N.W.F.P.

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

Final Strategic Investment Plan

VOL. II (Appendices)

September, 1989

Wardrop - Acres
Cowater International
NESPAK.

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VOLUME II

LIST OF APPENDICES

APPENDIX 1

APPENDIX 1: WATER RESOURCES

1. Topography

Covering an area of over 100,000 sq.km it shares borders with Baluchistan Province, Gilgit agency and Jammu and Kashmir. The River Indus forms a boundary with the Punjab and the entire region extends to the boundary with Afghanistan on the west.

Although NWFP is the smallest province in Pakistan, it has the most varied topography. Landscape ranges from Hindukush mountains which overlook the district of Chitral to the flat, alluvial plains of Peshawar Valley. South of here are the limestone and gravel plains around D.I.Khan. The River Kabul flows across the province to join the Indus at Attock.

Geomorphologically the entire province can be divided into three zones having distinct characteristics. The Sufaid Koh and its eastern extensions act as the central intermediate boundary between the north & south, containing for the most part the right bank catchment area of the Indus. The northern zone extends from the rugged and partly glaciated mountain ranges of the Hindu Kush down to the northern edge of the central zone in Peshawar Valley. Most of the consolidated rocks are of Paleozoic age and are igneous and metamorphic in origin. The southern region on the other hand is generally composed of exclusively sedimentary rocks with all stages of the tertiary era very well developed. These rocks are less resistant to erosion.

Physiographically the Province can be categorized in seven areas:

North-West Hills
Sub mountain Indus Region
Trans Indus Tract
The Peshawar Plain
Kohat Valley
Bannu Low Lands
Indus Plain.

The northern boundary lies at an altitude of 4877 m, with some peaks over 7300 m high in the Hindu Kush range. Minor ranges, emerging from the Hindu Kush System,

descend gradually towards Dir, Kohistan and Swat. These have achieved an altitude of about 5500 m in the north, carrying many permanent glaciers.

The sub mountain Indus region consists of comparatively less elevated Himalayan mountains.

The Trans Indus Tract lies between the Indus River, the north western hills and the plains of Peshawar, Kohat and Bannu.

The Peshawar Plain forms a great, circular, fertile low-land of about 6500 sq.km of hill grit, except the river Indus in the South East. The Kohat valley is higher than Peshawar and Bannu Valleys, at a ground level elevation of 457 m above means sea level. Bannu low land is from 244 m to 457 m above means level and is enclosed by hills.

Except Dera Ismail Khan, which represents a part of the Indus Basin, all the valleys are surrounded by hills which usually offer steep gradients on their northern margins and a gentle southern face.

2. Drainage

Nearly all the rivers of the Province, except the Kunhar which flows down the Kagan Valley, drain into the Indus River System. The Indus is one of the principal rivers of the World. It rises in the mountainous catchment of the Himalayas and enters into the Province near Darband. At Attock it receives the Kabul River, flowing from Afghanistan, then flows due south forming a boundary between the Punjab and NWFP. The other main tributaries draining from the West Bank are the Kurram and Gomal Rivers which are less seasonal in character. There are numerous small streams, many of which carry water only after a severe summer thunder-shower.

3. Geology

The geology of the area has been greatly influenced by the formation of the Himalayas. During Middle Tertiary period the Indian Sub Continent moved northwards on a collision course with the Eurasian continent. The collision resulted in shearing the Indian plate below the Eurasian. The rigid mantle of the Indian plate was subducted under the Eurasian plate but the crust on top of the Indian plate was deformed into

many overfolds. Meanwhile the Eurasian plate was uplifted, causing the younger layers of the crust to slide south-wards on a base of plastic clays and salt layers of the Kohat saline series. During the same period, an igneous eruption took place in the Western Flank, bringing the egneous rocks in contact with the sedimentary group. Under the influence of these igneous intrusions, the rocks metamorphosed forming crystalline limestone exposed on a large scale. The filling of Bannu basin most probably started after the emergence of salt range which cut off Peshawar and Bannu basin from Indogengetic geosyncline.

The rocks of NWFP can be grouped into four broad units:

Paleozoic, of Igneous and Metamorphic origin.

These rocks occur in the north and north-west of the Province and are mostly associated "Hornblendic Group". The rocks exposed is hornblende-gneisses, followed by intermediate and basic rocks, and metasediments such as quartzite.

These rocks are dominant in Bajur and Mohmand Agencies/ Khyber agency, Talash, Adinzai areas and the left bank the of Indus River.

Mesozoic, of Sedimentary Origin.

Consolidated rocks of South and South-Western part of the Province are mostly covered by limestones, sandstones and shales of sedimentary origin. These rocks are widely distributed in the Kurram agency, North Waziristan, South Waziristan, Khyber Agency. Orakzai area and sufed Koh Parachinar, Kohat range, left bank of Kurram river agrey to dark grey limestone is dominating.

Tertiary

The central and south eastern zone is mostly covered by limestone, sandstone, siltstone, shale and clays of Eocene to Miocene in age. These form a major proportion of the consolidated rocks in Kohat Ranges, Suleman Range, and hills surrounding Peshawar and Bannu basins.

Unconsolidated deposits, of Quaternary age.

Sediments of Pleistocene and recent epochs were laid down in independent depressions related to the present Orogenic structure. These are mostly alluvial sediments derived by erosion of the mountains, and deposited by streams and rivers transported from distant areas. Near the foot hills deposits are generally coarse grained gravel and gradually become finer towards the centre of the valleys. Sand, gravel and clays are the main constituents.

4. Climate

The climate of NWFP varies from severe cold winters and mild hot summers in the mountainous areas in the north, to very hot summers in the plains towards the south. In the plains May and June are the hottest months with daily maximum temperatures normally exceeding 40 C and seldom below 24 C. During winter, January is cold with average daily temperatures varying from 5 C to 16 C. In the mountainous areas summers are pleasant with severe winters having temperatures below freezing point.

The average annual precipitation in the Province is indicated in Fig. 2.1.3/2, adapted from NESPAK. Precipitation during the winter months i.e. November through April, is widespread rain in the plains and largely in the form of snow in the mountains. During summer rainfall occurs mainly as thunder storms and showers, often intense but of short duration. Also there is a wide variation in precipitation both in amounts and distribution over the year. In the mountainous areas in the north it usually exceeds 50" and in the plain areas towards the south is 10" to 15". Snowfall occurs in mostly all mountainous areas from the Hindu Kush in the north to the Suleman Range in the south.

5. Water Resources

The Indus River rises in the mountainous catchment of the Himalayas, receiving a number of hill torrents. After entering the North West Frontier Province, the Indus receives the waters of four right bank tributaries: Swat, Kabul, Kurram and Gomal Rivers. The Siran River feeds the Indus River from the right bank.

The Kabul River springs out near Qila Wazir in Afghanistan, enters Pakistan and reaches Warsak.

The Swat River appears in the Hindu Kush Range near Asgoluph, flowing south westerly until it joins the Kalam River draining the central portion of Kohistan.

Gomal River rises from the Hindu Kush and has an outfall into the River Indus downstream of D.I.Khan. Besides these rivers there are a large number of small perennial streams during the rainy season. The source of surface water supply to the rural population near the edge of mountainous areas is from springs which discharge in and along the mountain front and in the adjacent bottom lands. The supply derived from springs is usually small. Discharge of most of these springs is intermittent and begins in the late spring, when the rising water table intersects the land surface, and continues into winter.

Most of the hill torrents remain dry for a major part of the year but bring flash flows during the rainy season.

Discharge data of rivers and hill torrents is inadequate and not amenable to comprehensive analysis. Most of the small streams are without recording gauges.

5.1 Groundwater

Review of available data, reports on hydrogeologic setup and groundwater conditions has indicated that:

- The unconsolidated sediments, comprising sand, gravel, silt, clay or mixtures of these, constitute the main groundwater reservoir. These alluvial deposits are of fluviatile origin and widely distributed in plain areas of various basins north and north west of River Indus, extending to the apron of the mountain highlands.

- Consolidated deposits such as limestone, sandstone and weathered igneous or metamorphic rocks in mountain terrain also yield water to settlements in limited quantities.

The aquifer in NWFP has many diverse conditions. In some places lacking in water supply, it nevertheless has some of the largest rivers and springs and some of the most copious water supplies obtained from wells. In the mountainous areas the water supplies are obtained from springs and streams. The groundwater is also exploited from thin

alluvium fill in comparatively small valleys and depressions. The area on the west side of the Indus including Mardan, Kohat, Peshawar, Bannu and D.I.Khan, groundwater occurs chiefly in the alluvial fill and people take water from open wells, and tubewells. Depth to water varies from place to place depending upon topography but ranges from 30 m to 50 m near the mountains to less than 1 m along the river, where water logged conditions prevail at some places. The groundwater in NWFP occurs in confined, semi-confined to unconfined conditions.

NWFP has five large basins:

- The inter-mountain basins of Dir, Swat and Chitral.
- River Indus;
- Peshawar/Mardan;
- Kohat/Karak; and
- Bannu/D.I.Khan.

Recharge of the aquifer in NWFP is due to the infiltration of precipitation and runoff from catchment areas, stream flow, and percolation from irrigation systems.

Withdrawals are from open wells and tubewells, springs, subsurface outflow to streams and rivers and evapotranspiration.

5.2 Development Potential

WAPDA Hydrogeology Directorate, Peshawar in collaboration with the Institute of Applied Geoscience from the Netherlands made studies and compiled data on groundwater resources of NWFP, with special reference to the groundwater development potential and promising areas where tubewells having at least 1 cusec capacity could be installed.

Three area classifications are identified:

Class - I

Areas classified as suitable for the installation of tubewells having one cusec discharge capacity are placed in this category. It is estimated that about 600 tubewells could be installed in these areas.

Selection of individual tubewell sites depends on many factors such as lithologic setup, depth to water table and water availability. In the areas where water logging is a problem, more tubewells could be installed to control water table and combat water logging, and the areas where surplus surface water is available the requirement to install a tubewell may be small.

Class - II

Where the least possibility of further development of groundwater resource exists it is classified as a Class II area. It is anticipated that further installation of tubewells in these areas may cause depletion and mining affects may become pronounced.

Class - III

Non - classified areas.
The areas in which sufficient data are not available to assess groundwater development potential are placed in this category.

It is evident that ample quantities of groundwater are available for further development in the Province.

5.3 Management of Ground water

Surface and groundwater are complimentary parts of the same source. Serious problems of groundwater are in areas where the rate of withdrawal exceeds the recharge, resulting in declining water levels. Users are unaware that they are drawing more water from the aquifer than its capacity will allow and it will be exhausted unless precautionary measures are taken.

In NWFP there is no legislation on groundwater management. Inventorying, monitoring and arranging this source is required on more scientific lines, to decide how surface water and groundwater development systems should be organized.

APPENDIX 2

APPENDIX 2: GOVERNMENT COLLEGES OF TECHNOLOGY AND POLYTECHNIC INSTITUTES

INSTITUTES	PROGRAMMES
Govt College of Technology Peshawar	DIP. Civil Technology DIP. Electrical Technology Dip. Mechanical Technology Dip. Auto Motive Technology Dip. Chemical Technology B. Tech Electronics
Govt Polytechnic Institutes	
Peshawar(Female) Peshawar	Dip. Civil Technology Dip. Electrical Technology Dip. Mechanical Technology Dip. Chemical Technology Dip. Electronics
Haripur	Dip. Civil Technology Dip. Electrical Technology Dip. Mechanical Technology Dip.Telecommication Technology
D.I.Khan.	Dip. Civil Technology Dip. Electrical Technology Dip. Mechanical Technology Dip. Auto Motive Technology
Mingora (Swat)	Dip. Civil Technology Dip. Electrical Technology Mechanical Tcehnology
Nowshera	Dip. Civil Technology Dip. Electrical Technology Dip. Mechanical Technology Dip. Printing Graphics (Plannes)
Abbottabad.	Dip. Civil Tech. Dip. Electrical Tech Dip. Mechanical Tech
Polytechnics (Planned) Bannu	Dip. Civil Technology Dip. Electrical Technology Dip. Mechanical Technology
Kohat	Dip. Civil Technology Dip. Electrical Technology Dip. Mechanical Technology
Dir	Dip. Civil Technology Dip. Electrical Technology Dip. Mechanical Technology
Swabi	Dip. Civil Technology Dip. Electrical Technology

APPENDIX 3

APPENDIX 3: CIVIL TECHNOLOGY CURRICULUM POLYTECHNIC

Ist Semester		4th Semester
Maths.	Applied Mathematics-I	C.T. Hydraulics
Gen.	Technical English-I	C.T. Surveying-III
Gen.	Ideology of Pakistan	C.T. Water Supply.
C.T.	Building Materials	C.T. Quantity Surveying-II
C.T.	Surveying-I	C.T. Theory of Structures
C.T.	Civil Engg. Practice-I	C.T. Project Management-I
C.T.	Civil Drafting -II	Gen. Islamiat
E.T.	House-Hold Wiring	

2nd Semester		5th Semester
Maths	Applied Mathematics-II	C.T. Quantity Surveying-III
Gen.	Technical English-II	C.T. Concrete Technology
Gen.	Islamiat	C.T. Construction-III
C.T.	Construction-I	C.T. Bridge Engineering
C.T.	Civil Engg. Practice-II	C.T. Soil Mechanics
C.T.	Civil Drafting-II	C.T. Project Management-II
C.T.	Surveying-II	Gen. Islamiat

3rd Semester		6th Semester
Maths	Applies Mathematics-III	C.T. R.C.C. Design
S.C.	Applied Science	C.T. Highways, Airports and Traffic Engg.
C.T.	Quantity Surveying-I	C.T. Railways, Docks and Harbours.
C.T.	Civil Drafting-III	C.T. Sanitary Engineering
C.T.	Strength of Materials	C.T. Irrigation Engineering
C.T.	Construction-II	C.T. Civil Engg. Project
C.T.	Safety Practices	Gen. Islamiat
Gen.	Islamiat.	

COURSE IN WATER SUPPLY - 17 WEEKS

Objectives

To familiarise students with the fundamentals of water supply. To acquaint students with the technical works required for purfication, storage and distribution of watger for drinking and commercial purposes.

Description

Rain fall, run-off, sources of water, underground water, impurities of water and purfication of water including disinfection and softening specifications and laying of conduits, appurtenances, conveyance of water, service reservoirs, pumping of water, distribution system, contamination of purified water and assessment of water rates.

COURSE IN SANITARY ENGINEERING - 18 WEEKS

Objectives

To familiarise students with the construction and maintenance of sewers, collection, conveyance and disposal of sewage.

Description

Sewage and Sewerage, combine and separate sewers, quantity of sewage, collection of sewage, flow through and section of sewers, pipe sewage, construction and maintenance of sewage disposal, decomposition of sewage, disposal by dilution and irrigation, screening, sediment sludge process, filtration, sludge disposal.

COURSE IN PROJECT MANAGEMENT - 17 WEEKS

Objectives

To familiariese students with the methods of keeping proper managements of projects which

would come under them. To develop know-how of management at project site and in office; to acquaint students with procedure of tendering and executing works including maintenance of accounts of cash and material; Report writing etc.

Description

Management procedures and human psychology. Works account code; Measurement books; Muster rolls; Major Minor, supplementary and revised estimates. Procedure of leting out works on contract basios - contract documents payment procedures; technical sanctions and administrative approvals. Developing power of expression of students by writing various reports; completion report and progress report of a project.

COURSE: PROJECT MANAGEMENT PART-II - 17 WEEKS

Objectives

To familiarise with the detailed procedures of preparation of records, survey, field work and drawings of a project. Lists of tools, equipment, furniture, drawing material etc, are to be prepared by students. Methods of efficient management at project site are to be adopted.

Description

Procedure of tenders for a Drawings of a project, Establishment and record for a project, Tools plants, equipment and furniture for a project Bye-Laws of a project, Code and procedure of maintaining accounts of a project, Economic feasibility of project, Surveys, Layouts, Centering and shuttering of a project. Claims, compensation, overtime and welfare schemes for-staff. Specifications of various items of civil engineering projects. Complete report of project.

APPENDIX 4

APPENDIX 4: COMMERCE COLLEGES AND PROGRAMMES

Institutes	Programmes
Peshawar	C. Commerce D. Commerce B. Commerce B. Commerce M. Commerce
Mardan	C. Commerce D. Commerce B. Commerce
Abbottabad	C. Commerce D. Commerce B. Commerce
Kohat	C. Commerce D. Commerce B. Commerce
Bannu	C. Commerce D. Commerce B. Commerce
Thana	C. Commerce D. Commerce B. Commerce
Chitral	C. Commerce D. Commerce B. Commerce Dip. Mechanical Technology
(Planned) Swabi	C. Commerce D. Commerce B. Commerce
Karak.	C. Commerce D. Commerce B. Commerce

APPENDIX 5

APPENDIX 5: **GOVERNMENT VOCATIONAL INSTITUTES**

GOVT. Vocational Institutes (MALE):

SETTLED AREAS:

- Kohat;
- Bannu;
- Tank;
- Swabi;
- Ghazi;
- Chakdara;
- Hangu;
- Thall;
- Karak; and
- Charsadda(Planned).

