1,940	304	-
Khaipur East Feeder	2,096	336	-
Right Bank Kotri Barrage			
Kalri Beghar Feeder	9,075	352	251
Left Bank Kotri Barrage			
Pinyari Canal	13,800	-	786
Fuleli Canal	14,350	-	929
Akram Wah	4,100	487	-
Right Bank Guddu Barrage			
Begari Sind Feeder	14,764	-	1,190
Desert Feeder	13,140	-	490
Left Bank Guddu Barrage			
Ghotki Feeder	8,420	-	1,020
Total (1000 acres)		7,797	5,186

In the Arid Thar Zone the rainfall is particularly variable. Generally there is cycle wherein every four to six years there is a two to three year drought. For example in the drought period 1951 to 1956 there was no rain at all in some years.

4. Irrigation System

The Indus Plain is dissected by an extensive network of irrigation canals which are feed by three major barrages; The Gudu Barrage in the north, the Sukkur Barrage and the Kotri Barrage at Hyderabad. This irrigation system has a fundamental impact on activities on the plain and is the basis for the agricultural economy.

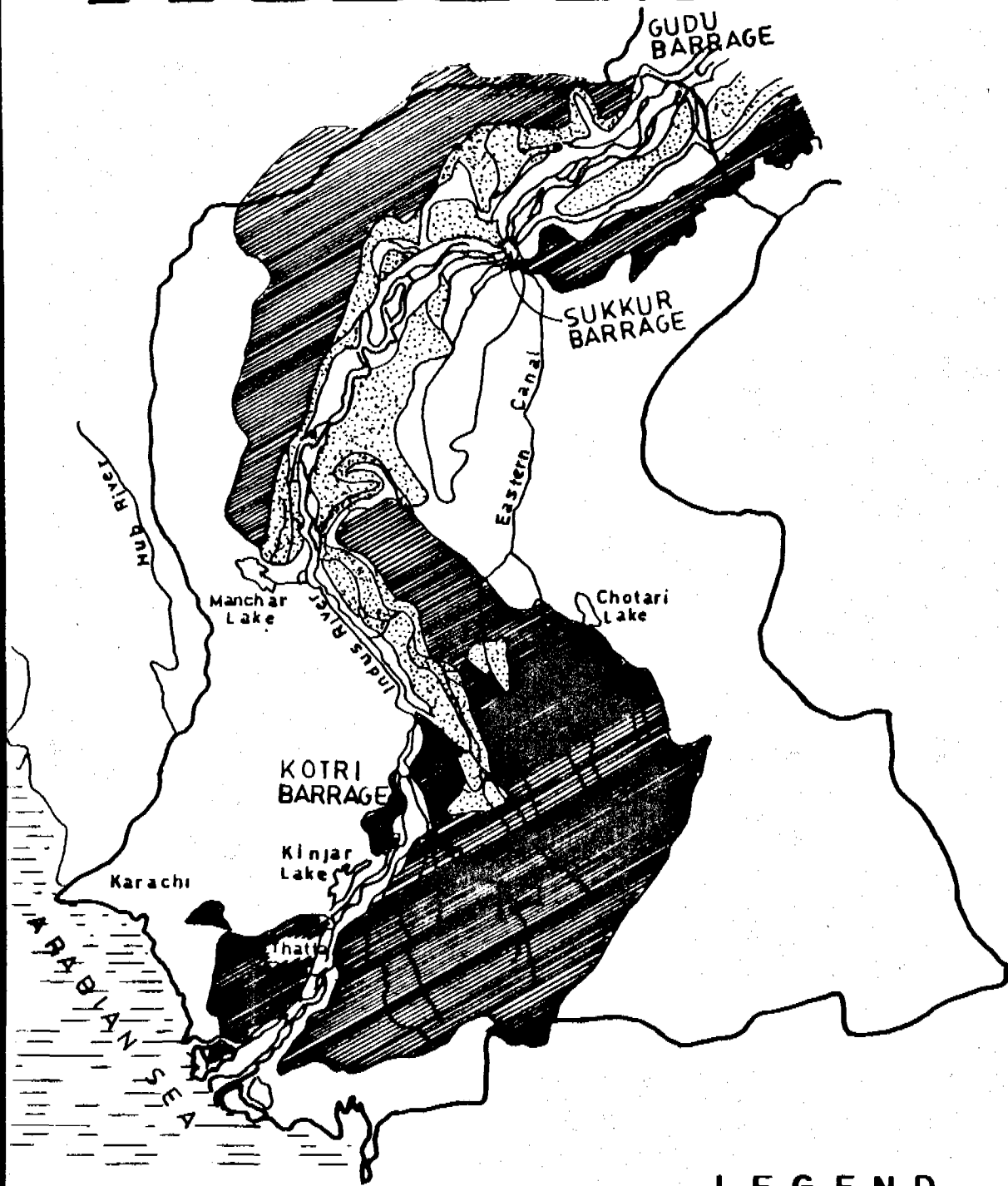
The major canal commands areas are indicated on Figure III-3. A significant portion of the canals are non-perennial. These represent about 25% of the total irrigated areas as indicated on Table III-2. In areas of non-perennial irrigation there is no flow in the canals for a period of up to six months during the winter period. Even in areas of perennial irrigation canals are closed for up to six weeks for maintenance. This has significant implications for water supply.

5. Hydrogeology

5.1 Indus Plain

The main aquifers in the Province are the alluvial sand deposits underlying the irrigated Indus plain. However in approximately 62 per cent of the area the water bearing sands within 37 meters of the surface are brackish and unsuitable for domestic use. The map Figure III-4 shows the

GROUND WATER QUALITY IN COMMAND AREA TO 37 METERS



LEGEND

Less than 3000 PPM

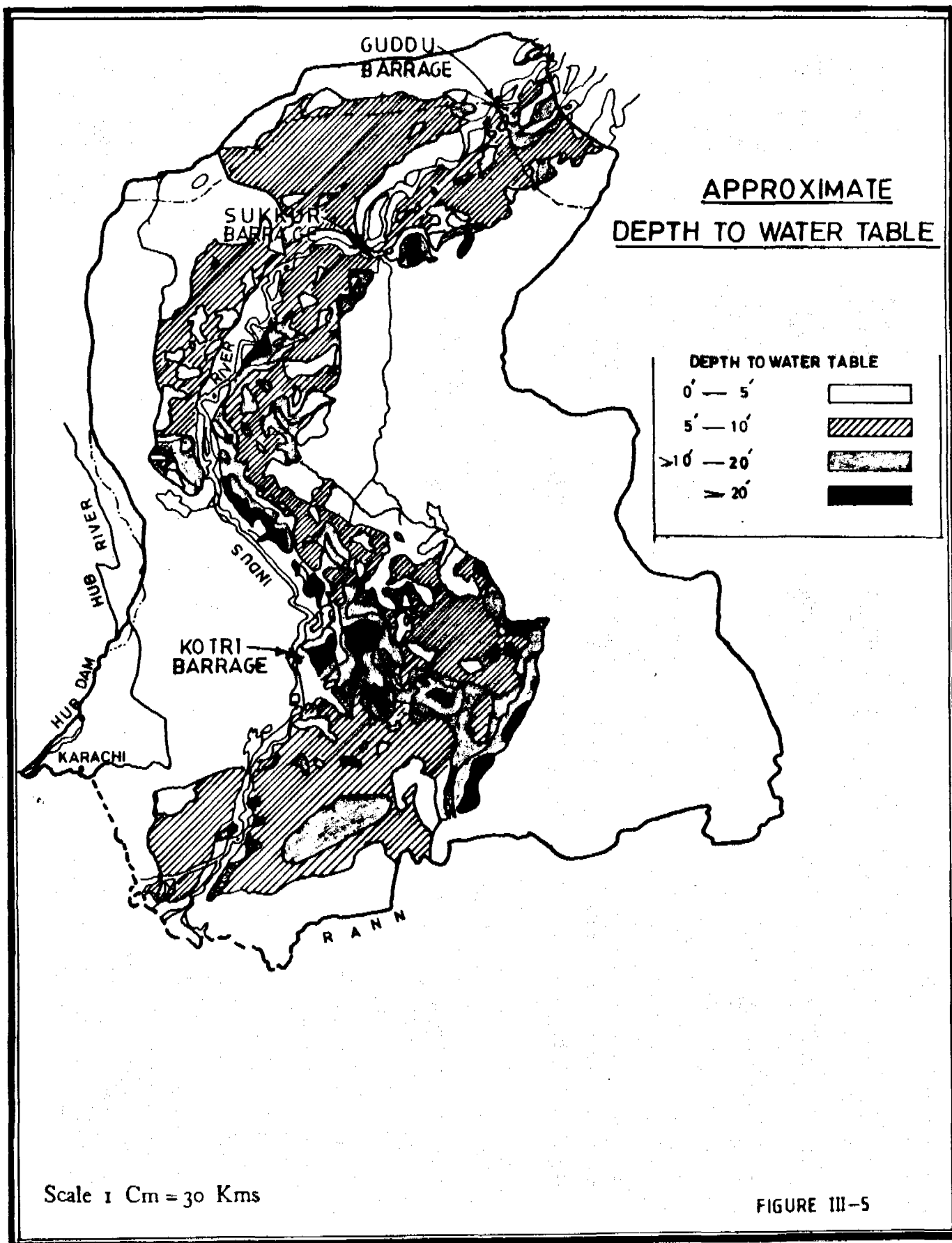


Greater than 3000 PPM



Scale 1 Cm = 30 Kms

FIGURE III-4



### Appendix III

extent of the area underlain by sweet water. The area of sweet water is gradually diminishing as ever increasing numbers of tube wells are installed for domestic and irrigation use.

The infiltration of irrigation waters to the underlying alluvial deposits has raised ground water levels significantly throughout the Indus plain. Water level measurements in observation wells have been recorded throughout the irrigated area beginning in the early 1930's. There are a total of 3600 such observation points. As an indication of the impact of irrigation waters a typical water level rise was from 5 meters below surface to within 1.5 meters of surface. As shown on Figure III-5 the water table is within 1.5 meters of surface over about 20% of the area and within 3 meters of surface over nearly 80% of the area.

The high water levels have caused severe water logging and excessive soil salinity. The situation in each of the sub areas of the Indus plain is as indicated in the following chart:

Sub Area	Extent of Waterlogging and Soil Salinity
Upper Sind Plain	: 98 per cent poorly drained or water logged, : 33% severely saline
Central Sind Plain	: 14 per cent poorly drained or water logged : 3 per cent severely saline.
Lower Sind Plain	: 94 per cent poorly drained or water logged : 50 per cent severely saline.
Indus Delta	: 27 per cent poorly drained or water logged : 33 per cent severely saline.

5.2. Arid Thar Zone

The Thar is also underlain by extensive alluvial sand deposits into which the limited rainfall readily infiltrates. However throughout much of the area the water bearing zones are poor both in quantity of water available and in quality. In most cases the only available water has dissolved mineral content well over the maximum acceptable unit of 1500 ppm established by the World Health Organization. For example, of 24 wells drilled under the UNICEF/PHED program of 1980-88, none had a total dissolved content within the prescribed limit and three had total dissolved solids of over 10,000 ppm.

The main potential aquifers are the alluvial deposits and sandstones in the underlying sedimentary rocks. There are only a few drilled wells in the area but many hand dug wells. The hand dug wells range in depth from 5 to 100 meters and are completed in both the alluvial sands and in the soft sandstones. Yields of these wells are low and most dry up or become excessively brackish during periods of extended drought. The water varies from fresh to severely brackish. Use of water with a total dissolved solids content of 3000 ppm is not unusual. Quite often hand dug wells are constructed in the tarais (shallow depressions) when the surface water has evaporated.

5.3 Kohistan Arid Zone

Ground water resources in Kohistan are limited in quantity and quality. The main potential aquifers are; alluvial deposits in the main valleys and sedimentary bedrock formations. The alluvial deposits are limited in areal

### Appendix III

extent and consist of gravels, sands and silts. Recharge to these deposits occurs during the infrequent rainfalls through infiltration in the streambeds. The limestone and sandstones of the sedimentary formations are potential aquifers particularly in the synclines beneath the main valleys.

Hand dug wells, a few springs and some seepages along the major streams are the main water sources. A few deep tube wells have been constructed. Most dug wells are completed in the unconsolidated alluvial sand deposits along the major streams. The water from these sands is generally fresh to slightly brackish. Many wells go dry in periods of extended drought.

In the Thano Bula Khan and Kalu Khuhar Basins the unconsolidated sands of the Upper Nari Sandstone is being exploited by hand dug wells, however the water is generally brackish.

In the Upper Malir Basin, most wells are located in the alluvial deposits of the main streams (Thaddo, Mol, Turi Nala, Jarandi, and Khadeji). Depth to water is generally less than 30 meters. There are some wells used for irrigation. There are also some wells completed in the Gaj limestone formation but the water is often brackish.

The Lower Malir basin is covered with extensive unconsolidated sediments which are recharged by the river. There are several hundred shallow wells completed on these deposits for irrigation.

In the Gadap Basin about 50 hand dug wells 7 to 30 meters deep are completed in unconsolidated alluvial deposits and in the sedimentary formations. These wells are being used to

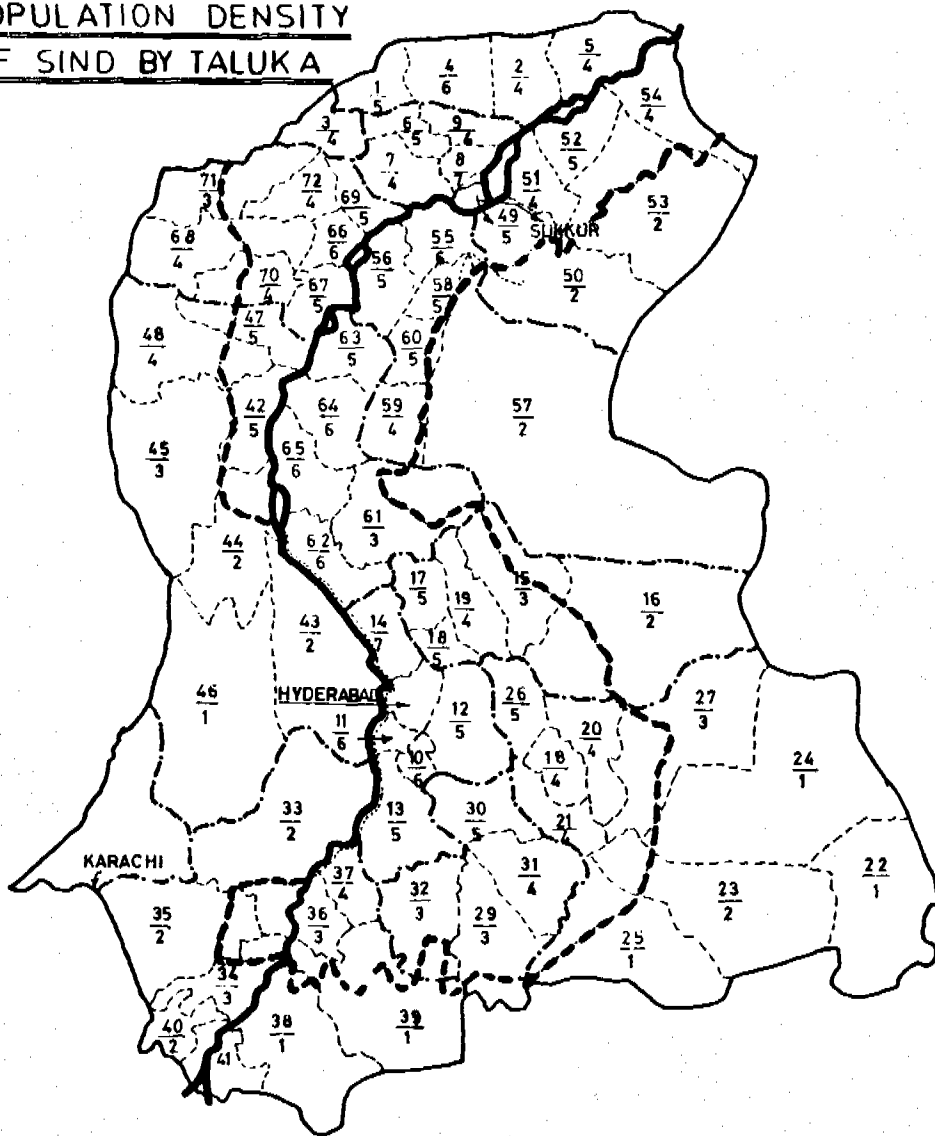
Appendix III

supply irrigation water. The water quality varies from 600 to over 2000 ppm total dissolved solids.



APPENDIX-IV

**POPULATION DENSITY  
OF SIND BY TALUKA**



**LEGEND**

DISTRICT BOUNDARY - - - - -

TALUKA BOUNDARY . . . . .

LIMIT OF IRRIGATED AREA - . . . . .

1 SERIAL NUMBER OF TALUKA ( See Table II 2 )  
5 POPULATION DENSITY IN PERSON PER SQ. KM.

8	OVER 301 PERSON PER SQ. KM.	4	101-150	PERSON PER SQ. KM.
7	251 - 300 " " "	3	51-100	" " "
6	201 - 250 " " "	2	26-50	" " "
5	151 - 200 " " "	1	≤ 25	" " "

Scale 1 Cm = 30 Kms

FIGURE IV-1

**APPENDIX IV - DEMOGRAPHICS****1. Administrative Divisions**

Sind is divided into 14 Districts plus the Municipalities of Karachi and Hyderabad. Each District is further subdivided into talukas, There are a total of 74 Talukas as indicated on Table IV-1 and map Figure IV-1. The talukas are further divided into dehs which are the basic census unit.

**2. Population Distribution and Density**

The total population of Sind in 1988 is estimated to be 23.5 million of which an estimated 12.9 million are in rural settlements. According to the 1981 Census, the growth rate in the rural settlements is about 3.6 per cent. The distinctions between rural and urban is based on whether or not a community has established a Town Committee. The formation of a Town Committee usually occurs when a community reaches a population of between 5000 and 10,000.

Most of the population is concentrated in the irrigated areas as shown on Figure IV-1 and Table IV-1 where the rural population densities in the talukas ranges from 115 to 280 persons per square km. In the Arid zones the population densities are considerably lower, ranging from 30 to 40 per sq. km. The population in the Arid Thar Zone is between 0.7 and 0.8 million. In the Arid Kohistan Zone the population is estimated to be about 0.1 to 0.2 million with a density in some talukas as low as 15 persons per sq. km.

TABLE IV-1 POPULATION DENSITY IN SIND BY TALUKAS

DISTRICT	TALUKA	RURAL POPULATION	AREA (sq. km)	DENSITY (pop/sq. km)
JACOBABAD	1 Jacobabd	102,000	657	155
	2 Khandh Kot	200,000	1419	141
	3 Garhi Khairo	94,000	726	129
	4 Thul	290,000	1285	226
	5 Kashmore	168,000	1391	121
SHIKARPUR	6 Shikarpur	92,000	562	164
	7 Gharhi Yasin	151,000	1026	147
	8 Lakhi	176,000	633	278
	9 Khanpur	85,000	736	115
HYDERABAD	10 Hyderabad	221,000	892	248
	11 Hyderabad City	16,000	74	216
	12 Tando Allah Yar	292,000	1543	189
	13 Tando Mohd. Khan	238,000	1573	151
	14 Hala	376,000	1388	271
SANGHAR	15 Sanghar	126,000	2112	60
	16 Khipro	191,000	5854	33
	17 Shahdadpur	163,000	894	182
	18 Tando Adam	102,000	541	189
	19 Sinjhor	144,000	1236	117
	THARPARKAR	20 Samaro	132,000	1246
21 Digree		137,000	1082	127
22 Nagarparkar		104,000	4190	25
23 Mithi		136,000	4045	34
24 Chachro		177,000	7243	24
25 Diplo		99,000	3911	25
26 Mirpur Khas		163,000	1075	152
27 Umerkot		198,000	3786	52
28 Kot Ghyulam Mohd.		99,000	812	122
BADIN		29 Badin	195,000	2049
	30 Matli	182,000	1091	167
	31 Tando Bago	184,000	1734	106
	32 Golarchi	134,000	1778	75
	THATTA	33 Thatta	149,000	3966
34 Ghora Bari		74,000	964	77
35 Mirpur Sakro		94,000	2969	32
36 Sujawal		74,000	752	98
37 Mirpur Bathoro		94,000	714	132
38 Shah Bandar		58,000	2952	20
39 Jati		80,000	4662	17
40 Keti Bandar		21,000	578	36
41 Mohal Kharo Chhan		5453	942	6
DADU		42 Dadu	148,000	823
	43 Kotri	144,000	3876	37
	44 Sehwan	98,000	3278	30
	45 Johi	162,000	1992	81
	46 Mohal Kohistan	68,000	4678	15
	47 Mehar	169,000	941	180
	48 Khairpur N. Shah	137,000	1128	121

TABLE IV-1 (Cont'd)

SUKKUR	49 Sukkur	38,000	201	189
	50 Rohri	138,000	4116	34
	51 Pano Aqil	135,000	1061	127
	52 Ghotki	165,000	928	178
	53 Mirpur Mathelo	157000	4158	38
KHAIRPUR	54 Ubauro	147000	1213	121
	55 Khairpur	218000	984	222
	56 Gambat	157000	1042	151
Kot Digi	57 Nara	47000	1100	43
	58 Kot d	107000	555	193
	59 Faiz Gang	103000	964	107
NAWAB SHAH	60 Mir Wah	104000	614	169
	61 Nawab Shah	246000	2517	98
	62 Sakrand	303000	1278	237
	63 Kandiaro	215000	1126	191
	64 Naushero Feroze	300000	1260	238
LARKANA	65 Moro	315000	1320	239
	66 Larkana	130000	563	231
	67 Dokri	164000	854	192
	68 Kamber	141000	1225	115
	69 Rato Dero	98000	558	176
	70 Warah	147000	993	148
	71 Shahdad Kot	92000	1501	61
	72 Miro Khan	112000	749	150
KARACHI EAST	73 Karachi East	188,000	2332	81
KARACHI WEST	74 Karachi West	42,000	943	45
Totals		10,751,453	127,952	