F.A.T.A.

- Jandola(F.R.D.I.Khan);
- Bara(Khyber Agency);
- Khar(Bajaur Agency);
- Miranshah(N.W.Agency);
- Kalaya(Orakzai Agency);
- Wana(S.W.Agency);
- Ekka Ghund(Mohmand Agencg); and
- Sadda(Kurram Agency).

Government Vocational Institutes(FEMALE):

PROVINCIAL GOVERNMENT.

- Peshawar;
- Nowshera;
- Mardan;
- Abbottabad; and
- D.I.Khan.

WOMEN'S DIVISION.

- Swat;
- Kohat;
- Bannu;
- Swabi; and
- Mansehra.

The above institutes offer the following courses:

Male	Female
. Machinist	. Knitting
. Plumber	. Enbroidery
. Automechanics	. Tailoring/dressmaking
. Draughtsman	. Handicrafts.
. Welding	
. Electrician	

APPENDIX 6

APPENDIX 6: PUBLIC HEALTH ENGINEERING COURSE AT THE UNIVERSITY

1. **Course Work**

- physical, chemical and biological characteristics of water and wastewater;
- sampling and analysis;
- water quality and health/water related dieases, water quality standards;
- basic quality and quantity requirements for water supply and sanitation in rural and urban communities;
- sources of water and their characteristics;
- cause, effects and control of water polution;
- theory and practice of methods for water and waste water treatment.
- sewerage schemes, need for treatment and selection of processes, effluent and sludge disposal;
- source protection, conveyance of water, simple treatment processes, operation and maintenance requirements;
- rural wet and dry sanitation systems, excreta reuse, simple sewerage schemes, sullage handling; and
- practical work based on the proposed course contents of Public Health Engineering;

2. **Laboratory Work**

2.1 <u>Basic Chemical and Physical Characteristics of Water and Waste Water.</u>

- colour;
- turbidity;

- conductivity;
- total solids;
- suspended solids;
- pH;
- alkalinity;
- hardness; and
- hissolved oxygen.

2.2 Organic Strength and Nitrogen Content.

- B O D;
- C O D;
- ammonia nitrogen; and
- aitrate nitrogen.

2.3 Bacteriological Examination

- total colony count; and
- coliform count.

2.4 Treatment Processes Laboratory

- sedimentation;
- coagulation of water;
- filtration of water; and
- biological oxidation of wastewater.

3. Equipment

The following equipment for the NWFP University of Engineering and Technology, Public Health Engineering Laboratory was supplied by WHO.

- Hach dr/3 portable spectrophotometer with conductivity meter;
- Hach portable turbidimeter;
- Hach portable DO meter;
- Hach COD apparatus;

- Hach pH meter;
- Sartorious 200/0.1 mg balance;
- muffle furnace Gallenkamp.115x125x170 mm;
- drying cabinet Gallenkamp;
- drying oven Gallenkamp equivalent;
- Aqua 4200 water still;
- Edwards Speedivac 2 vacuum pump;
- water bath 12-place;
- water bath and cover;
- incubators, 2;
- autoclave;
- Olympus BHT/312 microscope outfit;
- magnetic stirrers, 2;
- desiccator cabinet;
- Millipore portable water analysis kit;
- Hach BOD apparatus; and
- Hach floc tester.

APPENDIX 7

APPENDIX 7: **TECHNICAL TRAINING CENTRES**

PROVINCIAL PROGRAMME

NAME OF INSTITUTE: TECHNICAL TRAINING CENTRE PESHAWAR

ESTABLISHED IN 1925

S.No.	Trade	Seating Capacity Morning	Seating Capacity Evening	present enrolment Morning	present enrolment Evening	Output during 1987-88
1.	Turner/Bench fitter/Machinist.	60	30	-	15	2
2.	Welding	24	-	-	6	1
3.	Auto Diesel Mechanic	48	30	45	16	28
4.	Plumber/Pipe Fitting	12	15	17	1	5
5.	Electrician	48	30	48	19	37
6.	Radio & T.V. Mechanic.	30	15	30	8	23
7.	Carpentry	40	-	20	6	
8.	Refrigeration & Air-Conditioner	30	15	40	22	29
9.	Draughtsman Mechanical	48	-	41	-	19
10.	Draughtsman Civil	-	30	-	28	Result awaited
11.	Tailoring	10	-	19	-	11
12.	Electric Supervisor	-	-	-	-	-
13.	Textile					
14.	Tractor Mechanic.	-	-	-	-	
15.	Mason	-	-	-	-	-
	Total	350	165	316	94	179

PROVINCIAL PROGRAMME

NAME OF INSTITUTE: TECHNICAL TRAINING CENTRE D.I.KHAN

ESTABLISHED IN 1974

S.No.	Trade	Seating Capacity Moning	Seating Capacity Evening	Present Enrolment Morning	Present Enrolment Evening	Output during 1987-88
1.	Turner/Bench fitter/Machinist.	32	32	5	2	2
2.	Welding	16	16	-	12	1
3.	Auto Diesel Mechanic	16	16	0	5	9
4.	Plumber/Pipe Fitting	-	-	-	-	-
5.	Electrician	16	16	9	11	43
6.	Radio & T.V. Mechanic.	16	16	8	16	23
7.	Carpentry	16	16	-	6	-
8.	Refrigeration & Air-Conditioner	-	-	-	-	-
9.	Draughtsman Mechanical	16	16	4	2	21
10.	Draughtsman Civil	16	16	18	19	34
11.	Tailoring	-	-	-	-	-
12.	Electric Supervisor	-	-	-	-	-
13.	Textile	-	-	-	-	-
14.	Tractor Mechanic	-	-	-	-	-
15.	Mason	16	16	-	5	-
	Total	160	160	50	78	133

PROVINCIAL PROGRAMME

NAME OF INSTITUTE: TECHNICAL TRAINING CENTRE MINGORA

ESTABLISHED IN 1984

S.No.	Trade	Seating capacity Morning	Seating capacity Evening	Present enrolment Morning	Present enrolment Evening	Output during 1987-88
1.	Turner/Bench fitter/Machinist.	16	16	5	18	15
2.	Welding	16	16	1	4	4
3.	Auto Diesel Mechanic	16	16	17	19	6
4.	Plumber/Pipe Fitting	16	16	1	12	5
5.	Electrician	16	16	16	33	21
6.	Radio & T.V. Mechanic.	-	-	-	-	-
7.	Carpentry	16	16	-	5	5
8.	Refrigeration & Air-Conditioner	-	-	-	-	-
9.	Draughtsman Mechanical	-	-	-	-	-
10.	Draughtsman Civil	-	-	-	-	-
11.	Tailoring	-	-	-	-	-
12.	Electric Supervisor	-	-	-	-	-
13.	Textile	-	-	-	-	-
14.	Tractor Mechanic	-	-	-	-	-
15.	Mason	12	12	-	-	-
	Total	108	108	40	91	56

APPENDIX 8

APPENDIX 8: **APPRENTICESHIP TRAINING CENTRE**

PROVINCIAL PROGRAMME

NAME OF INSTITUTE: APPRENTICESHIP CENTRE, MARDAN

ESTABLISHED IN 1988

S.NO	TRADE	Seating Capacity Morning	Seating Capacity Evening	Presebt enrolment Morning	Presebt enrolment Evening	Output during 1987-88
1.	Turner/Bench fitter/Machi-nist.	32	16	23	12	Result awaited
2.	Welding	16	16	5	4	-do-
3.	Auto Diesel Mechanic	16	16	17	14	-do-
4.	Plumber/Pipe Fitting	-	-	-	-	-
5.	Electrician	-	-	-	-	
6.	Radio & T.V. Mechanic.	-	-			
7.	Carpentry	16	16	9	-	-do-
8.	Refrigeration & Air-Condi-tioner	-	-	-	-	-
9.	Draughtsman Mechanical					
10.	Draughtsman Civil	-	-	-	-	-
11.	Tailoring	-	-	-	-	-
12.	Electric Supervisor	-	-	-	-	-
13.	Textile	-	-	-	-	-
14.	Tractor Mechanic	-	-	-	-	-
15.	Mason	-	-	-	-	-
	Total	80	80	151	31	34

APPENDIX 9

APPENDIX 9: **SOCIAL SURVEY AND ASSESSMENT OF COMMUNITY BASED ORGANIZATION AND UNION COUNCIL SURVEY**

1. **Social Survey**

The questionnaires for the surveys of Community Based Organizations in NWFP had as their objective to collect data on CBOs so that their role and stage of development could be understood to identify the institutional arrangements for community involvement in future water supply, sanitation, health and hygiene education projects. The following were the main guidelines and key issues:

- perception of CBO's;
- knowledge and awareness (sector related);
- capacities and cabilities;
- leadership;
- women's involvement; and
- communication and information linkages.

The questionnaires were in both Urdu and English language for clarification and time savings. Questions were open ended and descriptive.

The province was divided into 3 physiographic zones: North, Central and South.

Communities were selected to be representative of categories of population greater than 500 and less than 500, with and without water supply. 60 villages were selected in the field as having development oriented village organizations.

1.1 Northern Zone

The Nothern zone comprises Hazara and Malakand Divisions which are characterised by mountainous terrain with forests and plains. Water quality in general is classified as sweet and potable. However water availability at convenient distances can be an issue. Main water sources are perennial springs and streams, which flow with varable discharge. In some valleys groundwater is also readily available.

Socio-Cultural and economic status is determined by agriculture, labour, farming and forestry as a means of livelihood.

Population density in these Northern areas is found to be medium to low. In some northern areas, e.g. Kohistan, the population is nomadic and scattered.

1.2 Central Zone

The Central region comprises Peshawar and Mardan Divisions and is characterised by the flat plain irrigated by canal systems fed by the Kabul and Swat Rivers.

Ground water quality is generally good and is fit for drinking purposes. It is the main water source and is often found at convenient depths of 20 to 60 ft. Surface water is also available from the canals and rivers.

The Central region is mainly an intensive agricultural zone, irrigated by canal systems. Sugar-cane, beet, tobacco and fruit are cash crops grown in the area.

Population density in the central region is relatively the highest of the three divisions.

1.3 Southern Zone

The Southern zone comprises Kohat and D.I.Khan Divisions and is partly plain and hilly but arid, desert terrain.

The quality of ground water is often poor due to salinity and areas of D.I.Khan, Bannu and Karak are marked with shortages of water. Rain water collected in ponds which is unfit for drinking, is used in some areas, particularly those without water supply schemes. The ground water depth in some areas exceeds 400 ft.

The population density is low but clustered. Apart from some small tracts of irrigated land there are no significant agriculture and cash crop oriented activities.

2. Methodology

The recording of information was done during the survey in the field according to the guidelines attached. Analysis was carried out at the provincial office. A detailed review was made at the end of each field record in order to add information while still fresh in the mind of the surveyor. An analysis sheet was devised at the provincial office which tabulated information. A final review of the questionnaires was made to complete the analysis sheet.

The 'issue' of not reaching the rural women due to 'purda' was settled by using female extension staff from the Local Government and Rural Development Department.

On reaching villages the surveyors held preliminary discussions with members of the villages to determine if there was a village organization or not. If not no further survey of the village was undertaken at that point. This occured in some 35% of cases. A repeat visit, however revealed that half of the rejected villages did have VO's but they were not readily apparent.

The rural area survey preempted the necessity to hire 'Pushto' speaking staff except in some areas in D.I.Khan, and Hazara where Pushto is not spoken. The translation of the English/Urdu questionaire facilitated the task of the surveyor where villagers were concerned.

The problems faced included the training of the survey team which coincided with the month of fasting and repeated visits in some instances to locate CBO's and persons who could best answer questions.

The institutions/persons interviewed were:

- Local Councils;
- Mosque Communitees;
- Local Leadership;
- C.B.O (registered and unregistered);
- male and female members of communities; and
- related institutions.

A second survey was carried out using mailed-in questionnaires.

The objective of the survey was to gain a better insight into village capabilities and sector involvement using a much broader sample of villages than the CBO survey offered.

The questionnaire, written in "Urdu" for clearer understanding had both open and closed ended questions pertaining to population, water supply and other infrastructure, willingness to contribute, schools, health facilities and training centres.

A random sample within the 655 union councils was undertaken and a short follow-up survey was deemed appropriate to assess the reliability of the responses received.

3. Analysis

It is estimated that some 80% of villages in NWFP do have active VO's in multi-disciplinary activities. On the basis of the data collected from the field and summarized in Table 2.2.13.1, their distribution is as follows:

Table 2.2.14.1: DISTRIBUTION OF VILLAGE ORGANIZATIONS BY TYPE - in % by ZONE.

	Formal	Informal	Trad.Leader	MosqueL.Counc	
Southern	46	25	11	18	0
Central	69	13	5	0	13
Northern	38	31	12	19	0
Total %	51	23	5	10	11

Formal VO's are those which have been registered with the Social Welfare Department and are therefore eligible for government support. Informal VO's are those which are not registered, they can be the leadership grouping within the village or any other non-registered group having a development orientation. Only those VO's with development orientation were considered in this analysis. The mosque committee was considered as a VO if it had a development orientation. In many cases members of the mosque committee were also active in village leadership and members of other VO's. The VO's listed above represent the most active in each village, and the most likely to succeed in executing projects within this sector. The local Councillor and tribal leader are both individuals. The local councillor representrs Union or District Councillors who have

relinquished their office but continue to exert influence over the village and its development.

Half of the villages surveyed had formal Vo's. In the northern Districts, 70% had village organizations, the rest had either a mosque committee or traditional leaders having strongest influence over development projects. In central zone Districts, communities with VO's reached even higher (81%); however, the mosque committees were not found to be as strong as in the other zones. In the south, half of the VO's were informal. Overall, 2/3 of the VO's had become registered. By reason of greater access to Peshawar, higher levels of education, knowledge of government and communications, those VO's in the central zone have taken greater advantage of opportunities available to them through government and become registered.

With respect to all villages in the province (not only those surveyed) it is estimated that 80% have some sort of development organization, and 70% of these are formal or informal VO's. Adding to these the development oriented mosque committees results in an estimated 2/3rds of all villages having formal, informal organizations or development oriented mosque committees. This proportion is likely to be an underestimate, as only those villages with "apparent" VO's on first visit were included in the survey.

Of greatest interest is the fact that only 4 out of the 60 villages surveyed had no village based infrastructure development or construction experience. Almost all had built their own mosque (which included water supply) in self-help projects. Drains and streets are also traditionally a function of the Local Council/community. Thus over half of the villages had constructed drains and streets themselves. This reflects the nature of construction and the ease of later maintenance. There is also widespread concern for public cleanliness reflected in the perceived need and action taken in village clean-up through drains and street construction. When roads are added to streets and drains nearly three quarters of all villages surveyed had undertaken construction of this type through their village organizations. Formal water supplies were undertaken by only ten of the 60 villages, almost all being in the northern zone. This shows the relative complexity and higher level of capital required for construction. Gravity schemes predominated, being feasible in the northern zone. Other types were communal hand pumps and open wells. Further down on the list are schools, bridges, culverts, community halls and irrigation channels indicating a wide variety of community projects and capabilities embodied within the VO's.

The degree of VO success was measured through discussions within the community and took into consideration a broad spectrum of public opinion about the particular village organization. It is therefore, not limited to the actual projects undertaken. Low degree of success reflects the collapse of the VO as witnessed by the community. Corruption, self-seeking orientation of the VO and absence of the "active" member were reasons given for collapse. Such instances were relatively rare (5%). (57%) were considered to be VO's of medium success as measured by having projects which had been successfully completed. The remainder were very successful not only having completed projects but going on to expand them reaching at least the planning stages.

Sustainability took all projects and the VO itself into consideration. Few projects had failed. Development activities had been sustained in nearly all cases. Medium sustainability was determined when projects and the VO had continued over time without significant periods of failure. High sustainability required expansion of existing projects or revival of a defunct one plus continued on-going sustenance of current projects. Over 90% of VO's were categorized as having medium or high sustainability. Community consciousness was a measure of the degree to which the community was conscious of the VO, its leadership, and its projects, existing needs for development within the community and means by which they might be met. Community consciousness was generally high in the sample studies, especially in the central zone where communications and education are relatively high compared to the other two zones. High community consciousness is reflected in community members being very aware of details, needs and projects; medium consiousness less so but still being aware. It is apparent that community members are generally aware of their VO's, this being a reflection of the VO's being an essential part of the fabric of village society.