TABLE IV-2 SIND POPULATION BY VILLAGE SIZE IN EACH DISTRICT

DISTRICT	Villages (1) under 200		Villages (2) 200-500		Villages (3) 500-1000		Villages (3) over 1000		Total Population
	Popn.	(%)	Popn.	(%)	Popn.	(%)	Popn.	(%)	
1 Sukkur	411,154	53	184,915	24	100,850	13	82,081	11	779,000
2 Khairpur	269,990	36	222,353	30	127,708	17	114,977	16	735,028
3 Nawab Shah	555,430	40	393,606	28	219,944	16	212,020	15	1,381,000
4 Larkana	285,099	32	240,948	27	175,283	20	180,690	20	882,020
5 Jacobabad	381,639	45	253,762	30	124,218	15	94,381	11	854,000
6 Shikarpur	173,930	34	124,699	25	101,158	20	105,213	21	505,000
7 Hyderabad	413,425	36	284,359	25	188,835	17	256,381	22	1,143,000
8 Sanghar	350,573	48	195,381	27	113,707	16	65,342	9	725,003
9 Tharparkar	538,744	43	379,177	30	223,897	18	103,182	8	1,245,000
10 Badin	391,783	56	176,706	25	83,264	12	42,247	6	694,000
11 Thatta	398,284	58	186,106	27	66,554	10	37,056	5	688,000
12 Dadu	292,558	32	250,313	27	187,577	20	194,552	21	925,000
13 Karachi East	118,458	63	20,360	11	20,441	11	28,741	15	188,000
14 Karachi West	13,496	32	8,801	21	9,435	22	10,268	24	42,000
Totals	4,594,563	43	2,921,486	27	1,742,871	16	1,527,131	14	10,786,051

Notes: (2) =Percent of total population of district  
 (1) Based on 1981 Census  
 (2) Based on settlement survey conducted in 1983-84  
 (3) Based on settlement survey conducted in 1986

3. Rural Settlements

There are an estimated 66,800 rural settlements in Sind according to the 1981 census data. The majority of these settlements have less than 200 people. The numbers of settlements in four size categories and their corresponding populations are as follows;

Settlement Size	No. of Settlements	Populations
Under 0-200	53,195	5,883,600 (1)
200-500	10,050	3,134,800 (2)
500-1000	2,660	2,079,300 (3)
Over 1000	910	1,821,800 (3)
Totals	66,800	12,920,000

Notes. (1) Extrapolated from 1981 census at 3.6%  
 (2) Extrapolated from 1986 settlement survey at 3.6%  
 (3) Extrapolated from 1983 settlement survey at 3.6%

Table IV-2 provides a breakdown of the rural population in each size category by District. On average 43 per cent of the rural population lives in settlements under 200 persons, 27 per cent in settlements of 200-500 persons and 30 per cent in rural settlements over 500. The large number of rural settlements of under 200 persons has significant implications with respect to provision of water supply, sanitation and health education facilities. Large numbers of small water supply schemes are needed to cover this population.

4. Age Distribution, Literacy and Education Levels

An average of 17 percent of the rural population in each district is below the age of 5 years and 46 percent are below the age of 15 years as indicated on Table IV-3.

TABLE IV-3 RURAL POPULATION AGE DISTRIBUTION AND LITERACY LEVELS  
(Based on 1981 Census)

DISTRICT	Population	Age Distribution		Literacy Levels	
		Under 5 Years (%)	Under 15 Years (%)	Male (%)	Female (%)
1 Sukkur	779,000	16.9	45.5	37.5	12.8
2 Khairpur	735,000	17.9	47.0	34.2	7.1
3 Nawab Shah	1,381,000	17.8	48.9	34.1	10.8
4 Larkana	882,000	17.4	45.9	32.6	10.0
5 Jacobabad	854,000	16.6	46.4	34.0	10.0
6 Shikarpur	505,000	16.1	45.6	35.6	8.7
7 Hyderabad	1,143,000	16.3	46.3	36.5	19.8
8 Sanghar	725,000	15.6	46.4	24.0	8.0
9 Tharparkar	1,245,000	15.2	45.0	23.7	7.9
10 Badin	694,000	16.4	46.1	21.8	6.8
11 Thatta	688,000	17.0	47.0	26.5	7.7
12 Dadu	925,000	17.0	46.8	32.5	8.6
13 Karachi East	188,000	-	-	-	-
14 Karachi West	42,000	-	-	-	-
Total	10,786,000				
	Averages	16.7	46.4	31.1	9.9



Data on education levels in rural settlements is provided in Table IV-4. A significant indicator is the ratio of male to female students. In primary, middle and high school this ratio varies from 3:1 to 4:1. The literacy rate in rural residents was estimated at 31 per cent for males and 10 per cent for females in the 1981 census.

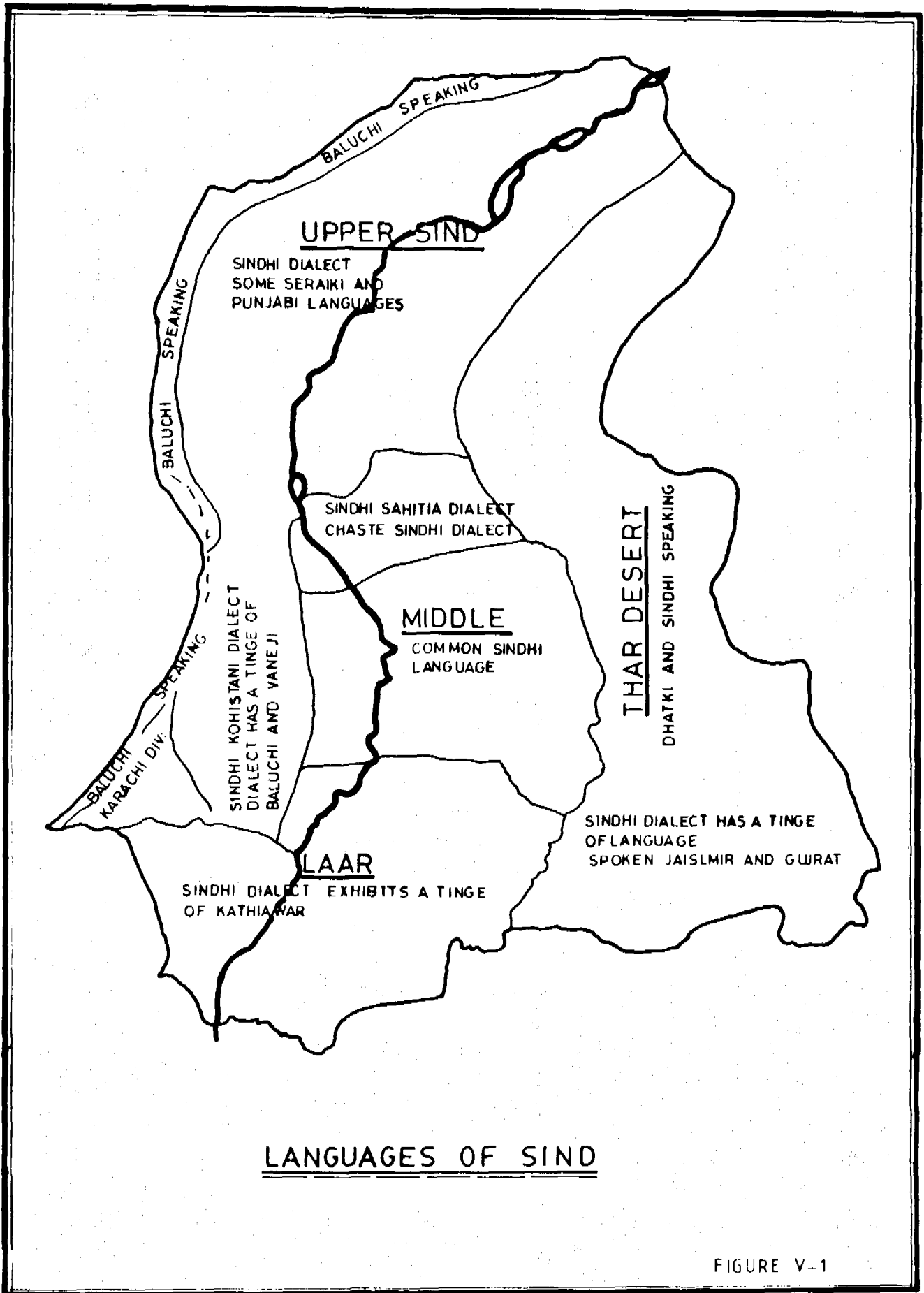
There is a significant drop out rate between primary school and middle school. About 77 per cent of male students and 89 per cent female students do not progress beyond primary school.

5. Migration in the Thar Zone

Most of the people in the Arid Thar Zone depend on livestock for a livelihood. When there is inadequate fodder for the cattle the people traditionally have moved to the irrigated areas. This usually occurred in the period February to June but in periods of drought was longer. In exchange for grazing on the irrigated lands the Tharis would provide labour for the harvest.

This pattern of annual migration continues today but is becoming less tied to the need for grazing. Currently many of the Thar people migrate to the irrigated area during the dry season (February to June) for the harvest, particularly the cotton and sugar cane harvests on a piece work for cash basis. During extended drought periods up to 50 percent of the Thar population migrates to the irrigated lands during the winter months. This has a significant impact on the labour situation and on the services required for health and water.

APPENDIX-V



LANGUAGES OF SIND

FIGURE V-1

## APPENDIX V - SOCIO-CULTURAL

1. Tribal Groups

The peoples of rural Sind are derived from thirteen tribal groups: Rajputs, Sammos, Sumros, Baluchis, Brahuis, Sayeds, Jatas, Mohanos, Serais, Hindus, Lohanos, Sahtas, and Kolis. Although in the past these tribes had distinct cultural characteristics and languages they have become so intermingled that it is now difficult to distinguish one from another.

2. Languages

The common language of rural Sind is Sindhi, however there are moderate differences in use of vocabulary and accent in various regions; namely, Laarh, Thar, Kohistan, Sahitia and Upper Sind (see map). This deviation is caused by the languages prevalent in the adjoining areas. Thari dialect has an influence from languages spoken in Jaisalmir and Gujrat. The Laarhi dialect exhibits a little of the Kathiawari language. The Kohistani dialect has a little of the Baluchi and Vaneji languages.

In the Nawabshah District and adjoining portion of Sanghar and Khairpur Districts the Sahitia dialect is common. Further north the dialect is mainly affected by Seraiki and Punjabi languages. In fact a fairly large portion of the populace in Upper Sind speaks the Seraiki language which is not common in Lower Sind. In the western portion of Larkana and in a fairly large portion of Jacobabad District, Sindhi is mixed with the Baluchi language and a large number of people in these areas speak Baluchi.

3. Women in Rural Areas

There is a misconception that women in rural Sind have little status. Although this may be true in certain castes of the Hindu community, in general, women have an important role in the home but not in public. The eldest woman in the household has a supervision role over the entire family.

Although the property of the household is managed by the male members, a woman can have proprietary rights over land and other assets. Ornaments always remain in the custody of the eldest woman and the younger women and unmarried girls are only allowed to use them on occasion. The eldest woman determines the quality and quantity of the dowry of the daughter. With the exception of Hindu families large dowries are not normally given.

In families of higher status such as Peers, Sayeds and Ameers (landowners) women are normally confined to the house and the veil is used extensively. On the other hand, in poorer rural households, the women look after the milk cattle and bullocks and share responsibility in the cultivation of the land. The men do the ploughing while women do a portion of the planting. A portion of the harvest work is undertaken by women, such as picking cotton. Women also carry the fodder for the cattle.

Women have an opportunity to accumulate some income from sale of products from small livestock, such as goats and sheep. However this must be accomplished without the knowledge of the husband.

Education of rural women is discouraged by the males. This is borne out by Table IV-3 in Appendix IV which indicates that in many districts the ratio of male to female students

in the primary grades is over 4 to 1.

4. Economic Conditions

About 75 per cent of rural peoples of Sind are dependent on agriculture for their livelihood. The main categories of people involved in agriculture in Sind are;

- . the Wadera or landlord who hires labourers or tenant farmers to work his land;
- . the Cultivator who owns and works his own land;
- . the Hari or tenant farmer who works the land with his own oxen for a Wadera and retains 50 per cent of the harvest;
- . the Hari who has no oxen and uses that provided by the Wadera in return for working the land receives 25 per cent of the harvest;
- . the labourer works on the Waderas land for a monthly charges; and
- . the seasonal worker who works for daily charges.

In Sind about 47 per cent of the agricultural land is worked by Cultivators and 36 per cent is worked by tenant farmers and their families. The average size Cultivator worked farms is 13.5 acres while the average tenant operated farm is 8.6 acres. Of the 4.1 million farms in Sind, 49 per cent are being worked by tenant farmers mainly on a share cropping basis.

The per capita income in rural Sind is one of the lowest in

the country. As indicated in Table 3 of Appendix VI the average household income is Rs 1416 per month. Thirty four per cent of rural residents are below the poverty line of Rs 1000 per month per household.

5. Cultural Practices

Rural people believe in the powers of traditional healers (Pirs) and saints (Faquirs) to assist them in dealing with sickness or other domestic problems.

Although the people are poor they will spend lavishly on special occasions, particularly weddings; births of sons and Kathna ceremonies (circumcision). In the event that a family does not have the means to pay for an appropriate ceremony the community will come together and contribute in cash, gifts or kind. This sense of community spirit is an important strength of the rural community and will be an asset in community development work envisaged in the Sector.

Further discussion of cultural practices as related to health and hygiene is presented in the Appendix on Hygiene Education.

APPENDIX-VI



## APPENDIX VI - ECONOMICS

TABLE VI-1: ANALYSIS OF AFFORDABILITY OF WATER CHARGES  
(Percentage of Households with Ability to pay)

Monthly Water Charge per household (Rs.)	If water charges should not exceed		
	1% of Income	1.5% of Income	2% of Income
5	95	97	97
10	66	89	95
15	32	66	86
20	14	43	66
25	7	26	49
30	4	14	32

Source: Household Income and Expenditure Survey 1984-85.

TABLE VI-2 CATEGORISATION OF DISTRICTS OF SIND BY LEVEL OF  
RURAL PER CAPITA INCOME AND DEVELOPMENT POTENTIAL  
(early to mid-80s)

DISTRICT	RURAL PER CAPITA INCOME	RURAL DEVELOPMENT POTENTIAL
Khairpur	High	Medium
Jacobabad	High	Medium
Nawabshah	Medium	Medium
Larkana	Medium	Medium
Sukkur	Low	Low
Shikarpur	Medium	Medium
Sanghar	High	High
Tharparkar	Medium	High
Dadu	Low	Medium
Thatta	Low	Low
Hyderabad	Medium	Medium
Badin	Medium	Low

Measured as Crop Cash Value per Capita

Sources: Agricultural Census, 1980.  
Haroon Jamal and Salman Malik, Shifting Patterns  
in Developmental Rank Ordering: A Case Study of  
the District of Sind Province, Pakistan  
Development Review, Vol XXVII, No. 2.

TABLE VI-3 INCOME DISTRIBUTION IN THE RURAL AREAS  
OF SIND, 1984-85

Household Monthly Monthly income (Rs)	Cumulative Percentage of Households	
	SIND	PAKISTAN
Below 600	6	9
601- 1000	34	35
1001- 1500	68	64
1501- 2000	86	81
2001- 3000	96	93
3001- 4500	99	97
Above 4500	100	100
Average Monthly (Rs)	1418	1538
Index of Monthly Income (Pakistan=100)	92	100
Percentage of population below the poverty line of Rs.1000 per month	34	35

Source: Household Income and Expenditure Survey, 1984-85.

TABLE VI-4 DISTRICTS WHICH CONTRIBUTE SIGNIFICANTLY TO  
PROVINCIAL OUTPUT IN DIFFERENT CROPS IN SIND  
(as of 1985-86)

WHEAT: Nawabshah (22%), Sanghar (17%), Tharparkar (14%),  
Khairpur (11%)

RICE: Larkana (39%), Jacobabad (23%), Shikarpur (15%).

SUGAR CANE: Badin (25%), Hyderabad (21%), Nawabshah (19%)

COTTON: Sanghar (24%), Nawabshah (20%), Tharparkar (16%),  
Sukkur (16%), Hyderabad (13%)

ONIONS: Hyderabad (42%), Badin (11%), Tharparkar (11%)

MANGOES: Hyderabad (28%), Tharparkar (20%), Nawabshah (17%)  
Sanghar (16%)

BANANAS: Thatta (26%), Hyderabad (20%), Tharparkar (17%).

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The share of Sind province in the national output of the  
above crops is as follow:

Wheat (16%), Rice (37%), Sugar Cane (27%), Cotton (26%),  
Onions (45%), Mangoes (36%), Bananas (84%).

Note: Figures in brackets are percentages of provincial  
output.

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APPENDIX-VII

## APPENDIX VII - HEALTH

1. Health Status

The diseases or health problems that are water/sanitation related in rural Sind are:

- . diarrhoea;
- . malaria;
- . worms;
- . hepatitis;
- . poliomyelitis; and
- . skin and eye infections.

Of these diarrhoea is by far the most important as a cause of illness and death, particularly of children. It is therefore used as an indicator or "proxy" for the entire water/sanitation related health status.

General health cannot be measured and reported in a numerical way, so certain indicators are used to represent it, the most common indicators are infant mortality rate (number of deaths under one year of age per 1000 live births), life expectancy, and maternal mortality rate.

The exact infant mortality rate (IMR) in Pakistan currently is not available, as fewer than 5% of rural births and deaths are registered. It can only be estimated from a few small surveys and analysis of census data. The only survey known to be representative of all provinces, and rural and urban populations, was Dr. Siraj ul Haq's diarrhoea survey of 1984. This survey was based on interviewing mothers in 1,490

households with 2,631 children under 5 years of age. It found that IMR was 124 for all Pakistan, with 128 in rural areas, 117 in urban areas.

A more limited survey by the King Edward Medical College, of villages and urban communities in the Lahore area in 1985 and 1986, through monthly visits to homes, found 102 deaths in 1600 children, or an IMR of about 70. However it was weighted toward an urban population, and localized in Punjab. Although the numbers were smaller and less reliable, its relatively affluent urban subset had an IMR about 40, while the rural villages had an IMR of about 200.

A World bank population and health sector report of 1987 used an IMR estimate of 105. The UNICEF situational analysis of 1987 uses an estimate of 115. The government of Pakistan gives an estimate of 80 in its seventh five year plan documents.

A most likely estimate for infant mortality rate for all of Pakistan is about 100. The rate will be significantly higher in the rural 70% of population, and lower in the cities.

It is clear that there is no estimate good enough to use to evaluate the impact of any program, through change over time. But, since IMR is about 10 in highly developed countries, 90% of infant deaths in Pakistan are preventable. About 40% of these have been found to be due to diarrhoea. So the potential of water and sanitation and related hygiene education programs to save infant lives is substantial.

Information on water/sanitation related morbidity  
(quantitative assessment of illness) and mortality

(quantitative assessment of deaths) was collected through interviews with the Sind Department of Health officials, professors of community medicine in medical colleges, professors of paediatrics, and practising hospital doctors. Hospital and health centre routine reports of number of patients treated with water borne diseases were reviewed, as well as special survey and case study reports.

## 2. Diarrhoea

Diarrhoea is defined as three or more watery stools per day. Almost all diarrhoea is caused by ingestion of one of three kinds of micro organism; bacteria, viruses, or protozoa (one celled organisms). All are shed in the faeces and travel in water or food or on hands to other people. A study of 758 diarrhoea cases in Islamabad area hospitals by Dr. Abdul Ghafoor of National Institute of Health showed the proportion of cases caused by each micro organism. A cause was identified for 77% of the diarrhoea cases. Of these 66% were bacteria, 29% were viruses, and 5% protozoa. Of the control group, without diarrhoea, 18% had bacteria, 8% viruses, and 3% protozoa, of the same disease-producing kinds. The lesson drawn from this is that even stools of a persons without diarrhoea can be dangerous

While the casual proportions have implications for treatment, particularly of severe cases (mild cases are always best treated by increasing oral fluids, such as by oral rehydration therapy) they are not important for prevention. That is because all are spread by the same faecal-oral route, and all can be expected to be diminished by the same measures to break transmission.



Other findings of Dr. Ghafoor's study were that the majority of cases of diarrhoea were in the first year of life, with the peak in the second six months. This is consistent with Dr. Siraj ul Haq's finding that the peak age at death from diarrhoea in children under five was 11 months. This has implications for breast feeding practices, and time of weaning, as it has been proven that breast fed children get less diarrhoea.

In a 120 bed paediatric ward at Quetta, Dr. M. Rafique reported the relative number of "gastro intestinal tract" disease (virtually all diarrhoea) as a proportion of all admissions and deaths of children over a 12 year period. Diarrhoea deaths were 45% of all deaths, and diarrhoea as a proportion of all admissions has risen from 44% to 54% in the last few years. These data reflect the situation for urban Quetta mainly, as 85% of the patients were from there, and only 15% rural.

In summary, data that do exist show that diarrhoea is the a frequent cause of death of children in Pakistan. However the information is not reliable enough or representative enough of the rural problem to provide a baseline for health impact evaluation.

In Sind, the Department of Health services has mounted a vigorous program of diarrhoeal control through the use of oral rehydration therapy (ORT). Distribution of ORT packets has been distributed through Basic Health Units, Traditional Birth Attendants, EPI vaccinators (Expanded Program of Immunization), non-government organizations and community health workers. In the period 1982-88 nearly 8 million ORT packets had been distributed. An international review in

1988 indicated that 70% of mothers were aware of ORT and 52% had used it.

### 3. Malaria

Malaria is included in the water/sanitation related sector because it is transmitted from person to person by the anopheles mosquito, which breeds in standing water and thus is affected by drainage. It is an important health problem in Pakistan. As is the case for diarrhoea, reliable figures for incidence or mortality due to malaria do not exist. However UNICEF estimated in 1987 that there are about 50,000 child deaths from malaria in Pakistan yearly out of a total of 689,600 child deaths as compared to an estimated 313,400 child deaths from diarrhoeal diseases.

Another indicator is that, of 505,919 malaria slides examined in the province of Sind in 1987, 17,630 or about 3% were positive. Of these 9129 were of the falciparum type (more severe, "killer" malaria, sometimes chloroquine resistant), and 8633 of the milder vivax type. Some reduction in malaria might result with better drainage. However the impact is expected to be small because there will still remain a major breeding place for mosquitoes in irrigation canals.