The survey considered the leadership of the VO. Such elements as acceptance of the leader, his representing the broad spectrum of views within the community, his being held in respect, trust and demonstration of leadership through projects and development oriented activities. Low leadership indicates those who have lost their political power base or lost respect and have become ineffective as leaders of organizations within the community. It also indicates a reduced interest in development activities which is often accompanied by increased vested interest and the use of the organization to further political ambitions. In such cases the VO has often established a group leadership in his place and carried on. Otherwise, leadership was found to be generally strong as reflected in the success of projects and development activities undertaken.

The degree to which experience gained in these projects can be used in future water supply projects is reflected in the results. Consideration was given to the types of projects undertaken in the past, their content and complexity. Although only ten of the VO's had been directly involved in community water supply projects nearly all of them had built mosques. Almost all of these had a water supply component, thus, experience was gained in provision of communal water supply albeit on a small scale.

The ability to raise funds from within the community is important to future self-help activity in this sector. Consideration went beyond the amounts of funds collected to include how and why. A high ability was measured as the VO taking on the total initiative to raise funds for the project. In nearly all instances, cash was only part of the contribution, land, labour, materials, equipment and supplies were also generated from within the community. High capacity in this regard was also reflected in the VO to project itself positively inside and out of the community. Not only the affluent and influential would contribute but also the lower income status groups, although in proportion to their capacity. Funding and contributions needed to not only be derived from inside the community: lobbying outside sources was also considered. Success usually involved a retired experienced person in the VO being responsible for fund/contribution raising.

Crisis or emergency fund raising usually resulted in families contributing Rs. 10 to 100 depending on ability. Thus from Rs. 2,000 to 3,000 is possible depending on the reason. Commonly, members (normally 30 to 100 of them) pay membership fees in the order of Rs. 10/m.

The effectiveness of group decision making reflects the ability of the VO to make decisions for the community as a whole. Larger VO's generally succeeded as their leadership was spread over several members. Accountability was an important question, the Jirga being highly accountable to the community. The majority of VO's were found not to be able to make effective decisions for the whole community due to the make up of its leadership. This is a reflection of the hierarchical pattern within the village society as a whole. There are means for the lower strata to be heard such as the Hujra or Mosque Committee meetings which are democratic in nature.

An understanding of government structure and procedures is highly desirable in the communities which have to relate to government for services. Various questions were

asked in the villages which revealed overall understanding of government activities in the sector. At the extreme end, many did not realize which agency had installed their water supply facility, thinking it was the Union Council and Local Government or elected members, whereas in reality the PHED had installed and was the maintaining it.

For the most part, villagers had only medium understanding, reflecting a lack of awareness and hence missed opportunity and inability to hold government in any way accountable for services provided. A deficiency exists here which would require correcting should greater reliance be placed on the community and hence government/community interaction for project implementation. The exception was in the central zone where education and access was higher than the other zones.

Discussions in the sample villages included viewpoints on women. Both women and men were interviewed. Topics included the education of girls, decision making in the community by women, women's income generation, women's control over money matters, female participation in multi-purpose social activities, infrastructure such as community halls for women, female participation in agricultural and water fetching activities. The data (Table 2.2.14.1) illustrates that in the so-called backward areas attitudes towards women were more conservative and restrictive (this was particularly true in Kohistan where in the whole of the District there are no high schools for girls). Other such attitudes prevailed in the Districts of Dir, Abbottabad, D.I.Khan and Kohat. The Central zone Districts were more positive in their attitudes towards women.

Questions and discussion also related to the community member's knowledge of the sector. Most centered around the individual's knowledge of health and its inter-relationship with drinking water and excreta. Other topics included basic understanding of water supply and wastes disposal. Low knowledge indicates less than 10% correct knowledge. This occurred in Tor Dher (Swabi) where there was little to no interest in water supply improvements, in the very remote community of Kehwari (Mansehra) and Drosh (Chitral). In general however interest was strong and knowledge was medium to high. Again, the highest level of knowledge occurs in the central zone.

An understanding of how information (particularly related to the sector) was obtained through discussions on past projects. That is whether the information flowed through the Union Council, through community leaders, or the VO itself. Also of interest was whether the community was passive in receiving information or did it actively go out in

search of it, and how. Low information dissemination characterizes a passive community which receives information and neither channels it through to the various groups within the community nor does anything with it. High levels of dissemination are evidenced again in the central zone where people are active in gathering information from outside the community and putting it to use within. The best Districts in this respect were Peshawar and Charsadda, as expected.

Willingness to pay for improvements was approached qualitatively. It was observed that community members were willing to pay where there was a substantial and perceived need for the service, acceptance of past practices in funds management within government run programmes and adequate income levels. Where these conditions were satisfied, there were no negative responses. There were however, many communities which indicated a conditional response. That is to say: "when we actually see the water pipes and system going in then we will be willing to pay". Preference was also stated for projects which "deliver" promptly in a short time. In general, the understanding of level of payment for operation and maintenance was Rs. 20/month during these discussions.

4. Conclusions

The conclusions drawn from the survey and assessment are as follows:

- community based organizations with a potential to take an active and responsible role in operation and maintenance exist throughout the province;

- these organizations have had extensive experience in self help project (mosque, streets, roads, drains and water supply, construction) which are relevant to self-help project development in this sector;

- success of installation and sustainability have been medium to high and could be enhanced with training or other support;

- decision making and leadership tends not to represent the broad base of society within the community which could adversely effect the provision of services to the lower income and less influential groups;

- the ability to raise resources from within the community is good, however a general lack of understanding of government procedures and external opportunities coupled with limited communications hampers the active search for technical assistance and externally derived resources;

- the consumer is willing to pay provided there is a need and that the service is rendered fairly and well; and

- there are several factors which appear to be influenced by education levels, access, income and communications. These include attitudes towards female participation, understanding of government, knowledge of the sector, information dissemination, representativeness of the broad base community in decision making, community consciousness and sustainability. These are all higher and more positive in the central zone and auger well for the success of self-help projects in this sector.

5. UNION COUNCIL SURVEY

A questionnaire written in Urdu was mailed to Union Councils in the province. Since each Union Council represents more than one village, the total number of villages on which information was received was 1,698, distributed as follows:

Large Settlement	713
Medium Settlement	632
Small Settlement	353
Total:	1698

The questionnaires concerned sector related information on population, needs, coverage, community participation, sanitation, infrastructure, health and private sector involvement with sanitation linkages. The questionnaire was sent out in March/April and responses were initially received from April to end of June, 1989.

Districts with high responses were Swat, Dir, Manshera, Abbottabad; and those with medium responses were Kohat, D.I.Khan, Bannu, Peshawar. Low responses were received from Malakand, Charsadda, Swabi, Chitral and Kohistan.

One reason for low responses was the creation of new districts Charsadda and Swabi hence records were at a preliminary stage of compilation and analysis.

D.I.Khan, Bannu and Kohat all revealed water supply as their basic need in small, medium and large communities, reinforcing the view that the south is a high need area.

The responses indicate that water supplies have been provided in the following percentage of communities:

Small settlement	25%;
Medium settlement	40%; and
Large settlement	51%.

These figures correspond to the overall estimated coverage of 59% of the people.

The analysis reveals that local councils have been developmentally active in large settlements where they provided 173 schemes compared to 254 schemes provided by PHED. This is contrary to common understanding that Local Councils do not operate in large settlements.

Local councils indicate their maximum activity in areas which mostly use gravity flow schemes. The degree of village involvement in schemes is small and tallies with the results of the CBO's survey.

One information gap is evident in the shape of UNICEF involvement in the sector. The response report no involvement of UNICEF coverage in Manshera for example which is erroneous.

In larger settlements, the use of house connections is considerably greater than in the small communities. In the central zone use of house connections is larger than the southern zone. In the south, water supply is a more critical need. Affordability is greater in the centre than south due to higher income level.

The maximum usage of wells is in Malakand in the North, Charsadda and Mardan in the central and Kohat in the south in PHED schemes. In Mansehra and Chitral, where

UNICEF is in collaboration with District Councils, the PHED involvement in O&M has been reduced:

	No of Schemes Constructed by PHED	No. of Schemes with PHED in 0 & M
Mansehra	10	6
Chitral	2	0

In sustainability, satisfaction with the operation is reported in 72% of small communities, 88% of medium and 90% of large.

In the north alternate sources for water and in 91% of the cases are rivers and streams.

In the south the reported use of streams is negligible. The greatest use is made of hand pumps as expected from the topography and the available water resouces. Larger settlement showed lower hand pump use, a reflection of PHED's focus on them.

Community participation is higher where no other option is available, and no service availability is seen in the remote future. Need increases willingness to participate on a self-help basis.

Latrines, which have been built on a self-help basis, are most common in the North where 4.0% of households have them. In the centre, 2.8% and in the South, 3% of households are covered.

Latrine coverage is lowest in small settlements, considered to be due to greater privacy than in large settlements.

The field survey indicates that large settlements have a greater percentage of literate people. It is evident that larger settlements require and attract more educated and skilled people to provide the services which are more common in larger settlements where educational opportunities are greater.

The highest % of drainage coverage is in the Central area, the lowest in the north. This is due to the natural environmental conditions; the mountainous terrain of the north provides a natural source of drainage through rivers and springs.

The majority of drains are reported as being constructed by local government, but some drains have also been built by villagers.

% of paved streets made of concrete, brick and gravel is highest in the central zone.

In the north e.g. Kohistan it is difficult to have paved streets and drains because of hard rock formation and intense physical effort to construct for drains.

The survey confirmed the number of primary schools per village is higher in the central zone than in the North or South, due to higher level education facilities and health facilities.

Traditional Birth Attendants (TBA) training centres are more common in the north as a result of efforts by Donor agencies and special programmes (Chitral, Manshera).

Male adult education centres are more numerous in the central zone than in the north and south corresponding to the regular education facilities. Facilities for women are more common in the south.

The greatest number of skill development centres are in the central zone.

Sector related skilled personnel in the private sector are high in all areas, but greatest in the central region. The personnel include plumbers, and hand pump installers.

These private sector personnel require:

- organization;
- training; and
- support facilities, e.g. credit and matching grant facilities.

Training for such skills is available only in the urban areas, but should also exist in the rural areas. This is evident from the survey results which show a ready availability of untrained manpower in rural areas.

APPENDIX 10

Appendix 10: **WATER SUPPLY COVERAGE: FIELD SURVEYS**

1. **Methodology**

Field surveys of rural water supply schemes were carried out in April 1989 in 103 villages in eight Districts: D.I.Khan, Bannu, Kohat, Karak, Dir, Swat, Abbottabad and Mansehra.

In May,1989 another 23 villages were surveyed in Kohistan, Kurram and in Orakzai and South Waziristan agencies in the Federally Administered Tribal Area. Repeat sampling was carried out in the District of D.I.Khan to confirm the results obtained from a previous survey.

A third round of sampling in August 1989, was carried out in 30 villages in the Districts of Chitral, Mardan, Swabi, Peshawar, Charsada, Malakand, Abbottabad and Bannu Districts.

The total number of villages surveyed was 156.

The field surveys focussed on the assessment of coverage based on:-

- population as reported by PHED and as observed;
- water usage; and
- population having less than 3 gallons/capita/day, within a distance of 1000 ft.

Population was assessed by a walk-through survey in the villages.

The total number of streets in each village was counted and then multiplied by the average number of houses, giving the total number of houses.
The average number of people per family was determined by interviews with at least 3 or 4 persons in the village.

The population of the village was estimated as the total number of houses multiplied by average family size.

The average number of houses estimated were also confirmed by interviews with local residents.

Water usage was based on interviews with at least 3 or 4 persons in the village.

The distance for house connections was taken as zero. For community tanks and standposts, usage was determined based on interviews with the local residents regarding to the number of tins or pitchers each one of them carried home daily from the water source.

The number of tins/pitchers transported each day from the water source to the individual household, multiplied by the capacity of each, then divided by the average family size yielded the average per capita consumption per distance category: 0-250' - 500'-750'-1000'.

In most cases, the existing water sources and the water system were inspected.

The survey team assessed both the PHED coverage in these villages as well as the status of the schemes. Some schemes built by District Councils were also visited in Kohat, Abbotabad, Mansehra,Chitral & D.I.Khan Districts.

2. Observations

In the south in D.I.Khan, long distance pumping of sweet water is a common phenomenon. This is necessitated due to the fact that most of D.I.Khan's ground water is brackish. Long distance pumping of sweet water however creates higher energy costs, interruption of service to large population due to load-shedding or flood demage, and minimal terminal pressures at the villages living on the far ends of the system.

Most of D.I.Khan has brackish groundwater and/or a deep water table (300'-400') with the exception of areas lying near the Indus River where handpump and/or dug well installations are possible.

Other than the Indus River the surface waters are limited and of torrential nature.

Slow sand filter plants constructed to treat surface water are mostly malfunctioning and raw water is by-passed to the villagers.

The newly created Tehsil of Banda Daud Shah has also a water resource problem as the wells there are shallow with a poor yield and there is a proposal to lay 35 miles of pipeline from Hangu (Kohat) to serve those villages, at a cost of more than 20 million rupees.

In Kohat, the water-supply situation is better than other areas in the south. However some of the PHED Schemes visited had severe water shortage problems due to low discharge of tube wells as well as inadequate pressure zoning.

In the north due to the presence of natural springs and streams the supply situation is not seem to be critical.
However Haripur Tehsil in Abbotabad and Bounir Tehsil in Swat face severe water shortage problems especially in summer. In the Galiat in Abbotabad District, people have sometime to walk as far as 5 km to fetch water for drinking.

In Kohistan where surface water is in abundance, people still have to walk long distance in some areas to fetch water, due to lack of plain areas. Most of the population to higher altitudes during Summer and back to lower elevations during winter.

In Chitral the surface water is in abundance and is generally the source of drinking water. Partial treatment in the form of sedimentation tanks is normally provided.

In Malakand District most of the schemes constructed are based on surface water although some tubewells have also been drilled.

In Peshawar District ground water is normally availaible at shallow depths making handpumps, dug wells and tubewells the most probable technologies for drinking water supply.

Nowshehra Tehsil in Peshawar District differs from the rest of Peshawar Valley in terms of water resources because of a very deep water table in areas around Nizampur.

In Mardan and Swabi the water table generally exists at very shallow depth creating a water-logging /salinity problem.

In such areas, deep drilling of tubewells is the only possible solution to obtain good quality water.

3. **FATA**

In South Waziristan most of the schemes visited were based on tubewells and Community Tanks. Water resources are quite limited resulting in water shortage during summer.

In Orakzai the situation is more critical. Natural springs have very low discharge and are unable to meet the drinking water demand.

In Kurram agency people normally depend on surface water for both drinking and washing purposes as well as for irrigation. This surface water is usually unfit for drinking. Tubewells and infiltration galleries have been installed.

4. **Rehabilitation**

Based on the results of the survey, upto 20% of PHED schemes need some kind of rehabilitation/upgrading and/or enhancement. This trend is more pronounced in the south than in the north due to problems associated with long distance pumping and low ground water table.