### 4. Worms

Intestinal worms form a significant part of total illness, and some deaths, particularly in children, in Pakistan. The two most important types are hookworm and guineaworm, followed by roundworm and whipworm.

Hookworm eggs are excreted in the faeces, but the hatched worm, living in faeces on the ground and not in water, enters another person through the skin of the foot. Therefore safe excreta disposal, rather than water supply, is relevant to its control. A stool survey of villages in the Punjab showed a 20% infestation rate, which may be representative of rural areas throughout Pakistan where people walk barefoot and lack safe excreta disposal. Hookworms cause severe anaemia and sometimes death by sucking blood from the intestine.

The other important worm in Pakistan, guinea worm, occurs primarily in the Arid Thar Zone. It lives in ponds and open wells and goes through a snail cycle. It enters the human who drinks the water, but is passed out through a sore in the skin, usually on the leg, where the worm erupts. Guinea worm rarely kills, but is disabling. The "Global 2000" program in Pakistan is believed to be effective against the worm and is expected to eradicate it around 1990. It therefore need not be a consideration for water/sanitation sector planning for after that date.

The other worms, roundworm and whipworm, are transmitted by direct hand to mouth contact among children, and not usually by water. Hygiene education is therefore more likely to have an impact on them than water supply or sanitation.

5. Hepatitis

Hepatitis is an active viral infection transmitted by the faecal-oral route, mainly in water that is consumed. Two types, hepatitis A and non-A/non-B are passed this way. A third, hepatitis B, is transmitted by other routes and is

not affected by water/sanitation. Hepatitis A is very common in Pakistan, occurring in almost 100% of the population at some time, and reported recently to be the fifth most common cause of hospital admission in Pakistan. About 5% of cases cause chronic illness, and about 1% of adults who get it die from it. It is less severe in children and there is no practical preventive measure or effective treatment for it, apart from breaking the chain of transmission through water/sanitation and hygiene behaviours.

6. Poliomyelitis

Poliomyelitis is a disease caused by a virus transmitted by the faecal-oral route, mainly in water supplies. It kills many children. No figures were obtainable on its incidence or mortality. The most effective preventive measure is immunization in infancy. This is one of six activities of the "EPI" program of the Department of Health and is delivered through 263 fixed rural units (mainly hospitals, Rural Health Centres, Basic Health Units and dispensaries, 746 rural outreach units (5-15 kms) and 13 mobile units (arid zones). This program been successful having immunized 74% of infants (1988). For the unimmunized, safe water supply, sanitation and personal hygiene are protective. It is expected that coverage will be well advanced by the time projects are implemented following this planning phase, so it need not be considered.

7. Skin and Eye Infections

Skin and eye infections are serious health problems for children where sanitary conditions are poor, as is the case in rural Pakistan. They can lead to blindness, and heart and

kidney disease. They are not related to faeces or sanitation, or to safe water ingestion, but to the quantity of water available and used for personal washing. No data are available on their incidence but it is expected to be high, in rural Sind, particularly in the arid zones.

#### 8. Health Services

The Sind Department of Health operates a system of hospitals, Rural Health Centres, Basic Health Units, and Maternal and Child Health Centres. In the past, urban services and particularly hospitals received an undue share of investment, but in the last few ADP's the expansion of rural services through establishment of basic health units in every Union Council area was undertaken. As of the beginning of the Seventh Five Year Plan in 1988, 287 out of the total of 620 union councils had a Basic Health Unit covering approximately 20,000 people each. A further 316 are under construction. Management and staffing problems, and shortages of supplies and equipment, have however limited their effectiveness, and it is generally agreed that they are under utilized.

While health workers of all types and at every level in contact with the public have health or hygiene education as part of their duties, all (except the very few designated "health educators") have other more major time commitments to activities which are easier, or more demanded by the public. Actual hygiene education activity is therefore less than would be expected from the numbers of health workers trained to do it.

The four types of health worker best able to carry out

hygiene education activity, are the Traditional Birth Attendants (TBA's), Lady Health Visitors, Medical Technicians and Medical Doctors. Female Medical Technicians and Female Doctors are particularly well suited but there are few of them. The doctors potential contribution to hygiene education in the rural areas is limited by their limited numbers, and frequent lack of interest or incentive to do health education, compared to higher-technology interventions. However good doctors know the most important thing that can be done for a patient is quite often not a technical intervention but help in overcoming a problem by changed behaviour. So Doctors in rural areas, as well as Lady Health Visitors, TBA's, and Health Technicians should all be considered an under utilized resources for hygiene education whose output may be increased by incentives or encouragement in projects.

There are currently about 6000 medical doctors in Sind, about 1 per 4050 population, which is generally believed to be enough given resource levels, urban rural maldistribution, and shortages of nurses and health technicians. There are over 6600 Traditional Birth Attendants "(dais)".

The Seventh Five Year Plan includes a new initiative, the "provision of a village health auxiliary in each census village", to provide primary health care services, after 18 months training. As they are trained and posted these workers will become an important channel of hygiene education, and should be considered in project planning.

9. Gaps in Health Information

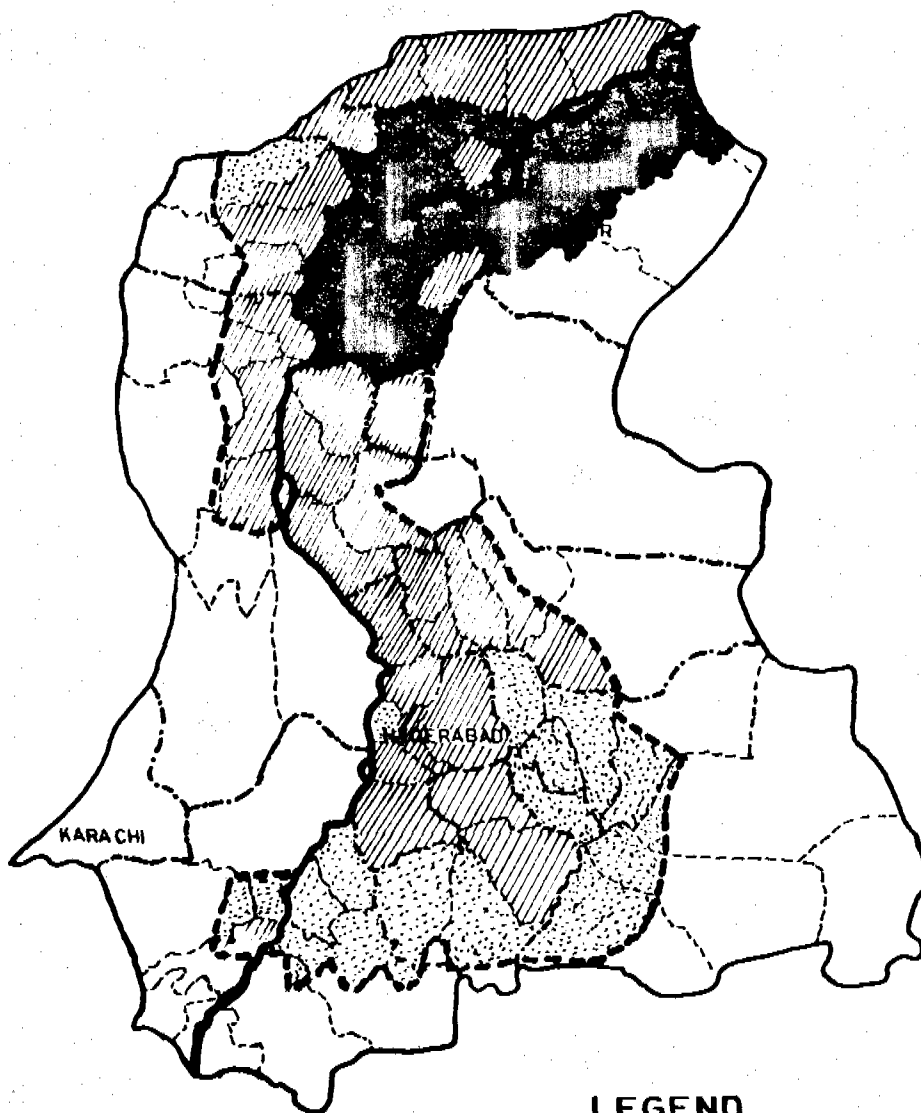
Because of the cost and "methodological difficulties" in collecting reliable, relevant, and representative information on rural health status, it would not be worthwhile during the planning project phase to attempt to do so. Available resources should be used during this period to assemble information on health determining behaviours, which may vary significantly because of ethnic and environmental differences, and which will greatly affect appropriate content and methods of hygiene education. Analyzing successes and failures of existing or past projects in the sector may also be beneficial.

In a general sense, evaluations of large investments in water supplies, sanitation, and hygiene education will be made in terms of apparent health impact, whether or not formal evaluations by this criterion are performed. The collection of routinely reported data on in-patients with diarrhoea might be considered in designing initiatives. This should probably be limited to children in health institutions when it can be determined that a substantial proportion of rural people use the institutions.





**APPENDIX-VIII**



# WATER SUPPLY SOURCES IN SIND



## LEGEND

- DISTRICT BOUNDARY -----
- TALUKA BOUNDARY ..... (dotted)
- LIMIT OF IRRIGATED AREA - . - . - . (dash-dot)
-  MAINLY GROUND WATER FROM HAND PUMPS
-  GROUND WATER FROM HAND PUMPS PLUS CANALS AND PONDS
-  MAINLY CANALS AND PONDS
-  MAINLY GROUND WATER FROM HAND DUG WELLS PLUS TARAE

Scale 1 Cm = 30 Kms

FIGURE VIII-1

## APPENDIX VIII - WATER SUPPLY AND SANITATION/DRAINAGE

1. Water Supply1.1 Water Supply Sources in Sind

The map on Figure VIII-1 and Table VIII-1 provide a summary indication of the water supply sources being used by the rural people of Sind. In the sweet water areas of Upper and Middle Sind in the vicinity of the Indus most of the people obtain water from a hand pump. In many cases the hand pump is located in the house. In these areas each hand pump serves about 15 people.

In the brackish water zone (eg. Badin District) the majority of people draw their water from the canals with no treatment. In the areas of non-perennial irrigation dugouts are used to store water for the winter period when there is no flow in the canals.

In the Arid Thar Zone (eg. Tharparker District) the people rely heavily on hand dug wells and on tarais (natural and man-made ponds). The situation is similar in the Arid Kohistan Zone except that there are a few more hand pumps.

Only a small percentage of the rural population has access to pipe borne water. The 1980 Housing Census indicated that between 6 and 7 percent of rural households had a pipe borne water supply. This figure is not expected to have changed appreciably.

Practically all of the hand pump water supplies have been installed by local artisans. In the sweet water areas there are hand pump artisans in practically all of the small towns. These artisans install the tubewell and supply and

TABLE VIII-1 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	72.5	13.0	6.5	8.0
2 Khairpur	92,400	64.0	18.5	6.0	11.5
3 Nawab Shah	172,400	57.0	19.5	11.5	12.0
4 Larkana	117,100	57.0	17.0	19.0	7.0
5 Jacobabad	114,000	58.0	16.0	20.0	6.0
6 Shikarpur	64,500	91.0	2.0	2.0	5.0
7 Hyderabad	172,000	45.0	15.0	33.0	7.0
8 Sanghar	104,000	5.0	45.0	48.0	2.0
9 Tharparkar	204,500	5.0	46.0	47.0	2.0
10 Badin	113,000	11.0	11.0	76.0	2.0
11 Thatta	107,300	8.0	14.0	73.0	5.0
12 Dadu	132,000	21.0	45.0	26.0	8.0
<b>Total</b>	<b>1,508,800</b>				
Percentage each source		38	24	32	6.3

install the hand pump. However, normally they do not place a concrete pad around the base of the pump. This is left to the discretion of the owner. Most owners do not bother to have a concrete pad installed. This lack of a properly constructed pad appears to be a major cause for the contamination of hand pump tube wells.

The Departments have been actively involved in the provision of water supplies. The Public Health Engineering Department has focused on pipe borne water scheme. The Rural Development Department has been working with the Union Councils in the provision of hand pump water supplies. The Sind Arid Zone has recently begun to be involved in provision of water supplies in the Arid Thar Zone. Here we will outline the type of schemes being provided through PHED. A discussion of the activities of RDD and SAZDA is presented in the Appendix dealing with the Institutions.

## 1.2 PHED Water Supply Schemes

Public Health Engineering Department (PHED) is responsible for provision of water supply schemes in the urban communities as well as in the rural settlements included in the Annual Development Program Budget. Normally these rural communities have a population of more than 1000. The systems are basically piped water supplies from either a canal or a tube well. The PHED has completed about 220 systems at an average rate of less than 30 schemes per year.

For the schemes based on a canal source the water is pumped to two settling tanks where it is stored for about 15 days. The water from the settling tanks is chlorinated and pumped to the distribution network. Normally there are only a few private connections. Most users draw water from two or three community tanks provided in central places in the village.

The schemes are designed for a period of about 10 years and are based on a consumption of 20 gallons (90 litres) per capita per day. Water is supplied twice a day; 1 to 2 hours in the morning and 1 to 2 hours in the evening. Filtration is not considered essential and only a few schemes are provided with sand filters.

In the past the PHED constructed and commissioned the schemes then turned them over to the Union Councils for operation and maintenance. However, most Union Councils were unable to properly operate the schemes and thus PHED has assumed this responsibility for all but a few.

Most people do not pay for the water received so that the cost of operation and maintenance is borne almost entirely by PHED. In the 1988-89 budget this represented about 14% of the total allocation for rural water supply.

Table VIII-1 provides information on selected water supply schemes. Community design populations range from 1300 to 9700. For systems based on a tube well source the capital cost per capita ranges from Rs.115 to Rs.784 with an average of Rs.350. For systems based on a canal water source the range is Rs.250 to Rs.1300 with an average of Rs.620. However these costs are understated because they do not include any allowance for the overhead costs to support the PHED organization.

Operation and maintenance costs are in the range Rs. 15 to Rs 50 per capita per year based on the design population. If the average household in the community consists of seven persons the cost per month per household is in the range Rs.10 to Rs. 30. However this cost is understated because the costs do not provide for PHED overheads and the full

TABLE VIII-2 DATA ON SELECTED WATER SUPPLY SCHEMES COMPLETED BY PUBLIC HEALTH ENGINEERING DEPARTMENT

DISTRICT	COMMUNITY	WATER SOURCE	1981 POP/N	DESIGN POP/N	COST Rs. millions	COST Rs/Cap
Sukkur	Sahib Khan Land	T.W.	1200	1500	0.621	414
	Khan Goth	T.W.	3500	5000	0.800	160
	Jarwar	C+T.W.	2043	6800	3.848	566
	Khanpur Mahar	C+T.W.	3140	8000	2.083	260
	Dad Laghari	T.W.	1181	1750	1.372	784
	Landhi	T.W.	1000	1350	0.902	668
	Patni No. 1	C	2731	2990	1.520	508
	Ali Wahan	T.W.	2428	7000	5.776	825
	Kandhra	C	3523	9700	4.839	499
	Adil Pur	T.W.	3315	4750	1.185	249
	Thikaratto	T.W.	1863	3100	1.360	439
Khairpur	Duraza Sharif	T.W.	666	3000	0.345	115
	Agra	T.W.	1463	4000	0.750	188
	Drib Mohar Shah	T.W.	2083	4700	1.256	267
	Zafarabad	C	1500	1500	0.806	537
	Pacca Chang	C	1146	1682	1.261	750
	Loung Fakir	C	3200	5000	4.173	835
	Sohu Qanasira	C	1017	3000	1.319	440
	Kolab Jail	C	2241	3200	1.436	449
Nawabshah	Khan Wahan	T.W.	3572	5000	1.322	264
	Katri Mohd. Kabir	T.W.	1236	2000	0.760	380
	Cheho	T.W.	1522	2000	0.554	277
	Mithiani	T.W.	1763	7500	1.365	182
	Darbelo	C	4000	5300	1.326	250
	New Jatoi	T.W.	1615	3000	0.827	276
	Dhiran	T.W.	1600	2400	0.843	351
	Old Jatoi	T.W.	2695	3750	0.917	245
	Daris	T.W.	2387	3500	1.027	293
Jani Saheb	C	1571	2300	3.060	1330	

Notes: T.W. = Tube well source  
C. = Irrigation canal source

TABLE VIII-2

Larkana	Miro Khan	T.W.	4206	3000	0.827	276
	Wasaya Bhutto	C	671	1500	1.856	1237
Jacobabad	Garhi Hassan	T.W.	6000	8500	0.971	114
	Juman Dakhan	OW+C	1216	2500	1.055	422
	Bhadur Khan	T.W.+	2252	2500	2.535	1014
	Kot Jangu	T.W.	1513	2300	1.215	528
	Buapr	C+T.W	2840	1500	1.286	857
	Badani	T.W.	1117	2000	0.697	349
	Liaqat Ali Dhamki	T.W.	1800	3630	0.855	236
	Ramzan Pur	T.W.	1101	1700	1.899	1117
	Qadir pur	T.W.	1169	1800	1.997	1109
	Jafarabad	C	859	1800	0.852	473
Thatta	Muhammad Pur	C+T.W	1940	2900	1.870	645
	Thanga	C	1000	1400	0.724	517
	Chilya	C	1000	1400	0.838	599
	Chak Jehan Khan	C	1000	1400	1.419	1014
Dadu	Lakhi Shah Saddar	River	2000	2000	1.329	665
	Karo Khaho	C	692	1400	1.215	868
	Akro	C	2461	4000	2.512	628
	Long Tunio	T.W.	1500	2200	0.663	301
	Phulji Station	C	2498	3300	2.141	649

Notes: T.W. = Tube well source  
C. = Irrigation canal source

design population is normally not served. The allocation of operation and maintenance costs for a typical scheme is as follows;

Item	Annual Cost (Rs)	Percent
Establishment	23,000	39.2
Electricity	24,000	41.0
Repairs	5,000	8.5
Chlorination	2,000	3.4
Raw Water Charges	1,800	3.1
Contingencies	2,800	4.8
	-----	-----
Total	58,600	100.0

(Establishment consists of pump operator, assistant, plumber and chowkidor)

## 2. Sanitation/Drainage

Sanitation in the context of rural Sind is considered to be drainage with an emphasis on disposal of sullage water. Drainage is an indicated responsibility of the local councils. Katcha (unlined) drains are normally constructed all the road sides and in the rural communities but are not well maintained so that effective removal of sullage and runoff from rainfall is not achieved in many cases.

Where a community has a pipe borne water system the production of sullage water increases significantly and the need for a proper drainage network becomes critical.

The Public Health Engineering Department has taken the lead in the provision of pucca (lined) drains in rural communities. The emphasis has been on development of formal



drainage systems in the communities where there is a pipe borne water scheme.

To the end of 1988 the PHED had completed a total of 56 schemes and has assumed responsibility for the maintenance of them. The design is based on a sullage water production rate of 20 gallon/head/day and of which it is assumed 80% are to be disposed.

A typical scheme consists of brick and concrete open drains leading to an aerobic tank. The waste water then flows to two collecting tanks from which the water is pumped to disposal on the land or to a water course.

The capital cost of most drainage schemes is in the range Rs.120 to Rs.1200 with an average around Rs.600 per capita using the design population. Again this is understated because nothing has been allowed for PHED overheads.

APPENDIX-IX

APPENDIX IX - INSTITUTIONS

1.0. The Departments

1.1 Planning and Development Department

The function of the Planning and Development Department is preparation of the Annual Development Program (ADP) and monitoring the performance of all development activities undertaken by the Province.

The Department is headed by the Additional Chief Secretary. He is supported by a Chief Economist and Chiefs of Sections. All projects in the water , sanitation and health education sector are dealt with by either the Physical Planning and Housing Section or the Health Section.

The Physical Planning & Housing Section is responsible for processing applications for projects in water supply and sanitation. The Health Section is similarly engaged in projects/plans dealing with preventive health care and hygiene education. Both process the following project application documents:

- . PCI's for project implementation;
- . concept clearance forms for initial startup of negotiations with international donor agencies; and
- . PCII forms for undertaking feasibility studies or preparing sector development plans.

The Sections are subsequently responsible for monitoring the implementation process and for coordinating the activities. This is accomplished through review of progress completion

reports.

Each Section Chief is a qualified professional. He is supported by one or more Deputy Chiefs, each responsible for more than one specific area in the sector. Each Deputy Chief is assisted by one Assistant Chief responsible for a specific topic.

The Planning Department Working Party approves development projects worth up to Rs.30 million. Its meetings are chaired by the Additional Chief Secretary Planning & Development in the absence of the Minister for Planning and Development and are attended by Provincial Secretaries.

## 1.2 Public Health Engineering Department

### 1.2.1 Scope of Operations

The Public Health Engineering Department has been undertaking assignments to design and construct safe water supply schemes and sullage and storm water drains in the medium to small urban settlements and in the larger rural settlements. In the past these schemes were turned over to the local councils, usually the Union Council on commissioning. Lately, however, PHED has also been operating and maintaining these schemes as the local government bodies are unwilling to take on that responsibility. Local councils contend that their unwillingness to take on these responsibilities is due to the poor design and execution of the schemes, and also to some extent their inability to finance the operating and maintenance costs.

## 1.2.2 Organization and Staffing

The PHED is attached to the Housing and Town Planning Department but is headquartered in Hyderabad rather than in Karachi. The PHED is headed by a Chief Engineer who is supported at the headquarters by a Director Design and by administrative, accounts, contracts and research staff. A water quality laboratory is attached the head office. The Director Design has a number of Design and Assistant Design Officers, Superintendents, Overseers and Draughtsmen reporting to him.

The Province is partitioned into Circles each of which is headed by a Superintending Engineer. A Circle is defined on the basis of the work load assigned to a Superintending Engineer. Currently there are 6 Circle Offices in Sind each encompassing two to four districts. Staffing at the Circle office consists of Assistant Design Officers and a full complement of supervisors, draughtsmen and an accountant with his staff of clerks.

The Circle is further sub-divided into Divisions, corresponding, roughly to the administrative District. There are 19 Divisional offices in Sind. Each Division is headed by an Executive Engineer who is supported by three or four Assistant Engineers, each responsible for one or a part of a taluka. A full complement of supervisors, draughtsmen and accounting and office staff is provided at each Divisional office. The establishment levels of the three components of the organization are indicated on Table IX-1. Operation and maintenance staff are excluded.