FIELD SURVEY DATA: COVERAGE

DISTRICT ABBOTTABAD

Village	Population Reported by Coverage PHED	PHED Reported Coverage		Estimated		Adjustmwnt to PHED %age
		%	No	%	No	(Est/PHED)
Chamba	3469	80	2775	85	2737	0.98
Khollian Bala	10712	70	7498	80	7950	1.06
Dhamtaur	7546	80	6036	85	5117	0.84
Nazarabad	1744	80	1395	85	1362	0.97
Total:	23471	75.42	17704	82	17168	0.96

FIELD SURVEY DATA: COVERAGE

DISTRICT CHATRAL

Village	Population Reported by Coverage PHED	PHED Reported Coverage		Estimated		Adjustment to PHED%age
		%	No	%	No	(Est/PHED)
Jagoor	3255	100	3255	100	3500	1.07
Baqar Abad	925	100	925	100	1125	1.21
Dapallian	375	100	375	100	980	2.61
Longa & Dhop	1280	100	1280	60	2652	2.07
Total:	5835	100	5835	82	8257	1.41

FIELD SURVEY DATA: COVERAGE

DISTRICT BANNU

Village	Population Reported by Coverage PHED	PHED Reported Coverage		Estimated		Adjustment to PHED %age
		%	No	%	No	(Est/PHED)
Sukari Zabita Khan and Karim Khan	7297	100	7297	100	6400	0.87
Kosar Fateh Khel	1633	100	1633	100	1500	0.91
Kamar Killi	4100	80	3280	50	1800	0.54
Surkari Jabbar and Hasan Khel	7921	95	7542	65	3074	0.40
Total:	20951	94	19734	78	12774	0.64

FIELD SURVEY DATA: COVERAGE

DISTRICT MALAKAND

Village	Population Reported by Coverage PHED	PHED Reported Coverage		Estimated		Adjustment to PHED %age
		%	No	%	No	(Est/PHED)
Katkanai	4166	100	4166	100	5400	1.29
Khar	5578	100	5578	100	6400	1.14
Khan Ghari	3028	100	3028	100	4000	1.32
Dargai	9333	100	93333	100	10500	1.21
Total:	22105	100	22105	100	26300	1.18

FIELD SURVEY DATA: COVERAGE

DISTRICT MARDAN/SWABI

Village	Population Reported by Coverage PHED	PHED Reported Coverage		Estimated		Adjustment to PHED %age
		%	No	%	No	(Est/PHED)
Gaddar	7648	100	7648	100	10000	1.30
Baghicha Dheri	4776	100	4776	100	7650	1.60
Fatima	7523	100	7523	100	8000	1.06
Janda	1919	100	1919	100	2240	1.16
Charbagh	2078	100	2078	100	2275	1.09
Total:	23944	100	23944	100	30165	1.25

FIELD SURVEY DATA: COVERAGE

DISTRICT PESHAWAR/CHARSADDA

Village	Population Reported by Coverage PHED	PHED Reported Coverage		Estimated		Adjustment to PHED %age
		%	No	%	No	(Est/PHED)
Dargai	8800	100	8800	100	9100	1.03
Agra	5973	100	5973	100	6300	1.05
Aza Khel Rayan	4377	100	4377	100	7000	1.59
Jardar Ghari	1628	100	1628	100	1750	1.07
Total:	20778	100	20778	100	24150	1.16

FIELD SURVEY DATA: COVERAGE

DISTRICT SWAT

Village	Population Reported by Coverage PHED	PHED Reported Coverage		Adjustment to PHED %age
		%	No	(Est/PHED)
Behrain	3017	98	6860	2.27
Camelpur	8282	98	1029	0.12
Khawaza Khela	7024	60	9600	1.36
Sonigram	417	98	1372	3.29
Kalapani	6771	98	6860	1.01
Sowaray	1750	95	998	0.57
Total:	27261	80	26719	0.98

FIELD SURVEY DATA: COVERAGE

DISTRICT MANSEHRA

Village	Population Reported by Coverage PHED	Estimated Coverage		Adjustment to PHED %age
		%	No	(Est/PHED)
Bairkund	4241	100	7000	1.65
Reerh	1556	100	2100	1.34
Ghari Habibullah	10258	100	10500	1.02
Total:	10655	100	19600	1.22

FIELD SURVEY DATA: COVERAGE

DISTRICT DIR

Village	Population Reported by Coverage PHED	Estimated Coverage		Adjustment to PHED %age
		%	No	(Est/PHED)
Mian Banda	1527	70	392	0.25
Kandaro	1205	84	885	0.73
Shalfalam	2152	100	1100	0.51
Mian Kalay	4702	100	6300	1.33
Total:	9586	96	8677	0.90

FIELD SURVEY DATA: COVERAGE

DISTRICT KOHAT

Village	Population Reported by Coverage PHED	Estimated Coverage		Adjustment to PHED %age
		%	No	(Est/PHED)
Sheikhan	4282	55	2888	0.67
Khushal Garh	2351	100	2500	1.06
Tora Gundai and Tora Wari	9787	56	3943	0.42
Total:	16420	63	9331	0.56

FIELD SURVEY DATA: COVERAGE

DISTRICT KARAK

Village	Population Reported by Coverage PHED	Estimated Coverage		Adjustment to PHED %age
		%	No	(Est/PHED)
Terri	5113	100	5200	1.01
Masoor Garh	469	91	910	1.94
Chanda Khurram	1566	77	1155	0.73
Khada	1411	85	1275	0.90
Sabirabad	3247	57	4275	1.31
Ahmed Khel	1324	100	2400	1.81
Total:	13130	80	15215	1.15

FIELD SURVEY DATA: COVERAGE

DISTRICT D.I.KHAN

Village	Population Reported by Coverage PHED	Estimated Coverage		Adjustment to PHED %age
		%	No	(Est/PHED)
Matt	1688	68	1688	0.98
Gul Imam	4532	60	3360	0.74
Kori Jamal	490	100	490	1.00
Attal Sharif	3500	55	1925	0.55
Jhok Ramazan	275	100	275	1.00
Sipra (Chohta)	198	95	1080	0.89
Wanda Nooraki	1209	90	1080	0.89
Total:	11892	65	8996	0.75

COVERAGE QUESTIONAIRE

Village: _____

Union Council: _____

Tehsil/Ta'alluka: _____

District: _____

Physiographic Unit: _____

Population: _____

WATER SUPPLY

Brief description of system;

_____

_____

_____

_____

Agency (ies) involved: PHED/LGRDD/Local NGO/foreign donor/private

If NGO or donor, specify: _____

Volume of water supplied/person/day:

Estimate range of volume considering variation in wealth and distance from source or water point:

0	-	2.5	g/c/d	_____ %
2.6	-	5	g/c/d	_____ %
5.1	-	7.5	g/c/d	_____ %
7.6	-	10	g/c/d	_____ %
11	-	15	g/c/d	_____ %
16	-	20	g/c/d	_____ %
20 g/c/d				_____ %

Estimates to be based on spot checks of households (minimum of 4) where volume is the number of vessels consumed x vessel volume or the tank size x the fraction consumed daily.

Design supply: _____ g/c/d

Why is there a difference?

Can the system currently provide more water than is demanded? _____ If so, how much more? _____

Is the system currently supplying less than the demand?

What is required to bring the actual supply up to the design supply?

_____

_____

_____

Service level:

Hours/day of service: design _____ actual _____

Days/weeks of service: design _____ actual _____

Reliability of supply:

Days/year when system does not function: _____

Causes of non-function: Lack of funds _____ %

Lack of water at source _____ %

Malfunction of system _____ %

Accident (i.e. flood) _____ %

Vandalism _____ %

If malfunction, what part and why _____

_____

_____

Water quality:

At the delivery point, is the water (circle as observed)

Clear/transparent but coloured/turbid/sandy

Your analyses: Conductivity _____ pH _____

Attach any government analyses

Is there a difference between your results and previous results?

Is so, why? _____

Distance to water point:

Distance of houses to water point:

0 (house connection)			_____ %
1	-	100 ft	_____ %
101	-	200 ft	_____ %
201	-	500 ft	_____ %
501	-	1000 ft	_____ %
1001	-	1/2 mi	_____ %
1/2	-	1 mi	_____ %
Over 1 mile			_____ %

What is the greatest distance from which people are using this system? _____

Are they paying someone to transport the water? _____

If so, at what distance from the home do people switch from walking to paying someone else? _____

What is the cost of the transport? _____

HUMAN WASTE DISPOSAL

Brief description of system:

_____

_____

_____

_____

Agency (ies) involved: PHED/LGRDD/local NGO/foreign donor/private

If NGO or donor, specify: _____

Coverage:

Population with access to waste disposal points _____ %

Population using waste disposal points _____ %

Distance to waste disposal point:

Distance of houses to waste disposal points:

0	(in the compound)		_____ %
1	-	100 ft	_____ %
101	-	500 ft	_____ %
501	-	1000 ft	_____ %

Over 1000 ft _____ %

Reliability of disposal system:

Days/year when system does not function: _____

Causes of non-function:

lack of funds _____ %

lack of water _____ %

malfunction of system _____ %

accident (ie. washout) _____ %

vandalism _____ %

other _____ %

If malfunction, what part and why _____

_____

Potential solutions to causes of system non function:

_____

_____

DRAINAGE

Brief description of system:

_____

_____

Agency(ies) involved: PHED/LGRDD/Local NGO/foreign donor/private

If NGO or donor, specify _____

Coverage:

.Population with improved drains outside compound _____ %

Reliability of drainage system:

Days/year when system does not function: _____

Causes of non-function:

too much water _____ %

solid waste blockages _____ %

other _____ %

Potential solutions to causes of system non-function:

_____

_____

RURAL WATER SUPPLY - PHED SCHEME

Questionaire on Coverage

Village Name:

District

1. PHED estimated population - reported statistics:

2. Population estimated - survey sample: _____

   Avg No. of houses in the village:

   Ask 3 or 4 peoples _____houses

   Avg. No. of persons/house: _____peoples

   Ask 3 or 4 people

   Population: Number of houses x No of persons_____

   Note:

   Verification: By walking through the village count streets. Then the number of streets x avg no. of houses/street = Number of houses. This multiplied by avg no. of people/house gives percent population.

3. % of the people for which the system was designed._____

4. (i) % of people in the village getting water within 0-250

   from water source: House Connection: _____

   Community tanks: _____

   Standposts: _____

   (ii) % of people in the village getting water within 250-500 from water source:

   H.C _____

   C.T _____

   S.P _____

   (iii) % of people in the village getting water within 500-1000 from water source:

   H.C _____

   C.T _____

   S.P _____

5. How much water people are using within 0-250 from water source:_____gal.
Mark the type of water source: H.C/C.T/S.P

Within 250-500 from water source: _____gal
H.C/C.T/S.P
Within 500-1000 from water Source: _____gal.
H.C/C.T.S.P

Note: Ask how many canisters/tins or pitchers each house gets every day and then divide that by the average persons/house. For example, if a household takes 10 tins everyday from community tank of 4 gal. capacity, usage is 10x4 = 5.7 gals. where 7 is the av. family size.

Capacity of pitchers normally varies from 2 gallons for small to 4 gallons for large.

6. Brief description of system
7. Is system operating : Yes/No
If no, then state reason:_____

Note: How many days/month and months/year not in operation? (Reasons may be electrical/mechanical breakdown, low voltage, flood damage, or other)

8. % of Design Output achieved: _____

Note: Is it operating as designed? Has there been a major reduction in capacity of the source T/well or spring? Has there been a major problem with operation and maintenance of the system since construction was completed?

What is the considered water Quality?

Clear and Clean:_____
Muddy (Turbid): _____

Salty (brackish):_____

Complaints Made:_____

Observations:

APPENDIX 11

Appendix 11: **METHODOLOGY FOR MAKING POPULATION PROJECTIONS**

The population projections in this study are being done for 1988, 1993, and 1998, which are to indicate the population at the end of each Five Year Plan. The growth rates being used are the estimated figures of the Planning Division, Government of Pakistan. Planning Division used the growth rate of 3.1% per annum for projecting the country's population up to 1988, which was empirically experienced during 1972-81 intercensal period. The other growth rate figures for 1988-93 and 1993-98 projection periods are also being taken from the Seventh Five Year Plan and Perspective Plan of the Government of Pakistan Planning Division. It may be stated however that these figures pertain only to total and urban population growth rates and that also for the whole country (no break up is give for the provinces or districts). However the difference between total and urban increase provides the incremental rural population which of course can be allocated to Districts on the basis of proportion of their rural population in 1981 weighted by the respective rural growth rates experienced.

A. METHODOLOGY FOR PROJECTING DISTRICT RURAL POPULATION FOR 1988-1993

1. Projecting the Total Population for 1988 & 1993 for Pakistan

According to Seventh Five Year Plan (Chapter 11, Para 31, Page 86), the population of Pakistan will continue to grow at an annual rate of 3.1% (which was also the inter-censal growth during 1972-81). This rate would thus be used for projecting the total population of the country up to 1988 and 1993.

2. Estimating the Urban Growth to 1988 & 1993

According to Seventh Plan (Chapter 28, Para 6, Page 236), the urban population of Pakistan is increasing at the annual growth rate of 4.8% during the 1980's. The same figures therefore can be used to estimate urban population in 1988 and 1993.

3. Finding the Rural Growth or Incremental Rural Population

The difference between the Total and Urban Population for the years 1988 and 1993

estimated in the above steps would provide the figures for rural population in 1988 and 1993.

4. **Allocation of Rural Population to Districts**

The allocation of incremental rural population to Districts for the years 1988 and 1993 would be based on the proportion of rural population of the country they had in 1981 weighted by the respective District rural growth rates experienced between 1972-1981 inter-censal period.

B. METHODOLOGY FOR PROJECTING DISTRICT RURAL POPULATION 1993-1998

1. The perspective plan (1998-1003) envisages a reduction in total population growth rate to 2.6% Per annum by 2003 (Seventh Plan, Chapter 3, Para 17, Page 24). Therefore it would be logical to use an annual growth rate of 2.8% for projecting the total population of the country during the next plan (1993-1998) up to 1998.

2. Other steps would be the same as used previously, i.e. Urban population would be projected at 4.8% per annum growth rate up to 1998. The difference between the total and urban population of the country would help in computing incremental rural population which can the be allocated to Districts as was done previously.

ADJUSTED AREAS AND 1981 POPULATION OF CURRENT ADMINISTRATIVE UNITS (DIVISIONS DISTRICTS)

ADMINISTRATIVE DIVISION	AREA	RURAL POPULATION	URBAN POPULATION	TOTAL POPULATION
PAKISTAN	796096	60412173	23841471	84253644
NWFP	74521	9395675	1665653	11061328
Malakand Div	29872	2378689	88078	2466767
Chitral	14850	208560	-	208560
Dir	5282	767409	-	767409
Swat	8788	1144923	88078	1233001
Malakand	952	257797	-	257797
Hazara Div	17195	2511846	189411	2701257
Kohistan	7582	465237	-	465237
Mansehra	5921	1076171	37436	1113607
Abbottabad	3692	970438	151975	1122413
Peshawar Div	4001	1432679	849073	2281752
Peshawar	3005	933702	717239	1650941
Charsadda	996	498977	131834	630811
Mardan Div	3045	1281897	224603	1506500
Mardan	1582	715163	166302	881465
Swabi	1463	566734	58301	625035
Kohat Div	7012	622847	135925	758772
Kohat	3642	386845	122246	509091
Karak	3370	236002	13679	249681
D.I.Khan Div	13396	1167717	178563	1346280
Bannu	4391	648821	61965	710786
D.I.Khan	9005	518896	116598	635494
FATA	27220	2198547	-	2198547
Bajaur	1290	289206	-	289206
Mohmand	2296	163933	-	163933
Khyber	2576	284256	-	284256
Kurrum	3380	294362	-	294362
Orakzai	1538	358751	-	358751
N.Waziristan	4707	238910	-	238910
S.Waziristan	6620	309454	-	309454
T.A.Peshawar	261	37061	-	37061
T.A.Kohat	446	57245	-	57245
T.A.Bannu	877	79362	-	79362
T.A.D.I.Khan	3229	86007	-	86007

DISTRICT : CHITRAL (M)

VILLAGE SIZE	1981 NO.	1981 POP	1988 NO.	1988 POP	1993 NO.	1993 POP	1,998 NO.	1998 POP
LESS THAN 200			161	19,004			138	17,972
200-499			177	62,218			173	66,558
500-999			106	79,896			116	95,244
1000-1999			52	74,259			64	100,751
2000-4999			7	19,543			12	36,428
5000,			0	0			0	0
	0	0	503	254,920	0	0	503	316,953

DISTRICT : MALAKAND (M)

VILLAGE SIZE	1981 NO.	1981 POP	1988 NO.	1988 POP	1993 NO.	1993 POP	1,998 NO.	1998 POP
LESS THAN 200			0	0			0	0
200-499			1	282			1	366
500-999			9	6,730			5	4,247
1000-1999			28	43,365			19	30,612
2000-4999			34	101,601			42	135,104
5000,			20	176,430			25	256,806
	0	0	92	328,408	0	0	92	427,135

DISTRICT : KARAK (M)

VILLAGE SIZE	1981 NO.	1981 POP	1988 NO.	1988 POP	1993 NO.	1993 POP	1,998 NO.	1998 POP
LESS THAN 200			7	599			5	253
200-499			28	9,120			24	7,987
500-999			16	11,433			19	13,620
1000-1999			27	37,341			24	34,819
2000-4999			31	106,461			29	95,874
5000,			10	110,800			18	173,905
	0	0	119	275,754	0	0	119	326,458

DISTRICT : KOHAT (M)

VILLAGE SIZE	1981 NO.	1981 POP	1988 NO.	1988 POP	1993 NO.	1993 POP	1,998 NO.	1998 POP
LESS THAN 200			12	785			11	754
200-499			17	5,709			12	4,069
500-999			35	25,551			29	21,585
1000-1999			45	65,377			39	53,476
2000-4999			57	176,004			66	208,132
5000,			22	196,835			31	293,209
	0	0	188	470,261	0	0	188	581,225

DISTRICT : BANNU (M)