The entire structure of PHED is built up on the premise that each Assistant Engineer is responsible for looking after 8 to 10 schemes concurrently. Recruitment by the Department is

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TABLE IX-1 ESTABLISHMENT OF PUBLIC HEALTH ENGINEERING DEPARTMENT

Position	Grade Level	Head Office	Circle Offices	Division Office	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
Basid	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

at the Assistant Engineer level only and takes place through the Public Service Commissions. Lateral entry is not possible at the more senior levels. This constrains the ability of PHED to expand its capabilities in the short run.

### 1.2.3 Project Process and Funding

Each project to be executed is identified either by the elected provincial or local council representatives. Preliminary designs and estimates are prepared by the Assistant Engineers, are checked by the Executive Engineers and finally approved by the Chief Engineer or the Director Design. PCI forms are then prepared through the same sequence of events and then transmitted onwards. Because of the need to execute a large number of projects within a short span, procedures for sanction have been modified radically, for example, the sanctioning limits have been raised substantially to their current levels ranging from Rs.100,000 for the Assistant Engineer to Rs.1,500,000 for the Chief Engineer.

Funds for the execution of schemes are made available to PHED through Annual Development Program budgetary allocations. During the course of the Five Point Programme, PHED also executed a number of Rural Water Supply schemes on behalf of Senators, MNAs and MPAs.

The operation and maintenance function belongs to the Union Councils. The PHED was assigned responsibility for maintenance of the schemes for the first six months after commissioning and then turn the scheme over to the Union Council. However, in most cases the PHED has continued to provide this service because the Union Councils have been unwilling to assume that responsibility. In the past PHED financed the operation and maintenance out of its own



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resources by utilising its own staff, hiring work-charge staff and not paying WAPDA for electrical energy consumed. Lately, however, the provincial Government is providing PHED with funds for this activity. In the budget for 1988-89 fourteen percent of the total for rural water supply and drainage was allocated for operation and maintenance as indicated in the following;

	Millions	Percent
Rural Water Supply	Rs. 136.46	46.1
Drainage	Rs. 117.54	43.7
Maintenance	Rs. 42.00	14.2
	-----	
Totals	Rs. 296.00	100.0

### 1.3 Local Government Department

The Local Government Department supervises and coordinates the functions of the local councils (District and Union), Town Committees and Municipal Corporations and acts as their personnel department by providing them with officers belonging to the Local Council Service.

The Department is headed by a Secretary and consists of two Divisions: Hyderabad and Sukkur/Larkana. Within each Division the Department maintains an office located in each District capital. Each of these offices is headed by an Assistant Director who supervises the activities of Development Officers assigned to each Taluka within the District. The staffing complement is indicated in the following table:

Table IX-2 Establishment of Local Government Department

District	Director	Assistant Director	Development Officer
Hyderabad Division	1	-	-
Hyderabad	-	1	4
Tharparkar	-	1	9
Dadu	-	1	7
Thatta	-	1	8
Sanghar	-	1	5
<b>Badin</b>	-	1	4
Sub-total	1	6	37
Sukkur/Larkana Division	1	-	-
Jacobabad	-	1	5
Nawabshah	-	1	5
Sukkur	-	1	6
Larkana	-	1	7
Khairpur	-	1	6
Shikarpur	-	1	4
Sub-total	1	6	33
Total	2	12	70

Attached to the Department is the Sind Local Government and Rural Development Academy at Tando Jam. This institution was intended to serve as an orientation centre for local council representatives and staff, an in-service training facility

for local government employees and a training centre for community development workers and community development organization leaders.

#### 1.4 Rural Development Department

##### 1.4.1 Role of the Department

The Rural Development Department provides technical support to Town Committees, Municipal Corporations and Union Councils but not to the District Councils.

Works that the Department becomes involved in include; schools, rural health centres, clinics, basic health units, hand pump water supplies, drainage, and roads. Because of the split responsibilities between Town Committees and Union Councils and among the various types of works, the Assistant Engineers are estimated to devote only 5 to 10 percent of their time to rural water supplies.

##### 1.4.2 Organizations and Staffing

The Department is headed by the Director-General based in Karachi. The Department consists of three divisions and a technical wing each of which is headed by a Director. The Divisions are Hyderabad, Sukkur and Karachi. The Karachi Division has only an Assistant Director and a Planning Officer. Hyderabad and Sukkur Divisions are subdivided into District offices which are staffed by an Assistant Director and a District Planning Officer with support staff.

The Technical Wing is headed by the Director (Technical). A Circle Head Draughtsman is attached to the Director's office which is located in Hyderabad. An Executive Engineer is located in each of the Divisional offices (Hyderabad and

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Sukkur) and from one to five Assistant Engineers are attached to each District office. Generally an assistant engineer is responsible for two or three talukas. Staffing levels are indicated on Table IX-3.

Table IX-3 Establishment of the Rural Development Dept.

	: Dir. :	Div. :	A. D. :	Distt. :	Ex En :	A. E. :
		P. O. :		P. O. :		
Hyderabad Div	2 *	1	-	-	1	-
Hyderabad Dist.	-	-	1	1	-	2
Tharparkar	-	-	1	1	-	5
Thatta	-	-	1	1	-	4
Badin	-	-	1	1	-	2
Sanghar	-	-	1	1	-	3
Dadu	-	-	1	1	-	4
Sub-total:	2	1	6	6	1	20
Sukkur Division	1	1	-	-	1	-
Jacobabad	-	-	1	1	-	2
Nawabshah	-	-	1	1	-	2
Sukkur	-	-	1	1	-	3
Larkana	-	-	1	1	-	3
Khairpur	-	-	1	-	-	3
Shikarpur	-	-	1	1	-	2
Sub-totals	1	1	6	6	1	15
Totals	3	2	12	12	2	35

Notes: \* Director (Development) and Director (Technical)

Div. P.O. = Division Planning Officer  
 A.D. = Assistant Director  
 Distt. P.O. = District Planning Officer  
 Ex En = Executive Engineer  
 A.E = Assistant Engineer

### 1.4.3 UNICEF Projects

Currently the Rural Development Department is being assisted by UNICEF on two rural development initiatives. One initiative involves the supply of 2300 hand pumps to 619 rural settlements. There are two models of new hand pump being introduced; the shallow lift Bangladesh No.6 hand pump for depths to 15 meters and the Afridev hand pump for lifts to 50 meters. Associated with the hand pump supply effort there is also a program to improve 20 hand dug wells and 3 tarais in the Arid Zones. The allocation of the hand pumps is as follows;

District	Villages	No. 6	Afridev
Tharparker	180	500	75
Dadu	84	300	45
Sanghar	59	255	38
Khairpur	122	383	70
Larkana	104	272	72
Jacobabad	70	290	-
	-----	-----	-----
Totals	619	2000	300

To date about 650 of the shallow lift pumps have been installed, mainly on new tube wells. None of the Afridev pumps have been installed. Most of the Afridev pumps will be installed in the Arid Zones either on tube wells or on hand dug wells. The depth to the water is significantly greater in the arid areas than in the irrigated area.

The second UNICEF assisted initiative involves establishment of hand pump tube wells and latrines in six pilot scheme villages through community development organizations. The establishment of the community based organization was the first phase of this project. The approach being taken with respect to the latrines is to first place one at each of the main public places in the community, for example the school, the Union Council Office, the basic health unit as a demonstration. The next phase has involved installing a latrine for some of the poorest families in the community with the user providing all of the labour and the RDD/UNICEF providing the materials and skilled help.

1.5 Sind Arid Zone Development Authority

The Sind Arid Zone Authority was established to plan and implement on a pilot project basis development programmes for the Thar and Kohistan Arid Zones. The stated objectives of the Authority are:

- . meet the basic minimum needs of the maximum number of people;
- . provide income generating activities for the people;
- . integrate the Arid Region with the rest of the economy;
- . raise the human and animal capacity of the region;
- . exploit to the fullest possible extent the economic potential of the region; and
- . change the migratory character of the population.

To fulfil this broad mandate the Authority has proceeded with a program which includes:

- . exploration for ground water;
- . construction of small dams for the conservation of

- . water for irrigation;
- . planting of crops on saline soils;
- . development of livestock farms;
- . establishment of veterinary services centres;
- . creation of a health services network;
- . construction of roads;
- . provision of electricity through grid stations and solar energy plants;
- . setting up cottage industry;
- . development of forests and ranges;
- . control and reversal of desertification; and
- . training of personnel in different disciplines.

The Director General is the chief executive officer of the Authority. Five directors report to him; Director Engineering, Director Agro Livestock, Director Planning Coordination and Administration, Director Social Services and the Director Finance. There are three regional offices each headed by a Regional Director; Kohistan based at Sehwan, Nara based at Khairpur, and Thar based at Mirpurkhas. There is also a Hydrogeological Wing based at Hyderabad. Field stations are situated at three locations in each Region.

The Authority has initiated numerous projects since assuming its mandate in 1986 but few have been completed. These works includes;

- . construction water tanks and dug wells, installation of wind mills and rehabilitation of tarais (rain water reservoirs);
- . establishment of fixed and mobile veterinary units;
- . establishment of first aid stations, mobile medical units, and dispensaries;
- . construction of roads;

establishment of base stations; and  
test hole drilling for ground water investigation (8  
holes drilled and 4 completed as tube wells)

#### 1.6 Health Department

The Health Department is responsible for providing preventive and curative health care throughout the Province. Towards this goal the Department operates a network of hospitals, clinics, dispensaries, Rural Health Centres and Basic Health Units as part of the curative services. The Department's activities in the preventive areas of health care have been limited, but have been particularly successful in immunisation and the distribution of oral rehydration salts.

The Department is headed by the Secretary Health to whom the heads of several major sections report. For water and sanitation the most important section is Health Services which is headed by a Director based in Hyderabad. Health Services consists of four Divisions the most relevant of which are headquartered in Hyderabad and Sukkur. At each divisional headquarters is located a Deputy Director who supervises the functioning of the District Health Officers.

Preventive health care is provided on site at the curative facilities (Basic Health Units) and through Mobile Health teams. The mobile teams are based at the taluka headquarter town which also is the location of the Rural Health Centre. Each team consists of a Lady Health Visitor, a Medical Technician, a Dispenser/Vaccinator, and the Ayah. There were 15 such mobile teams in operation in 1988.

The functions of the mobile teams include:



- . vaccinating all infants and children under the Extended Immunisation Programme (EPI);
- . vaccinating expectant mothers with anti-tetanus;
- . informing mothers about the benefits of breast feeding and using oral rehydration salts (ORS) for overcoming the effects of diarrhoea; and
- . imparting some basic knowledge of hygiene.

However 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, particularly Lady Health Visitors in the remote areas.

The Department has a very active program for training dais (Traditional Birth Attendants). The trainees are selected from the communities in which they will be working. To the end of 1988 a total of 6660 dais had been trained.

#### 1.7 Education Department

Even though the Education Department is not directly involved in the Sector at present, it has a potential role. For instance, through the Primary schools, teachers could more emphasis on teaching the rudiments of health and hygiene. Teacher training programmes may have to be modified suitably, as well as the primary school curricula, to include components of health and hygiene education. In addition the Adult Literacy Programme and the Mosque schools might be used for the promotion of health and hygiene education.

Most schools in rural settlements are under staffed, ill-equipped and do not have an acceptable water supply and or

latrine. Therefore, good hygiene behaviour is difficult to put into practice.

The Department is structured with the Secretary at its head. Functional Sections include the Director of School Education, responsible for overseeing the operation of all schools in the province. He operates through the Deputy Directors at the divisional level and District Education Officers - one male and one female - at the district level and Sub-divisional Education Officers - a male and a female - at the taluka level. A full complement of staff is in situ at each location.

The provincial Text Book Boards are headed by a Chairman who also reports to the Secretary. The Boards are responsible for approving and printing text books according to an approved syllabus and curriculum. The Department also operates a network of teachers training institutes.

## 2. Local Councils

### 2.1. District Councils

There are 14 District Councils in Sind. They 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 a number of Assistant Engineers. All of these officers are drawn from the Local Council Services. Support staff are recruited directly by the Council.

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The general responsibilities of the District Councils are:

- . disbursement of Annual Development Programme funds for approved projects;
- . appropriate measures for the development of skills, crafts and cottage Industries;
- . submission of regular progress reports to the Planning and Development Department on the implementation of development projects at different levels within the district;
- . promotion of sanitation and Public Health;
- . prevention, regulation and control of infectious diseases;
- . enforcement of vaccinations;
- . registration of marriages;
- . registration of the sale of cattle;
- . provision of water supply, construction, repair and maintenance of water works; and
- . licensing of vehicles other than motor vehicles and maintenance of public stands.

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.

The sources of funding available to the District Councils are:

- . matching grant-in-aid from province;
- . export taxes (75% retained and 25% distributed to Union Councils);
- . 85% of fisheries tax;
- . 85% of mineral tax; and
- . 1% of cess (collected by Revenue Department).

## 2.2. Union Councils

There are 620 Union Councils in Sind. Each is composed of members representing from 1000 to 1500 people. There are from 10 to 20 members in each Union Council. A Chairman is elected by the members and a Vice-Chairman is selected by the Chairman. Members are elected for a term of four years. The prescribed responsibilities of the Union Councils include among other things:

- . provision and maintenance of roads, culverts, bridges and public buildings;
- . prevention and abatement of nuisances in public places;
- . sanitation and conservancy of cleanliness of area;
- . regulation of collection, removal and disposal of manure and street sweepings;
- . provision and maintenance of wells, water pumps, tanks, ponds and other works for the supply of water.
- . adoption of measures for preventing the contamination of the sources of water supply for drinking;
- . prohibition of the use of the water wells, ponds, and other sources of water supply suspected to be dangerous to public health;
- . regulation or prohibition of the watering of cattle, bathing or washing at or near wells, ponds, or other sources of water supply; and
- . acting as construction and maintenance agency for schools, Rural Health Centres, family welfare clinics, Basic Health Units, piped water supply, potable water storage tanks hand pumps and tubewells and sanitation.

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.  
The main sources are:

- . block grant-in-aid (20,000 to 25,000 per year);
- . 25% of export tax (40,000 to 200,000 per year);
- . portion of cess (Rs. 1000-2000 per year);
- . portion of paddy/cotton fee;
- . octroi (import tax collected from industrial and commercial concerns); and
- . marriage fees.

There is considerable disparity in the ability of Union Councils to generate their own funds. For example, in the four Districts of the Hyderabad Division the gross income to Union Councils from their own resources ranged from zero to nearly 2 million rupees. Of the 259 councils 170 generated less than Rs. 5000 in 1987-88. Union Councils in which major industries are located such as sugar mills and cement factories are able to generate significant amounts of money from octroi.

### 3. Federal Agencies Involved in the Sector

#### 3.1 Federal Ministry of Planning and Development

The Ministry is generally referred to as the Planning Commission because one of the Ministry's functions is to act as the Secretariat of the Commission. The Commission itself consists of the President as Chairman, the Ministers of Planning, Finance and Economic Affairs as Members with several government officials as designated or ex-officio Members. The Secretary in the Federal Government, normally the previous incumbent to the office of the Governor of the State Bank, as Secretary General of the Ministry, is also nominated as the Deputy Chairman of the Commission.

The Commission prepares the various Plans, Five-Year and Perspective, and the Ministry implements these in the form of preparing the federal government's Annual Development Programs. Another major function of the Ministry is to act as a clearing house for all projects and plans with a value exceeding Rs.30 million. This is achieved in the water, sanitation and health education sector through the Physical Planning and Housing Section and the Health Section.

The Physical Planning & Housing Section is responsible for processing applications for projects in water supply and sanitation. The Health Section is similarly engaged in projects/plans dealing with preventive health care and hygiene education. Both receive and process applications on:

- . PCI's for project implementation;
- . concept clearances for initial startup of negotiations with international donor agencies; and
- . PCII's for undertaking feasibility studies or preparing sector development plans.

The Sections are subsequently responsible for monitoring the implementation process and coordination of the activities across provinces, wherever applicable. This is accomplished through review of progress reports and completion reports. Wherever donor or foreign exchange loan funding is involved, officials of the Sections sit in on meetings between the donor/loaning agency and the Economic Affairs Division.

Application forms and supporting documents are scrutinised and a summary prepared which is circulated to the line Ministries involved in the Sector, other concerned sections in the Ministry and the Planning and Development Departments of the provinces. Comments are circulated to members of the

Central Development Working Party for approval or onward transmission to the Executive Committee of the National Economic Council for projects worth Rs.50 million or over.

Normally formal approval is issued within a month of final sanction by the concerned Section and is then submitted for inclusion in the Annual Development Program.

Monthly meetings of the Central Development Working Party are chaired by the Secretary Planning and are attended by all the Federal Secretaries and Additional Chief Secretaries (Planning) of the provinces. Section heads of the Ministry attend for presenting cases pertaining to their Sections. All heads of agencies whose projects are being considered also attend to answer any queries raised. If modifications are not required to be incorporated into the planning documents, projects are either sanctioned or approved for onward transmission, as the case may require.

Semi-annual meetings of the Executive Committee of the National Economic Committee are chaired by the Minister of Planning and are attended by the Ministers and Secretaries (Federal and Provincial) of Planning & Development, Finance, Economic Affairs, Deputy Chairman Planning Commission, Chief Economists, Members of the Planning Commission, Additional Chief Secretaries of the provinces and the Governor of the State Bank of Pakistan.

### 3.2 Federal Ministry of Local Government and Rural Development

The Ministry has two wings - Local Government and Rural Development. Its functions include coordination among the provinces, establishment of a data base on local government finances, operation of training institutes - Pakistan Academy of Rural Development in Peshawar, National Centre

for Rural Development in Islamabad and Municipal Government Training Institute, Karachi - supervision of special projects in rural development.

The Ministry's chief executive officer is the Additional Secretary in-charge. He has three Joint Secretaries reporting to him, one each responsible for Local Government, Rural Development and Administration. The Rural Development Wing in addition to its Ministerial functions of coordinating the work of the provinces in rural development, supervises the functioning of the training institutes and the computer centre, and has recently established the Development Engineering Cell and is currently acting as the executing agency for the Asian Bank financed Farm-to-Market Roads project and thus encroaches on the responsibility of the line departments of the provincial governments. The planning Section of the Wing is responsible for preparing guidelines and plans for the Rural Works Programmes in cooperation with the provinces.



APPENDIX-X

**APPENDIX X - HEALTH AND HYGIENE RELATED PRACTICES AND BELIEFS**

The information presented on hygiene in rural communities in this section is based on interviews conducted with UNICEF Lady Health Visitors who have been working as trainers of Traditional Birth Attendant Master Trainers, a female sociologist and a Lady Doctor. In general there is an extreme lack of awareness on the part of the rural people Sind regarding the link between water, sanitation, drainage and health. Superstitions and misconceptions are common. Some of the most significant practices are outlined in the following.

Though breast-milk is culturally encouraged for infants, if the child has diarrhoea, the breast feeding is stopped immediately. The cause of the diarrhoea is believed to be that the mother's milk has been made unfit by the evil eye. Moreover it is believed that if the mother eats something without her husband's permission her milk goes bad or dries out and the baby gets diarrhoea.

The mother's first milk (cholestrom) is believed to be bad for the child and for at least 3 days, the child is given, butter, honey and "gur" (non-refined sugar).

Child's faeces are believed to be harmless. Children are allowed to defecate anywhere in the house. If it is in or near the kitchen, a dog may be allowed to eat it, or some ashes or earth may be spread to cover it.

Children are hardly ever cleaned with water after defecation. Either mother cleans the child with a piece of

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used cloth or the child rubs himself on the ground. Adult (men and women) may also first rub the bottom on the ground after defecation.

Women, generally defecate in an area near the house where bushes are planted to provide privacy. The men normally defecate in the fields far from the house. Women also use old pieces of cloth for cleaning after defecation. Men may use clay balls or leaves for this purpose.

In the Thar area women defecate at any convenient location with their long skirts providing privacy and use sand for cleaning and for covering the excreta.

There are significant difference in hygiene practices between large village and small villages (less than 200 people). In large villages, privacy and space become a problem for women. Quite often in large villages the women construct a crude latrine by digging a hole about ten feet deep and surrounding it with bushes or mud walls, depending on the economic situation of family. This hole is covered by wooden planks or tree branches for placing feet, leaving only a little hole.

In Lower Sind where these crude latrines are more common, women may throw salt or calcium oxide in the hole (ten kg. approximately) once a month. When the hole is full, another is dug nearby. Only the women use these crude latrines. Children defecate anywhere and the men go out to the fields. Depending on the availability of water in the village and economic status of the family, women may also arrange a place near the latrine for washing purpose. In such families, men may carry water along when they go to fields.

In Upper Sind hole latrines are not common. Quite often in

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this area the women will defecate in a place set aside on the roof of the house. A sweeper is engaged to clean the place periodically.

Dry surface latrines are also common in large villages. Only women and young girls use them. In the more affluent villages of Sukkur and Larkana Districts trading families, Hindus and Muslims keep their women in the house and sweepers are employed to remove excreta. There is more education among men and women in this area.

The general perception is that a dog's excreta is the dirtiest, a child's excreta is harmless and contact with adult excreta should be avoided but is not seen as causing disease. Cattle excreta is highly valued because it has utility as a fuel, and is believed to keep black magic, the evil eye, and the demons Jin and Bhoots away. In Hindu families cow dung is used on cuts and injuries. When a child is born, it is applied fresh all over his body especially on navel after cutting the umbilical cord because it is believed to promote healing.

Sindhis are conscious of the fact that a new born child is particularly vulnerable to death in the early months. There is a belief that demons love newborn babies due to their first hair. The baby's hair cannot be cut until its head has been properly moulded. Therefore the baby has to be carefully guarded. To keep the demons away a baby is rarely left alone in a room. If it is absolutely necessary to leave the baby an iron object is left near the baby or a metal amulet on a thread is tied around baby's neck to keep the demons away.

There is a trend toward more privacy of women as the effects

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of urbanization spreads and creation of middle class families occurs. Keeping women at home is a symbol of the higher status of the family as it indicates that the female labour is not needed. Such families are willing to pay for latrines to achieve the privacy they provide.

There is also a trend toward increasing use of bottle-milk for infants instead of breast feeding. Bottle milk is a status symbol for young women in the emerging middle class family. However the elder women are against this practice. In other countries the implication of bottle feeding under conditions of poor quality water has been increased occurrences of diarrhoea.