VILLAGE SIZE	1981 NO.	1981 POP	1988 NO.	1988 POP	1993 NO.	1993 POP	1,998 NO.	1998 POP
LESS THAN 200			28	2,655			25	2,570
200-499			47	16,023			40	14,604
500-999			95	69,462			76	57,907
1000-1999			90	127,394			96	136,380
2000-4999			82	254,980			93	294,605
5000,			39	305,781			51	436,965
	0	0	381	776,295	0	0	381	943,031

DISTRICT : DI KHAN (M)

VILLAGE SIZE	1981 NO.	1981 POP	1988 NO.	1988 POP	1993 NO.	1993 POP	1,998 NO.	1998 POP
LESS THAN 200			107	6,586			94	5,506
200-499			79	26,526			67	22,801
500-999			91	65,178			85	62,137
1000-1999			90	124,316			98	141,434
2000-4999			73	226,337			85	277,578
5000,			24	198,960			35	315,019
	0	0	464	647,903	0	0	464	824,475

DISTRICT : KOHISTAN (M)

VILLAGE SIZE	1981 NO.	1981 POP	1988 NO.	1988 POP	1993 NO.	1993 POP	1,998 NO.	1998 POP
LESS THAN 200	318	15,124	253	6,488	217	2,993	200	1,623
200-499	118	38,460	104	23,229	90	15,573	75	11,347
500-999	95	67,883	90	43,225	91	34,595	85	28,154
1000-1999	62	87,953	90	84,107	94	72,182	93	62,219
2000-4999	49	149,376	80	170,525	94	154,196	110	161,214
5000,	17	106,441	42	244,628	73	383,833	96	504,276
	659	465,237	659	572,202	659	663,372	659	768,833

DISTRICT : MARDAN (M)

VILLAGE SIZE	1981 NO.	1981 POP	1988 NO.	1988 POP	1993 NO.	1993 POP	1,998 NO.	1998 POP
LESS THAN 200	2	8	2	9	2	11	2	11
200-499	5	1,304	5	1,544	5	1,718	5	1,853
500-999	16	11,373	13	10,167	8	6,334	8	6,832
1000-1999	34	46,584	30	43,423	29	41,351	29	44,603
2000-4999	59	212,563	50	178,234	39	124,671	40	139,463
5000,	50	443,331	66	613,148	83	768,204	82	823,635
	166	715,163	166	846,525	166	942,289	166	1,016,397

DISTRICT : SWABI (M)

VILLAGE SIZE	1981 NO.	1981 POP	1988 NO.	1988 POP	1993 NO.	1993 POP	1,998 NO.	1998 POP
LESS THAN 200	9	812	9	979	7	660	6	502
200-499	16	5,417	12	4,326	12	4,303	12	4,392
500-999	26	17,966	24	17,061	25	19,106	21	16,014
1000-1999	25	35,609	25	36,340	20	29,204	25	37,029
2000-4999	32	102,532	32	104,312	35	114,176	32	108,719
5000,	43	404,398	49	520,166	52	601,905	55	670,066
	151	566,734	151	683,184	151	769,354	151	836,722

DISTRICT : CHARSADDA (M)

VILLAGE SIZE	1981 NO.	1981 POP	1988 NO.	1988 POP	1993 NO.	1993 POP	1,998 NO.	1998 POP
LESS THAN 200	10	1,071	9	1,016	9	1,117	8	983
200-499	24	8,087	19	6,324	18	6,424	18	6,577
500-999	27	19,412	29	21,480	23	16,664	22	16,279
1000-1999	37	55,034	28	40,304	32	45,562	30	42,501
2000-4999	79	248,005	84	272,785	77	253,962	77	258,847
5000,	22	167,368	30	237,017	40	312,537	44	354,958
	199	498,977	199	578,926	199	636,266	199	680,145

DISTRICT : ABBOTTABAD (M)

VILLAGE SIZE	1981 NO.	1981 POP	1988 NO.	1988 POP	1993 NO.	1993 POP	1,998 NO.	1998 POP
LESS THAN 200	75	6,836	71	6,875	62	5,551	62	5,862
200-499	158	54,819	132	46,918	123	43,148	113	40,502
500-999	175	127,842	178	131,560	168	122,396	164	119,922
1000-1999	186	262,765	183	261,306	192	272,120	197	283,240
2000-4999	113	329,648	137	404,443	152	455,504	157	478,925
5000,	32	235,547	38	297,742	42	342,279	46	382,006
	739	1,017,457	739	1,148,844	739	1,240,998	739	1,310,457

DISTRICT : PESHAWAR (M)

VILLAGE SIZE	1981 NO.	1981 POP	1988 NO.	1988 POP	1993 NO.	1993 POP	1,998 NO.	1998 POP
LESS THAN 200	35	2,279	32	1,833	32	1,924	32	1,991
200-499	43	15,626	44	16,461	38	14,204	31	11,137
500-999	65	49,111	56	42,615	54	39,579	56	39,454
1000-1999	91	129,938	91	128,815	95	135,350	99	143,098
2000-4999	111	359,277	117	384,775	113	370,779	110	365,226
5000,	48	377,471	53	433,245	61	495,951	65	533,658
	393	933,702	393	1,007,744	393	1,057,787	393	1,094,564

DISTRICT : MANSEHRA (M)

VILLAGE SIZE	1981 NO.	1981 POP	1988 NO.	1988 POP	1993 NO.	1993 POP	1,998 NO.	1998 POP
LESS THAN 200	26	2,866	20	2,040	17	1,596	17	1,694
200-499	60	20,820	52	17,635	50	17,171	44	15,159
500-999	87	62,306	86	62,517	81	60,045	74	53,502
1000-1999	127	184,718	119	177,717	108	160,370	111	162,877
2000-4999	141	425,681	157	498,793	168	534,349	168	536,115
5000,	46	332,761	53	417,351	63	506,570	73	589,705
	487	1,029,152	487	1,176,053	487	1,280,101	487	1,359,052

DISTRICT : SWAT (M)

VILLAGE SIZE	1981 NO.	1981 POP	1988 NO.	1988 POP	1993 NO.	1993 POP	1,998 NO.	1998 POP
LESS THAN 200	396	32,122	376	30,456	360	28,800	340	30,185
200-499	337	112,871	300	102,000	286	96,954	280	105,337
500-999	294	214,214	304	218,880	300	214,500	299	237,248
1000-1999	290	405,906	288	400,320	291	407,400	298	462,988
2000-4999	90	260,565	89	258,100	93	270,165	102	328,830
5000,	19	119,245	69	433,491	96	654,371	107	691,125
	1,426	1,144,923	1,426	1,443,247	1,426	1,672,190	1,426	1,855,713

DISTRICT : DIR (M)

VILLAGE SIZE	1981 NO.	1981 POP	1988 NO.	1988 POP	1993 NO.	1993 POP	1,998 NO.	1998 POP
LESS THAN 200			467	53,723			319	37,979
200-499			714	235,740			607	204,134
500-999			432	306,373			522	370,881
1000-1999			182	241,771			297	403,683
2000-4999			52	147,537			94	266,937
5000,			4	26,255			12	81,496
	0	0	1,851	1,011,399	0	0	1,851	1,365,110

DISTRICT : FATA (COLLECTIVE)

VILLAGE SIZE	1981 NO.	1981 POP	1988 NO.	1988 POP	1993 NO.	1993 POP	1,998 NO.	1998 POP
LESS THAN 200	203	22,032	186	23,800	142	16,257	129	16,039
200-499	325	110,263	288	115,199	268	95,913	248	96,387
500-999	358	259,088	304	259,386	290	221,390	280	232,136
1000-1999	265	364,408	308	499,345	327	474,336	335	527,724
2000-4999	203	620,211	256	922,129	279	899,175	288	1,007,990
5000,	91	822,545	103	772,195	139	1,189,976	165	1,265,873
	1,445	2,198,547	1,445	2,592,054	1,445	2,897,047	1,445	3,146,149

APPENDIX 12

APPENDIX 12: WILLINGNESS TO PAY SURVEY

Table 1: WILLINGNESS TO PAY FOR BASIC LEVEL OF WATER SUPPLY SERVICE*.

(SAMPLE OF HOUSEHOLDS IN VILLAGES WITHOUT WATER SUPPLY SCHEME)

Province/ Zone	Sample	Percentage of Households Willing to pay a Monthly Tariff of (Rs) 0	1-9	10-19	20-30	More Than 30	Total
NWFP	87	8	40	33	4	15	100
North	29	7	58	35	0	0	100
Central	27	0	56	44	0	0	100
South	31	18	10	21	12	39	100

* Basic Level of water supply service is defined as a standpost scheme supply water for 3-4 hours a day, located at a distance of 500 ft from the house, and supplying water of satisfactory quality.

** Adjusted for sample bias.

Table 2: WILLINGNESS TO PAY FOR HOUSE CONNECTION.

(SAMPLE OF HOUSEHOLDS IN VILLAGES WITHOUT WATER SUPPLY SCHEMES)

Province/ Zone	Sample	Percentage of Households Willing* to pay a Monthly Tariff of (Rs) 0	1-9	10-19	20-30	More Than 30	Total
NWFP	87	10	23	27	16	24	100
North	29	9	50	41	0	0	100
Central	27	11	7	29	20	33	100
South	31	10	12	12	28	38	100

* Adjusted for sample bias

Table 3: WILLINGNESS TO PAY FOR HOUSE CONNECTION WITH SUBSIDIZED CONNECTION COST.

Province/ Zone	Sample Size	Willingness to Pay a Monthly Tariff of (Rs) 0% Connection Cost Subsidy	50% Connection Cost Subsidy	100% Connection Cost Subsidy
NWFP	61	7.06	10.35	16.85
North	11	4.00	8.75	9.10
Central	21	6.90	11.50	20.85
South	23	8.41	12.78	21.29

Table 4: PREFERRED FREQUENCY OF WATER TARIFF PAYMENT.

Province/ Zone	Percentage of Sample Households Prefer to Pay Monthly	Quarterly	Harvest Time	Total
NWFP	92	7	0	100
North	90	10	0	100
Central	92	8	0	100
South	94	6	0	100

Table 5: SUGGESTED INSTITUTIONAL ARRANGEMENT FOR THE COLLECTION OF MONTHLY TARIFFS

Province/ Zone	Percentage of Households Suggesting				
	Non Response	Provincial Government	Local Government	Village Committees	Villages Collectively
NWFP	59	39	0	0	2
North	55	42	0	0	0
Central	43	57	0	0	0
South	87	13	0	0	0

Table 6: PERCENTAGE OF HOUSEHOLDS* WILLING TO INSTALL A LATRINE WITH SUBSIDIZED INSTALLATION COSTS.

Province/ Zone	Cumulative Percentage Willing to Install with			
	Zero Subsidy	Low Subsidy	High Subsidy	Not Willing at All
NWFP	5	58	88	100
North	0	35	90	100
Central	5	51	80	100
South	10	88	100	-

* Adjusted for sample bias.

APPENDIX 13

APPENDIX 13: **PROJECT IDENTIFICATION/APPROVAL PROCESS**

The process used to identify and approve projects is a complex one which starts with a request, goes through various checks and approvals dependant on its value, and is approved and included in the upcoming ADP.

The process changes from time to time, as it was for the 1989-90 ADP. The description below is for the process which was used this year.

1. Anyone can request that a scheme be constructed in a village - resident, Union or District Councillor, MNA, or line department staff. The request must be made to the MPA because the selection of communities for new systems is made by the MPAs and DPDACs.

2. The MPA makes a preliminary priorization of the communities for which schemes have been requested, reducing the long list to a short list of 4 - 6 villages. He submits this list to the DPDAC for forwarding to PHED.

3. PHED staff do a prefeasibility study, establishing the viability of the schemes and rough costs to construct them.

4. At a meeting between the PHED staff, the MPAs and the DPDAC, the MPA makes the final selection of two communities in which water supply schemes will be constructed.

5. PHED submits a request to P and D for an allocation under the ADP which is based on:

   - the lists of new schemes to be built in two communities as selected by the MPAs; and

   - the requirements for continuing the construction of schemes started in previous years but not yet completed.

6. After discussions with PHED, P and D includes a sectoral allocation in the Provincial ADP request. Once the budget has been established, the sectoral allocation is announced, as requested or modified.

7. The sectoral allocation made to PHED is roughly divided among the Districts:

- 60 % of the sectoral allocation is divided on the basis of population; and
- 40 % of the sectoral allocation is divided equally among the 15 Districts.

If the allocation is the amount requested by PHED, it is reallocated on the basis of new and continuing schemes as requested. If not, the amount assigned to start the new schemes is reduced and is made up in future years.

The Department is now able to start the design and construction of the new scheme. The process used has been unchanged for many years.

8. The Sub Divisional Officer (SDO), working under the supervision of the Executive Engineer makes a detailed survey of the community, prepares a detailed design and estimates the cost of the scheme. On this basis the PC-1 and Rough Cost Estimate are prepared and submitted to the Executive Engineer for approval.

9. The approval process is then dependant upon the value of the scheme:

Value of Scheme	Approval by
< Rs. 250,000	Executive Engineer
Rs. 250,000 - Rs. 550,000	Superintending Engineer
Rs. 550,000 - Rs. 1,000,000	Chief Engineer
Rs. 1,000,000 - Rs 1,500,000	Secretary
Rs. 1,500,000 - Rs 7,500,000	Departmental Sub-Committee

There are three additional levels of approval - the Provincial Development Working Party, Central Development Working Party and ECNEC. However, the value of rural projects is less than Rs 7.5 million each, and they are not referred to higher levels.

At each stage, the design, drawings and costs are reviewed. Questions of any aspect of the submission, suggestions and/or changes can be made.
Once approved, the PC-1 is returned through administrative channels to the Executive Engineer for implementation.

10. The Executive Engineer then calls tenders, awards the contract and supervises the construction of the scheme.

11. After construction is underway, the Executive Engineer reviews the estimated costs on the basis of experience to date and submits a revised Work Done Estimate to the Superintending Engineer for Technical Sanction. He reviews the estimate, discusses it with the Executive Engineer as necessary, and approves it, authorizing the Executive Engineer to continue with construction.

12. If at a later stage of construction it is obvious new situations have arisen, another estimate of cost may be made.

APPENDIX 14

DISTRICT DIR
(1)

Small Population < 500

Technology :- Handpump on a Shallow Well
Description:- Afridev Handpump 80' deep well 8' diameter, bricklined concrete slab on top, two handpumps on a shallow well.

A:- COST OF WELL

No 1:- Excavation Cost of 80' deep Well (70' dry and 10' wet).
0-5 ft= (3.14/4x(10)^2x(5) x Rs:0.6 per cft =Rs. 235.62
5-10 ft=(392.69) x Rs. 1.2 per cuft=Rs. 471.28
10-15 ft=(392.69) x Rs. 1.8 per cuft=Rs. 706.84
15-20 ft=(392.69) x Rs. 2.4 per cuft=Rs. 942
20-25 ft=(392.69) x Rs. 3.0 per cuft=Rs. 1178
25-30 ft=(392.69) x Rs. 3.6 per cuft=Rs. 1414
30-35 ft=(392.69) x Rs. 4.2 per cuft=Rs. 1650
35-40 ft=(392.69) x Rs. 4.8 per cuft=Rs. 1885
40-45 ft=(392.69) x Rs. 5.4 per cuft=Rs. 2121
45-50 ft=(392.69) x Rs. 6.0 per cuft=Rs. 2356
50-55 ft=(392.69) x Rs. 6.6 per cuft=Rs. 2591
55-60 ft=(392.69) x Rs. 7.2 per cuft=Rs. 2827
60-65 ft=(392.69) x Rs. 7.8 per cuft=Rs. 3062
65-70 ft=(392.69) x Rs. 8.4 per cuft=Rs. 3298
70-75 ft=(392.69) x Rs. 10.0 per cuft=Rs. 3927 (wet)
75-80 ft=(392.69) x Rs. 10.5 per cuft=Rs. 4123 (wet)
Total Excavation Cost = Rs. 32786
Bricklining = 3.14/4 [(9.5)^2 - (8)^2] x 80 = 1649 cuft.
Brick Work in 1:3, cement, sand mortar at Rs.2600 per % cuft.
=1649x2600/(100)= Rs. 42874
Concrete Cover 6" thick (1:2:4) mix =3.14/4 ((11.5)^2x0.5)= 51.9 cft.at Rs.21/cft = RS. 1090
Steel reinforcement for concrete slab=7 lb/cft=363.3 lb @Rs.12/kg= 1981
Total for concrete slab = Rs. 3071/cft.
Cost of two main hole covers 2'x2' = Rs. 2000/-
Cost of ventilation screen = Rs. 500/-
Drainage plateform for well = Rs. 4000/-
Total Cost of 80 ft deep well = 32786+42874+3071+2000+500+4000
= Rs. 85231/-

B. COST OF AFRIDEV HANDPUMP

1: Hardware

a). Afridev hand pump complete unit without rising pipe for 90 ft depth = Rs. 7600/-

b). Spareparts of plastic components per item 1= Rs.30/-

c). PVC riser 63mm O.D & 4.7mm wall thickness in 3m lengths, length 75 ft at Rs. 85/M (25.91/ft) x75 ft = Rs. 1943.25/-

d). PVC casing pipe 114.5mm O.D (4 inches nominal size) B class as per BSS 3505 -1968 with male-female ends in 10 ft (3M) length, 70 ft length at Rs. 90.5/M (27.59/ft) x 70 = Rs. 1931.40

e). PVC screen 114.5mm O.D (4 inches nominal size) male-female ends in 1.4m standard length 10 ft in length, at Rs. 113.13/M (34.49/ft) =34.49x10 = Rs. 345

f). PVC jointing / cement / solvent in half kg packs, 1 Kg = Rs.430/-

Total Cost of Afridev hand pump
= 7600 + 30 + 1943.25 + 1931.40 + 345 + 430 = Rs.12279.55
Say Rs. 12300.00
Total Cost of the technolgy 1= Rs.85231 + 2x Rs. 12300
= Rs. 109831/-

Add 15 % as transportation and carriage charges 109831x1.15= 126306.00

Cost per capita $= \frac{126306}{500}$ = Rs.253.00.

(2) Smalll population < 500

Technology:- Handpump on a borehole.
Description:- Afridev pump 100' deep borehole, 4" casing, concrete pedestal, 4" screen (Two handpumps)

Cost of handpump at 100 ft deep on a borehole.

1. Hard Ware.

Afridev handpump complete unit but without rising pipe for 100 ft setting depth.	Rs. 7600/-
Spare parts of plastic components for item 1	Rs. 30/-
PVC riser pipe 63mm O.D+ 4.7mm wall thickness with male-female ends in 3m (10ft) length. 95 ft length.	85/m = 25.91/ft x 95 ft = Rs.2461.45
PVC casing pipes 114.5mm O.D (4" nominal size) B class as per BSS 3505-1968, with male-female ends, in 3m (10') length.	90.5/m = 27.59/ft x 90 ft = Rs.2483.10
PVC screens 114.5mm O.D (4" nominal size) male-female ends, in 1.4 meter standard lengths 10 ft length.	113.13/m = 34.49/ft 34.49x10=Rs.345/-
PVC jointing/cement/solvent in 1/2 kg packs.	Rs. 430/-
DRILLING AND CIVIL WORK	Total: 13349
1. Drilling Cost at Rs. 120/m (36.58/ft). including cost for test boreholes.	Rs.36.58x100 = Rs. 3658/=
2. Civil Work for platform.	Average cost Rs. 2000/-
	Sub Total = 5658.00
	Total: = Rs.19007.55
	Say = Rs. 19000.00

Cost of 2 handpumps = 19,000 x 2 = Rs. 38,000/-
Add 15% as transportation and carriage charges= Rs.38,000x1.15
= Rs.43,700/=

Cost per capita = $\frac{43,700}{500}$ = Rs. 88/=

(3)

Small population < 500

Technology:- Spring + Gravity system.
Description:- Intake, 500 gal collection tank, 5000'-2" dia G.I transmission main, 1250 gal. surface tank, distribution. stand pipes.

Cost of 500 gal. collection tank =		=Rs.10,000.00
Cost of 2" G.I transmision main =	31x5000	=Rs. 15,5,000/-
Adding 10% for pressure break tanks and/or Air valves and specials = 155000 + 15500		=Rs. 170500/-
Cost of 1250 gal surface tank		=Rs. 14,000/-
Distribution 2"G.I = 1000' and 1" = 1000' = 31,000 + 17000		=Rs. 48,000/-
Rs. 48,000 + 10% for valves and specials		=Rs. 52800/-
Total = 14000 + 170500 + 52800 + 10000		=Rs.247,300/-
Add 15% as transportation and carriage charges	=Rs.247,300 x 1.15	=Rs.284,395
Cost per capita	= $\frac{284395}{500}$	=Rs.569/-

(4)

Medium, Population 501-2000

Average Population = 1250

Technology:- Handpumps on a shallow well.
Destribution:- For communities upto 1250 persons with one handpump per 300 persons i.e. 3 wells. Afridev pump 80'deep well, 8'diameter,bricklined concrete slab on the top.

A:- COST OF WELL

No 1:- Excavation Cost of 80' deep Well (70' dry and 10' wet).
0-5 ft= (3.14/4x(10)^2x(5) x Rs:0.6 per cft =Rs. 235.62
5-10 ft=(392.69) x Rs. 1.2 per cuft=Rs. 471.28
10-15 ft=(392.69) x Rs. 1.8 per cuft=Rs. 706.84
15-20 ft=(392.69) x Rs. 2.4 per cuft=Rs. 942
20-25 ft=(392.69) x Rs. 3.0 per cuft=Rs. 1178
25-30 ft=(392.69) x Rs. 3.6 per cuft=Rs. 1414
30-35 ft=(392.69) x Rs. 4.2 per cuft=Rs. 1650
35-40 ft=(392.69) x Rs. 4.8 per cuft=Rs. 1885
40-45 ft=(392.69) x Rs. 5.4 per cuft=Rs. 2121
45-50 ft=(392.69) x Rs. 6.0 per cuft=Rs. 2356
50-55 ft=(392.69) x Rs. 6.6 per cuft=Rs. 2591
55-60 ft=(392.69) x Rs. 7.2 per cuft=Rs. 2827
60-65 ft=(392.69) x Rs. 7.8 per cuft=Rs. 3062
65-70 ft=(392.69) x Rs. 8.4 per cuft=Rs. 3298
70-75 ft=(392.69) x Rs. 10.0 per cuft=Rs. 3927 (wet)
75-80 ft=(392.69) x Rs. 10.5 per cuft=Rs. 4123 (wet)
Total Excavation Cost = Rs. 32786
Bricklining = 3.14/4 [(9.5)^2 - (8)^2] x 80 = 1649 cuft.
Brick Work in 1:3, cement, sand at Rs.2600 per % cuft. =1649x2600/(100)= Rs. 42874
Concrete Cover (1:2:4)=3.14/4 ((11.5)^2x0.5)= 51.9 cft.at Rs.21/cft = RS. 1090
Steel reinforcement for slab=7 lb/cft=363.3 lb @Rs.12/kg= 1981
Total for concrete slab = Rs. 3071/cft.
Cost of two main hole covers 2'x2' = Rs. 2000/-
Cost of ventilation screen = Rs. 500/-
Drainage plateform for well = Rs. 4000/-
Total Cost of 80 ft deep well = 32786+42874+3071+2000+500+4000
= Rs. 85231/-

B. COST OF AFRIDEV HANDPUMP

1: Hardware

a). Afridev HP complete unit without rising pipe for 80 ft depth = Rs. 7600/-

b). Spareparts of plastic components per item 1= Rs.30/-

c). PVC riser 63mm O.D & 4.7mm wall thickness in 3m lengths, length 75 ft at Rs. 85/M (25.91/ft) x75 ft = Rs. 1943.25/-

d). PVC casing pipe 114.5mm O.D (4 inches nominal size) B class as per BSS 3505 -1968 with male-female ends in 10 ft (3M) length, 70 ft length at Rs. 90.5/M (27.59/ft) x 70 = Rs. 1931.40

e). PVC screen 114.5mm O.D (4 inches nominal size) male-female ends in 1.4m standard length 10 ft in length, at Rs. 113.13/M (34.49/ft) =34.49x10 = Rs. 345

f). PVC jointing / cement / solvent in half kg packs, 1 Kg = Rs.430/-

Total Cost of Afridev HP
= 7600 + 30 + 1943.25 + 1931.40 + 345 + 430 = Rs.12279.55
Say Rs. 12300.00
Total Cost of the technolgy 1= Rs.85231 + 2x Rs. 12300
= Rs. 109831/-

Cost of 3 wells & 6 handpumps = Rs 10983 x 3 =Rs 329493/
Add 15% as transportation & carriage charges =329493 x 1.15
=Rs 378917/-
Cost per capita = 378917/1250 = Rs 304/-.

(5)

Medium, Population 501-2000

Technology:- Handpump on a borehole.
Description:- Afridev handpump 100' deep bore hole, 4" casing, concrete pedestal, 4" screen (5 handpumps). For communities upto 1250 persons with one handpump per 300 persons.

Cost of handpump at 100 ft deep on a borehole.

1. Hard Ware.

Afridev handpump complete unit but without rising pipe for 100 ft setting depth. Rs. 7600/-

Spare parts of plastic components for item 1 Rs. 30/-

PVC riser pipe 63mm O.D+ 4.7mm wall thickness with male-female ends in 3m (10ft)length. 95 ft length. 85/m=$\frac{25.91}{\text{ft}}$x95 Rs.2461.45

PVC casing pipes 114.5mm O.D (4" nominal size) B class as per BSS 3505-1968,with male-female ends, in 3m (10') length. 90'length. 90.5/m =$\frac{27.59}{}$x90 Rs.2483.10

PVC screens 114.5mm O.D (4" nominal size) male-female ends, in 1.4 meter standard lengths 10 ft length. 113.13/m= $\frac{34.49}{}$ 34.49x10=Rs.345/-

PVC jointing/cement/solvent in 1/2 kg packs. Rs. $\frac{430/-}{}$
DRILLING AND CIVIL WORK Total: 13349

1. Drilling Cost at Rs. 120/m (36.58/ft). including cost for test boreholes. Rs.36.58x100 = Rs. 3658/=

2. Civil Work for platform. Average cost Rs. 2000/-

Sub Total = 5658.00
Total: = Rs.19007.55
Say = Rs.19000.00

Cost of 5 handpumps =19,000x5 =Rs. 95,000/-

Add 15% as transportation and carriage charges.
=95,000x1.15 =Rs. 109250/-

Cost per capita = $\frac{109250}{1250}$ =Rs. 88/-

(6)

Medium, Population 501- 2000

Technology:- Electric pump on a shallow well.
Description:- 5 H.P submersible pump, 80'deep, 8'dia 5000 gal. surface tank, stand pipes, distribution.

Pump.

Pump head required = 75'+(10' headloss in 3" dia 1000')
+ (2000' Elevation Difference)
Discharge = 30 GPM (assumed)
Total head = 285' say = 300' (suface tank assumed to be 200' higher than the top of well).
Take pump efficiency as 80% and motor efficiency as 70%

$$= \frac{2.72}{0.80 \times 0.70} = 4.72 \text{ Say } 5 \text{ HP.}$$

Cost of 80' deep well 8' dia = Rs. 85231/-
surface tank 5000 gal. cost = Rs. 35000/-
3" G.I. line to the tank 1000' =40x1000 = Rs. 40000 + 4000
10% for valves & spacails = Rs. 44000/-
2" G.I line coming back 1000' = 31 x 1000 = 31000 + 3100
= Rs. 34100/-
Distribution 1" G.I 1000' = 17 x 1000 = 17000 + 1700
= Rs. 18700/-
Pump cost = Rs. 100,000/-
Electrification = Rs. 100000/-

Total:85231 + 35000 + 44000 + 34100 + 18700 + 100,000 + 100,000
= Rs. 417031/-
Add 15% transportation and carriage charges.
= Rs. 417031 x 1.15 = Rs. 479586/-

$$\text{Cost per capita} = \frac{479586}{1250} = \text{Rs. } 384/-$$

(7)

Medium, Population 501-2000

Technology:- Electric pump on a borehole.
Description:- 4000 gph (discharge) 180' deep, 5000 gal surface tank, stand pipes, (one per 300 persons). [Boring+ pump + pumphouse + rising main + surface tank + distribution]

Surface tank 5000 gal. = Rs. 35000
Pump = Rs. 250,000
Pump house = Rs. 66,000
Rising main 1000', 3" G.I. + 10% valves and specials
= 40000+4000 = Rs. 44000.00

Distribution 2" & 1", 1000' line = 34000 + 18700 = 52800
Electrification = Rs. 100,000.00

Total = Rs. 547800.00

Add 15% transportation and carriage charges.

= 547800 x 1.15 = Rs. 629970.00

Cost per capita= $\frac{629970}{1250}$ = Rs. 504.00

(8)

Medium ,Population 501-2000.

Technology:- Spring + Gravity system.

Description:- Intake, 500 gal.Collection tank, 10,000' 2" dia. G.I transmission line, 2500 gal. surface tank, stand pipes, distribution.

Cost of 500 gal. Collection tank = Rs. 14000/-.

Cost of 10,000',2" G.I = Rs.310000+Rs.31000(10% Valves & Specails, pressure break tanks). = Rs. 341000/-.

Cost of 2500 gal. Surface tank = Rs. 20,000/-.

Distribution as per small = Rs. 52800/-.

Therefore Total = 14,000 + 34,1000 + 20,000 + 52,800
= Rs. 427800/-.

Add 15% transportation and carraige charges.
=427800 x 1.15 = Rs. 491970/-.

Cost per capita = $\frac{491970}{1250}$ = Rs. 394/-.

(9)

Large, Population 2001-5000.
(Average Population = 3500)

Technology:- Electric pump on a shallow well.

Description:- Two systems each consisting of 5 H.P Submersible pump , 80' deep ,8' diameter 5000 gal.Surface tank, rising main 3"G.I, 1000', distribution 2" & 1" G.I, 1000'each.

Cost of 80'deep well, 8'diameter = Rs.85,231/-.

Cost of surface tank 5000 gal. = Rs. 35,000/-.

3"G.I. Line to the tank 1000' = Rs. 40,000 + 4,000
= Rs. 44,000/-.

2"G.I. Line coming back 1000' = Rs. 31,000 + 3,100
= Rs. 34,100.00

Distribution 1"G.I. 1000' = Rs. 17,000 + 1700
= Rs. 18,700.00.

Pump cost = Rs.100,000.00

Electrification = Rs.100,000.00

Total = 85231 + 35000 + 44000 + 34100 + 18700 + 100000 + 100000 = Rs. 417031.00

The cost of 2 systems will be = 417031 x 2 = Rs.834062.00

Add 1.15% as transportation and carriage charges.
= Rs. 834062 x 1.15 =Rs. 959172.00

Cost per capita = $\frac{959172}{3500}$ = Rs. 275.00

(10)

Large, Population 2001 - 500

Technology:- Electric pump on a bore hole.

Description:- 5000 gph discharge, 180 ft deep, 10,000 gal. capacity storage tank. Stand pipes, 1/300 persons [boring, pump, pump house, surface tank 3" dia 1500' G.I rising main and distribution 2" dia, 1" for 1000' G.I.pipe.

Cost of pump	=	Rs. 250,000
Cost of pump house	=	Rs. 66,000
10000 gal. surface resevoir	=	Rs. 70,000
Rising main 3" dia 1500' G.I pipe.		
Cost = 40x1500 = 60,000 + 6000=		Rs. 66,000
Distribution 3" dia 1500'	=	Rs. 66,000
2" dia 1000'= 31000 + 3100	=	Rs. 34,100
1" dia 1000'= 17000 + 1700	=	Rs. 18,700
Electrifcation	=	Rs. 100,000

Total =250,000 + 66,000 + 70,000 + 66,000 + 66,000 + 34,100 + 18,700 + 100,000 =Rs. 670,800.00

Add 15% transportation and carriage charges
= 670800 x 1.15 = Rs. 771420.00

Cost per capita = $\frac{771420}{3500}$ = Rs. 221.00

(11)

Large, Population 2001 - 5000

Technology:- Spring + Gravity System

Description:- Intake, 1000 gal. collection tank, 15000' 2" G.I pipeline, 5000 gal. surface tank,stand pipes.

Cost of 1000 gal. collection tank	=	Rs. 13000
2" G.I transmission main = 15000'x 31	=	Rs. 465000
Add 10% for valves & spacails, pressure	=	Rs. 46500
break tanks.		Rs. 511500.00
Distribution 2" dia 1500' = 46500 + 4650	=	Rs. 51150
1" dia 1500' = 25500 + 2550	=	Rs. 28050
Cost of 5000 gal. tank	=	Rs. 35000

Total = 13000 + 511500 + 51150 + 28050 + 35000 = Rs. 638700/-

Add 15% transportation + Gcarriage charges = Rs. 734505/-
Cost per capita = Rs. 210/-

DISTRICRT PESHAWAR.

(1)

Small, Population < 500.

Technology:- Hand pump on a shallow well.

Description:- Afridev hand pump, 60'deep well, 8'diameter, bricklined, concrete slab on top, two hand pumps on shallow well.

COST OF WELL.

1) Excavation cost of 60' deep well & 8' diameter (50' dry & 10' wet).
0 - 5 = 3.14/4 x (10)^2 x 5 x at 0.6/cft = 235.62
5 -10 = 392.69 x 1.2/cft= 471.28.
10 -15= 392.69 x 1.8/cft= 706.84.
15 -20= 392.69 x 2.4/cft= 942.0.
20 -25= 392.69 x 3.0/cft= 1178.0.
25 -30= 392.69 x 3.6/cft=1414.0.
30 -35= 392.69 x 4.2/cft=1650.0
35 -40= 392.69 x 4.8/cft= 1885.0
40 -45= 392.69 x 5.4/cft= 2121.0
45 -50= 392.69 x 6.0/cft= 2356.14.
50 -55= 392.69 x 8.0/cft= 3141.0 (wet)
55 -60= 392.69 x 8.5/cft= 3338.0.

Total Excavation cost = Rs. 19438.00.

2) Brick-linig = 3.14/4 x ((95)^2 - (8)^2) x 60 = 1237cft.
Brick work in 1:3 at 2600%cft
=1237 x 2600/100 = Rs. 32162.00

3) Concrete cover(1:2:4). = 3.14/4 x ((11.5)^2x(.5)).
= 51.9cft.
= 51.9 @ Rs.21/cft=Rs.1090.
+7Ib/cft @ Rs.12/kg=Rs.1981.
=1090+1981 = Rs. 3071.00

4) Cost of manhole cover 2'x2' =Rs. 1000 each
Cost of 2 manhole =Rs. 2000.0

5) Cost of ventilation screen =Rs.500.0

6) Drainage plate-form for well = Rs. 4000.0

Total cost of 60' deep well = 19438 + 32162 + 3071 + 2000 + 500 + 4000 = Rs. 61171.00

COST OF HAND PUMP.

a) Afridev hand pump complete unit but without rising pipe for 80' setting depth. Rs. 7600.00

b) Spareparts of plastic Components for item 1 Rs.30.0

c) PVC riser pipe 63mm O.D & 4.7mm wall thickness with male - female ends in 10.0' length , 75' length. Rs. 85/m=$\frac{25.9 \times 75}{ft}$
=Rs. 1943.25.00

d) PVC casing pipes 114.5mm O.D (4" nominal size) B class as per BSS 3505 - 1968 , with male - female ends in 10' length 70' length. Rs. 90.5/m=$\frac{27.6 \times 70}{ft}$
= Rs. 1931.40.

e) PVC screen 114.5mm O.D (4" nominal size) male - female ends in 1.4m standard length, 10.0' in length.
Rs. 113.13/m= $\frac{34.49}{ft}$
=34.49x10=Rs.345.00

f) PVC jointing/cement/solvent in 1/2kg packs = Rs.430.00

Therefore Total = Rs. 12279.55.
Say Rs. 12300.00.

7) The cost of Afridev hand pump complete unit for 80' deep well = Rs.12300.0.

Therefore for a 60' deep well =$\frac{60}{80}$ x12300
=Rs. 9225.00
For two hand pumps = Rs. 18450.0
Then Total cost = 61171 + 18450
=Rs. 79,621.00
Say Rs. 80,000.00
Cost per capita = $\frac{80000}{500}$ =Rs. 160.00.

(2)

Small, Population < 500.

Technology:- Hand pump on a bore hole.

Description:- Afridev hand pump, 80 ft deep bore hole, concrete pedestal, 4" screen (2 hand pumps).

Cost of hand pumps at 100 ft deep on a bore hole.

Hard Ware.

1. Afridev hand pump complete unit but without rising pipe for 100 ft setting depth. Rs. 7600/=

2. Spare parts of plastic component for item 1. Rs. 30/=

3. PVC riser pipe 63 mm O.D + 4.7 mm wall thickness with male-female ends in 3m. (10ft) length. 95 ft length.
Rs.85/m=$\frac{25.9}{\text{ft}}$x95
Rs. 2461.45

4. PVC casing pipe 114.5 mm O.D (4 inh nominel size) B class as per BSS 3505-1968, with male-female ends in 3m (10ft) length . 90 ft length.
Rs.90.5/m=$\frac{27.5}{\text{ft}}$x90
Rs. 2483.10

5. PVC screen 114.5 mm O.D (4inh nominel size) male -female ends, in 1.4 meter staderd lengths 10 ft length.
Rs. 113.13/m=$\frac{34.49}{\text{ft}}$
34.49 x 10 =Rs.345.0

6. PVC jointing/cement/solvent in 1/2kg packs. 1kg =Rs.430.0

Total cost = Rs. 13349.00

DRILLING AND CIVIL WORKS.

1.Drilling cost at Rs. 120/m(36.58/ft). Rs. 36.58x100
including cost for test bore hole. =Rs. 3658.00

2. Civil works for plateform. Ave:cost Rs.2000.0
Sub Total= Rs. 5658.00

TOTAL = 13349 + 5658 = Rs.19007.0
Say Rs. 19000.00.

The cost of 100' deep bore hole with Afridev hand pump,screen etc. = Rs. 19000

Therefore for 80' depth = $\frac{80}{100}$ x 19000 = Rs.15200.00

For two hand pumps = 2x15200 =30400.0

Say = Rs. 31000.00

Cost per capita = $\frac{31000}{500}$ = Rs.62.0.

(3)

Medium, Population 501 - 2000.

(Average Population=1250)

Technology:- Hand pump on a shallow well.

Description:- For communities upto 1250 persons , one hand pump per 300 persons i.e, 3 wells, 60' deep & 8' in diameter and 2 hand pumps on each well i.e, 6 hand pumps.

A. Cost of well.

The cost of one well 60' depth & 8' in diameter = Rs.61171.00

Therefore the cost of 3 wells = 3 x 61171 = Rs. 183513.00

B.Cost of hand pumps.

Cost of one hand pump = Rs. 9225.00.

Therefore the cost 6 hand pumps = 6 x 9225 = Rs.55350.00.

Total cost = 183513 + 55350 = Rs. 238863.00
Say Rs. 240,000.00.

Cost per capita = $\frac{240000}{1250}$ = Rs. 192.00.

(4)

Medium , Population 501 - 2000.

Technology:- Hand pump on a bore hole.

Description:- For communities upto 1250 persons with one hand pump per 300 persons. i.e,5 bore holes (5 hand pumps),60' deep 4" casing concrete pedestal, 4"screen.

Cost of hand pump at 60'deep on a bore hole.

Hard ware.

1. Afridev hand pump complete unit but without rising pipe for 60' setting depth. Rs. 7600.00.

2. Spareparts of plastic components for item 1. Rs. 30.0

3. PVC riser pipe 63mm O.D + 4.7mm wall thickness with male - female ends in 3m(10').length, 55'length. Rs. 85/m=$\frac{25.9}{\text{ft}}$x55
Rs. 1425.05.

4. PVC casing pipes 114.5mm O.D (4"nominal size) B class as per BSS 3505 - 1968, with male - female ends in 3m(10')length 50'length. Rs. 90/m=$\frac{27.5}{\text{ft}}$x50
Rs. 1379.50

5. PVC screen 114.5mm O.D (3"nominal size) male - female ends in 1.4m standard lengths 10'length.
Rs. 113/m=34.49/ft
34.49x10=Rs.345.0

6. PVC jointing/cement/solvent in 1/2kg packs. 1kg = Rs.430.00

Total= Rs. 11209.55

DRILLING AND CIVIL WORKS.

1. Drilling cost at Rs.120/m(36.58/ft) Rs. 36.58 x 60
including cost for test bore holes. Rs. 2194.80.

2. Civil works for plateform. Ave:cost Rs.2000.0
Sub total=Rs.4194.80.

Total= 11209.55 + 4194.80 = Rs.15404.35.
Say Rs. 15400.00.

The cost of one bore hole & hand pump = Rs. 15400.00
So the cost 5 bore holes = 5 x 15400 = Rs. 77,000.00.
Cost per capita = 77000/1250 =Rs.62.00.

(5)

Medium, population 501 - 2000.

Technology:- Electric pump on a shallow well.

Description:- 2 H.P.Centrifugal pump, 60' deep well, 8' diameter, 5000gal.storage tank,distribution 2" dia PVC=1000' 1"dia PVC=1000', stand pipes.

Electric pump & motor.

The depth of well = 60'
The heigth of over head reservoir = 40'
And assuming 10' of losses.
Then total head = H = 60 + 40 + 10 = 110'
If discharge = 30 GPM.

$$H.P = \frac{110 \times 30}{3300} = 1 \text{ H.P.}$$

Assuming efficiency of pump as 80% & motor as 70%

$$= \frac{1}{.8 \times .7} = 1.78 \text{ H.P.}$$

Say 2 H.P.

Using centrifugal pump = Rs. 30000.0

Cost of 5000gal. OHR, =Rs. 75000.0

Distribution cost for 2"pvc - 1000'= Rs. 22,000.0
and for 1" pvc of 1000'=Rs. 8800.0
Total distribution systems cost = 22000 + 8800 =Rs. 30,800.00

Cost of well 60' deep =Rs. 61171.00

Electrification =Rs. 100,000.00.

Total cost = 30000 + 75000 + 30800 + 61171 + 100000.
= Rs. 296,971.00.

$$\text{Cost per capita} = \frac{296971}{1250} = \text{Rs. } 237.00$$

(6)

Medium, Population 501 < 2000

Technology:- Electric pump on a borehole.

Description:- 4000 gph discharge, 5000 gal. capacity tank, stand pipes, 1 per 300 persons (Boring, pump, pumphouse, storage tank and distribution).

1. Cost of tube well = Rs. 225000
2. Cost of pump house = Rs. 60,000
3. Cost of over head tank (5000 gal.) = Rs. 75000
4. Cost of Electrification = Rs. 100000
5. Distribution;

2" PVC @ Rs. 20/ft, 1000 ft.	=	Rs. 20,000
1" PVC @ Rs. 8/ft, 1000 ft.	=	Rs. 8000
Rs. 20,000 + Rs. 8000	=	Rs. 28,000

Add 10% for valves and specials = 28000

Sub total: 28000 + 2800 = Rs. 30800

Total Cost = 225000 + 60000 + 75000 + 100000 + 30800
= Rs.490800

Cost per capita = $\frac{490800}{1250}$ =Rs. 392.00.

(7)

Large, Population, 2001 - 5000.

Average Population = 3500

Technology:- Electric pump on a shallow well.

Description:- Two, 2 HP centrifugal pump, 60' deep, 8' dia, OHR 5000 gal., stand pipes, distribution. Two system in phases interconnected with each other through valving.

Capacity of Electric pump & motor.

Depth of well = 60'
The heigth of over head reservoir = 40'
And assuming 10' of losses.
Then total head = H = 60 + 40 + 10 = 110'
If discharge = 30 GPM.
H.P = $\frac{110 \times 30}{3300}$ = 1 H.P.
Assuming efficiency of pump as 80% & motor as 70%
= $\frac{1}{.8 \times .7}$ = 1.78 H.P.
Say 2 H.P.

Cost of Centrifugal pump	=	Rs.	30000
5000 gal. capacity tank (OHR)	=	Rs.	75000
Cost of well	=	Rs.	61171
Distribution:			
2" PVC 1000'	=	Rs.	22000
1" PVC 1000'	=	Rs.	8800
Sub total	=	Rs.	30800
Electrification	=	Rs.	100000
Total	=	Rs.	196971
For two systems	=	Rs.	196971x2 = 393942

Rs. 393942 + 100000 = Rs. 493942.00

Cost per capita = $\frac{493942}{3500}$ = Rs. 142.0

(8)

Large, Population, 2001 - 5000.

Technology:- Electric Pump on bore hole.

Destricption:- 500 gph discharge, T/well 180' deep 10000 gal. over head storage, stand pipes ,1 for 300 persons

Distribution
- 3" dia 500 ft (PVC)
- 2" dia 1500 ft (PVC)
- 1" dia 1500 ft (PVC)

1.	Cost of pump	=	Rs. 250,000
2.	Cost of pump house	=	Rs. 60,000
3.	Cost of O.H (10000 gal)	=	Rs. 200,000
4.	Distribution;		
	(i) 500' of 3" PVC @ RS. 26/ft. =	Rs.	13000
	(ii) 1500 ft of 2" PVC pipe @ Rs. 20/ft = 1500 x 20 =	Rs.	30000
	(iii)1500 ft of 1" PVC pipe @ Rs.8ft=	Rs.	12000
	= 13000 + 30000 + 12000	=	Rs. 55000
	(iv) Add 10% for Values & Specials.	=	Rs. 5500
	Total distribution cost	=	Rs. 60500
5.	Electrification charges	=	Rs. 100,000

Total Cost = 250000 + 60000 + 200000 + 60500 + 100000 = Rs. 670500

= $\frac{670500}{3500}$ = Rs. 192/capita

DISTRICT D.I.KHAN

(1)

Small, Population < 500

Technology:- Handpump on a shallow well.

Description:- Afridev hand pump 60' deep well 8' dia, brick lined, concrete slab on the top, 2 hand pumps on a shallow well.

COST OF WELL.

1) Excavation cost of 60' deep well & 8' diameter (50' dry & 10' wet).
0 - 5 = 3.14/4 x (10)^2 x 5 x at 0.6/cft = 235.62
5 -10 = 392.69 x 1.2/cft= 471.28.
10 -15= 392.69 x 1.8/cft= 706.84.
15 -20= 392.69 x 2.4/cft= 942.0.
20 -25= 392.69 x 3.0/cft= 1178.0.
25 -30= 392.69 x 3.6/cft=1414.0.
30 -35= 392.69 x 4.2/cft=1650.0
35 -40= 392.69 x 4.8/cft= 1885.0
40 -45= 392.69 x 5.4/cft= 2121.0
45 -50= 392.69 x 6.0/cft= 2356.14.
50 -55= 392.69 x 8.0/cft= 3141.0 (wet)
55 -60= 392.69 x 8.5/cft= 3338.0.

Total Excavation cost = Rs. 19438.00.

2) Brick-linig = 3.14/4 x ((95)^2 - (8)^2) x 60 = 1237cft.
Brick work in 1:3 at 2600%cft
=1237 x 2600/100 = Rs. 32162.00

3) Concrete cover(1:2:4). = 3.14/4 x ((11.5)^2x(.5)).
= 51.9cft.
= 51.9 @ Rs.21/cft=Rs.1090.
+7Ib/cft @ Rs.12/kg=Rs.1981.
=1090+1981 = Rs. 3071.00

4) Cost of manhole cover 2'x2' =Rs. 1000 each
Cost of 2 manhole covers=Rs. 2000.0

5) Cost of ventilation screen =Rs.500.0

6) Drainage plate-form for well = Rs. 4000.0

Total cost of 60' deep well = 19438 + 32162 + 3071 + 2000 + 500 + 4000 = Rs. 61171.00

COST OF HAND PUMP.

a) Afridev hand pump complete unit but without rising pipe for 80' setting depth. Rs. 7600.00

b) Spare-parts of plastic Components for item 1 Rs.30.0

c) PVC riser pipe 63mm O.D & 4.7mm wall thickness with male - female ends in 10.0' length , 75' length. Rs. 85/m=$\frac{25.9 \times 75}{ft}$
=Rs. 1943.25.00

d) PVC casing pipes 114.5mm O.D (4" nominal size) B class as per BSS 3505 - 1968 , with male - female ends in 10' length 70' length. Rs. 90.5/m=$\frac{27.6 \times 70}{ft}$
= Rs. 1931.40.

e) PVC screen 114.5mm O.D (4" nominal size) male - female ends in 1.4m standard length, 10.0' in length.
Rs. 113.13/m= $\frac{34.49}{ft}$
=34.49x10=Rs.345.00

f) PVC jointing/cement/solvent in 1/2kg packs = Rs.430.00

Therefore Total = Rs. 12279.55.
Say Rs. 12300.00.

7) The cost of Afridev hand pump complete unit for 80' deep well = Rs.12300.0.

Therefore for a 60' deep well =$\frac{60}{80}$ x12300
=Rs. 9225.00
For two hand pumps = Rs. 18450.0
Then Total cost = 61171 + 18450
=Rs. 79,621.00
Say Rs. 80,000.00
Cost per capita = $\frac{80000}{500}$ =Rs. 160.00.

(2)

Small, Population < 500

Technology:- Hand Pump on a bore hole.

Description:- Afridev handpump, 80' deep bore hole, concrete pedestal, 4" screen (2 hand pumps).

Cost of hand pumps at 100 ft deep on a bore hole.

Hard Ware.

1. Afridev hand pump complete unit but without rising pipe for 100 ft setting depth. Rs. 7600/=

2. Spare parts of plastic component for item 1. Rs. 30/=

3. PVC riser pipe 63 mm O.D + 4.7 mm wall thickness with male-female ends in 3m. (10ft) length. 95 ft length.
Rs.85/m=$\frac{25.9 \times 95}{\text{ft}}$
Rs. 2461.45

4. PVC casing pipe 114.5 mm O.D (4 inh nominel size) B class as per BSS 3505-1968, with male-female ends in 3m (10ft) length . 90 ft length.
Rs.90.5/m=$\frac{27.5 \times 90}{\text{ft}}$
Rs. 2483.10

5. PVC screen 114.5 mm O.D (4inh nominel size) male -female ends, in 1.4 meter staderd lengths 10 ft length.
Rs. 113.13/m=$\frac{34.49}{\text{ft}}$
34.49 x 10 =Rs.345.0

6. PVC jointing/cement/solvent in 1/2kg packs. 1kg =Rs.430.0

Total cost = Rs. 13349.00

DRILLING AND CIVIL WORKS.

1.Drilling cost at Rs. 120/m(36.58/ft). Rs. 36.58x100
including cost for test bore hole. =Rs. 3658.00

2. Civil works for plateform. Ave:cost Rs.2000.0
Sub Total= Rs. 5658.00

TOTAL = 13349 + 5658 = Rs.19007.0
Say Rs. 19000.00.

The cost of 100' deep bore hole with Afridev hand pump,screen etc. = Rs. 19000

Therefore for 80' depth = $\frac{80}{100}$ x 19000 = Rs.15200.00

For two hand pumps = 2x15200 =30400.0

Say = Rs. 31000.00

Cost per capita = $\frac{31000}{500}$ = Rs.62.0.

(3)

Small, Population < 500

Technology:- Electric pump on a bore hole.

Description:- 5000 gph pump, 180' deep, 5000 gal. capacity over head tank, serving 5 communities, one community tank of 500 gal. capacity in each village, distribution.

Cost of T/well = Rs. 350,000.00
(Pump, Pump house, boring)

Distribution:
2" PVC 1000' each for 5 communities = Rs. 22000x5
= Rs. 110000.00

Transmission line:
3" AC pipe 10000' @ Rs. 48/ft. =48 x 10000 = Rs.480000.0
Add 10% for valves & specails = 480000 + 48000 = Rs.528000.0

One community tank of 500gal. capacity = Rs. 5000.00
Therefore 5 community tanks = 5000 x 5 = Rs. 25000.00

Cost of over head tank 5000gal. = Rs. 75000.00

Electrification = Rs. 100000.00

TOTAL = 350000 + 110000 + 528000 + 25000 + 75000 + 100000
= Rs.1188000.00.

Cost per capita = $\frac{1188000}{500x5}$ =Rs. 475.00.

(4)

Medium, Population 501 - 2000.

Average Population = 1250

Technology:- Hand pump on a shallow well.

Description:- For communities upto 1250 persons with 1 hand pump per 300 persons i.e, 3wells 80' deep, 8' diameter, concrete on the top.

Cost of 1 well = Rs.85231.00
Therefore cost 3 wells = 3 x 85231 = Rs. 255693.00

Cost of 1 hand pump =Rs.12300.00
Therefore cost of 6 hand pumps = 6 x 12300 = Rs.73800.00

Total cost = 255693 + 73800 = Rs. 329493.00

Cost per capita = $\frac{329493}{1250}$ = Rs. 264.00

(5)

Medium , Population 501 - 2000.

Technology:- Hand pump on a bore hole.

Description:- For communities upto 1250 persons with 1 hand pump per 300 persons. Bore hole 80' deep , 4" casing, concrete pedastal, 4" screen, 1 hand pump on each bore hole (5 bore- holes).

Cost of 1 hand pump on a bore hole = Rs. 17200.00

Therefore cost of 5 hand pumps = 5 x 17200 = Rs. 86000.00

Cost per capita = $\frac{86000}{1250}$ = Rs. 69.00

(6)

Medium, Population, 501 - 2000.

Technology:- Electric pump on a shallow well.

Description:- 2 H.P. Submersible pump, 80' deep, 8' diameter, 5000gal. over head tank, stand pipes, transmission line 4" AC 200', distribution 2" PVC 1000'.

Cost of 2 H.P. Submersible pump = Rs. 80000.00

Storage tank (over head), 5000gal. capacity = RS.75000.00

Cost of 80'deep well = Rs. 85231.00

Transmission line:
4"AC 200' = Rs.4400.00

Distribution:
2"PVC 1000' = Rs.22000.00

Electrification = Rs.100000.00

Total cost = 80000 + 75000 + 85231 + 4400 + 22000 + 100000.
= Rs. 366631.00.

Cost per capita = $\frac{366631}{1250}$ = Rs. 294.00.

(7)

Medium , Population, 501 - 2000.

Technology:- Electric pump on a bore hole.

Description:- Tube-well of dischagre of 5000 gph , 250' deep, transmission line 6"AC 2000' distribution 2" PVC 1000', community tanks. This T/W will be serving more than one community, say (2).

Cost of Tube well = Rs. 400000.00
(Pump, Pump house, Boring)

Transmission line:
6"AC 2000'@ Rs.49/ft = 49 x 2000
=Rs.98000.00
Add 10% for valves & specials = 98000 + 9800.
= Rs.107800.00

Distribution:
2"PVC 1000'for 2 communities,
each @ Rs.20/ft = (20 x 1000)
= Rs.20000.00
Therefore for 2 communities,= 2 x 20000.
= Rs.40000.00

Add 10% for valves & specials = 40000 +4000
= Rs. 44000.00

Cost of storage tank (over head) 10000gal. = Rs.200000.00

Cost of 1 community tank = Rs. 5000.00
Therefore cost of 4 community tanks = 4 x 5000 = Rs. 20000.00

Electrification = Rs. 100000.00.

Total cost = 400000 + 107800 + 44000 + 200000 + 20000 + 100000
= Rs. 871800.00

Cost per capita = $\frac{871800}{2500}$ = Rs. 349.00

(8)

Large, Population, 2001 - 5000.

Average Population = 3500

Technology:- Electric pump on a bore hole.

Description:- Tube well dischagre 6000 gph. , 360' deep , 10000gal. capacity over head tank, transmission line 6"AC 20000', disrtibution 2"PVC 2000', community tanks.

Cost of T/W discharge 6000 gph, 360'deep = Rs. 600000.00
(Boring, Pump, Pump house,).

Transmission line:

6"AC 20000'@ of Rs. 49/ft = 49 x 20000
=Rs.980000.00

Add 10% for valves & specials = 980000 + 98000
= Rs.1078000.00

Distribution:

2"PVC 2000'@ of Rs. 20/ft = 20 x 2000
= Rs.40000.00

Add 10% for specials = 40000 + 4000
= Rs.44000.00

Cost of Over head tank 10000gal.capacity = Rs. 200000.00

Electrification = Rs. 100000.00

Total cost = 600000 + 1078000 + 44000 + 200000 + 100000.

= Rs. 2022000.00

Cost per capita = $\frac{2022000}{3500}$ = Rs. 578.00.

(9)

Large, Population 2001 - 5000

Technology:- Surface water treatment plant.

Description:- Sedimentation tank, Slow sand filter, Pumping station, Over head tank, Transmission line, distribution, community tanks.

Population to be served = 5000.

Daily demand =10 g/c/d. = 10 x 5000 = 50000 gal/day.

* Detention time of sedimentation tank = 20 days.
Therefore capacity = 50000 x 20 = 1000000 gals/day.

Use 3 sedimentation tanks.

$$= \frac{1000000}{6.24 \text{g/cft} \times 3} = 53418 \text{ cft.}$$

Use 6.0' deep Sedimentation tank.

$$\text{Sedimentation tank area} = \frac{53418}{6} = 8903 \text{ sqft}$$

Use 3 Sedimentation tank each of size.
140' x 65' x 6' (depth)

Cost for 3 sedimentation tanks = Rs. 275,00.00

Sand filters.

Filter Rate = 40gal/sqft/day

Therefore filter area required = $\frac{50000 \text{ gal/day}}{40 \text{ gal/sqft/day}}$

= 1250 sqft

Keeping 9.0' depth for gravity flow.

Therefore Filter size = 35' x 20' x 9' (depth)

Cost of 2 filters including filter media = Rs. 125,000.00

Cost of Pump, Pumping station & Electrification = Rs.200,000.0

Cost of clear water tank = Rs. 60,000.00

Cost of 10000gal. Over head reservoir = Rs. 200,000.00

Transmission line :

6" AC 10000' @ Rs. 49/ft = 49 x 10000
= Rs. 490000.00

Add 10% for valves & specials etc. = 490000 + 49000
= Rs. 539000.00

Distribution:

2" PVC 2000' @ Rs. 20/ft = 20 x 2000
= Rs. 40000

Add 10% for valves & specials etc. = 40000 + 4000
= Rs. 44000.00

Cost of 1 community tank 1000 gal. capacity = Rs. 13000.00
Therefore cost of 4 community tanks = 4 x 13000 = Rs. 52000.00

Total Cost = 275000 + 125000 + 200000 + 60000 + 200000 + 539000 + 44000 + 52000
= Rs. 1495000.00
Say = Rs. 1500000.00

$$\text{Cost per capita} = \frac{1500000}{5000} = \text{Rs. } 300.00$$

* The use of 20 days detention time for sedimentation tank was suggested in the technology workshop held in Islamabad from April 30th - May 1st, 1989, to take care of canal closure periods. The suitability of this detention time would be further examined at project - preparation stage.

DISTRICT KOHISTAN

(1)

Small, Population < 500

Technology:- Spring + Gravity system.
Description:- Intake, 500 gal collection tank, 5000'-2" dia G.I transmission main, 1250 gal. surface tank, distribution. stand pipes.

Cost of 500 gal. collection tank = =Rs.10,000.00
Cost of 2" G.I transmision main = 31x5000=Rs. 15,5,000/-
Adding 10% for pressure break tanks
and/or Air valves and specials = 155000 + 15500 =Rs. 170500/-
Cost of 1250 gal surface tank =Rs. 14,000/-
Distribution 2"G.I = 1000' and 1" = 1000' = 31,000 + 17000
=Rs. 48,000/-
Rs. 48,000 + 10% for valves and specials =Rs. 52800/-

Total = 14000 + 170500 + 52800 + 10000 =Rs.247,300/-

Add 20% as transportation and carriage charges.
247,300 x 1.2 = Rs. 296760.00

Cost per capita = $\frac{296760}{500}$ = Rs. 594.00

(2)

Medium ,Population 501-2000.

Average Population = 1250

Technology:- Spring + Gravity system.

Description:- Intake, 500 gal.Collection tank, 10,000' 2" dia. G.I transmission line, 2500 gal. surface tank, stand pipes, distribution.

Cost of 500 gal. Collection tank = Rs. 14000/-

Cost of 10,000',2" G.I = Rs.310000+Rs.31000(10% Valves & Specails, pressure break tanks). = Rs. 341000/-

Cost of 2500 gal. Surface tank = Rs. 20,000/-

Distribution as per small = Rs. 52800/-

Therefore Total = 14,000 + 34,1000 + 20,000 + 52,800
= Rs. 427800/-

Add 20% transportation and carriage charges.

$$= 427800 \times 1.2 = \text{Rs. } 513,360.00$$

$$\text{Cost per capita} = \frac{513360}{1250} = \text{Rs. } 411.00$$

(3)

Large, Population 2001 - 5000

Average Population = 3500

Technology:- Spring + Gravity System

Description:- Intake, 1000 gal. collection tank, 15000' 2" G.I pipeline, 5000 gal. surface tank,stand pipes.

Cost of 1000 gal. collection tank	=	Rs. 13000
2" G.I transmission main = 15000'x 31	=	Rs. 465000
Add 10% for valves & spacails, pressure break tanks.	=	Rs. 46500
		Rs. 511500.00
Distribution 2" dia 1500' = 46500 + 4650	=	Rs. 51150
1" dia 1500'= 25500 + 2550	=	Rs. 28050
Cost of 5000 gal. tank	=	Rs. 35000

Total = 13000 + 511500 + 51150 + 28050 + 35000 = Rs. 638700/-

Add 20% transportation and carriage charges.

= 638700 x 1.2 = Rs. 766440.00.

Cost per capita = $\frac{766440}{3500}$ = Rs. 219.00

APPENDIX 15

Appendix 13: **HYGIENE FIELD SURVEY**

They survey observes that most of the villages and houses visited had poor hygiene conditions. Most of the villages have no drainage systems and all kind of excreta could be found in the village streets. Especially in plains where cattle-shed, in a corner of the house compound is used often for defecation by females and children, heaps of excreta could be found either inside the house or out in the village streets.

The survey also reveals very high frequency of disease related to polluted water and excreta transmission. Diarrhoea, Cholera, Worms and Typhoid (in this order of importance) are reported to be common among the children below the age of 5 years by their mothers (See. Annexure Table No.II).

The Survey also shows a very high incidence of death among the children below the age of five (5) years. Out of total 183 mothers interviewed from 60 villages in 4 Districts of the Province, 92 mothers lost children before they reached the age of five years. Each mother lost on average 1.75 child (Table III). Although a great proportion of children died in the first few months after birth, and therefore, most probably died due to congenital anomalies, unsafe delivery, low coverage of immunisation against the six (6) major childhood diseases. Another significant proportion of children died between six (6) months to two (2) years age (Table IV). Majority of the mothers interviewed did not know the reason for their death, however, those who knew reported diarrhoea as cause of death, in most of the cases (See Annexure Table No.V).

Practices, beliefs and taboos related to water, excreta, health and hygiene:

a. Beliefs about causes of diseases

The survey shows that above 50% mothers know that diarrhoea is caused by unhygienic living conditions, impure water and food. However, as many did not know (See Table VI), more significantly, and unlike diarrhoea which is associated with a natural cause, and treated as a natural disease, various symptoms of dehydration are associated with supernatural powers such as evil shadow and fright. Further, research into the treatment patterns of these diseases/symptoms indicates that whereas mothers take their children suffering from fever, and diarrhoea to a local dispenser (known as "Daktar"), for the treatment of various symptoms of dehydration they see a Pir and less often a Hakim,

though many of them reported seeing the doctor too (see Tables VII and VIII).

b. Practices and taboos related to water and sanitation

The survey confirms the earlier belief that although excreta, especially adult excreta (smell if not the excreta itself) may be considered a taboo, baby's faeces are most probably considered to be harmless. This is also evident from our survey results : when inquired about the frequency of washing hands, although most of the women mentioned washing "often", very few admitted to do so after defecation and even less after cleaning baby's bottom (see Table IX).

Also, in areas where Derans or heaps of excreta exist near the cattle-shed inside the house, women from poorer households and tenants often transport it to the fields or to the streets outside the homes.

Defecation practices are also unhygienic in most of the rural areas of the Province. In Kohat all adults generally use fields and bushes away from the house and females near the house. In Peshawar, cattle shed or another corner in the house courtyard is generally used for this purpose especially by females and young girls whereas men use fields, bushes outside the house. In Mansehra, people go out in the forest and dry stream-beds, whereas in D.I.Khan many people have a dry surface or pit latrine inside the house and poor people use fields, bushes outside the house. However, children under the age of five years may sit anywhere inside the house in the courtyard, in the drain opening in the street, or anywhere outside the house.

In another question it was aimed to find out if people wanted to install latrines inside the house for hygiene purpose. The results, however, are not surprising for us : in Kohat all the respondents gave "comfort" or "convenience" as the major reason; in Peshawar, slightly higher number of respondents reported "cleanliness" as the reason whereas an equal number said that it was "to get rid of the bad smell", for "purdah" and "convenience" (a smaller number also mentioned" to achieve higher social status" as reason). In D.I.Khan 75% women said that it was to get rid of bad smell, 50% said it was for purdah and for cleanliness equally. In Mansehra, most of the women mentioned that purdah would be the major reason and on the second number the other three reasons were accorded an equal importance for installing a latrine inside the house (see Tables X and XI).

As far as water is concerned, mothers generally know that it may cause diseases. Mothers were asked if water may cause any disease, and if any, which disease. Women, generally named diarrhoea, typhoid, worms and malaria in Kohat (see Table XII). In Peshawar, Mansehra and D.I.Khan Districts majority of the women could not tell any diseases which may be caused by water. However, this information seems to be recent and not necessarily translated into practices, which also has understandable reasons such as:

- This information itself is superficial and not well-understood as is evident from their perceived causes of diseases such as diarrhoea and various symptoms or dehydration, as discussed earlier;

- non-availability of adequate safe water;

- Poverty which does not allow them to boil water and relative ignorance about hygiene practices.

It was also desired to find out mothers perceptions about safe water in rural areas. They were asked which of the existing source of water they preferred for drinking purpose. The responses are generally varied, however irrespective of geographic location, all women preferred stand-post water as safest for drinking (see Table XIII).

NOTE: It is possible that the respondents confused preference between "existing water sources" and the "ideal" which did not exist but knowing the purpose of the Presence of data-collectors named what they thought may be provided to them later.

EVALUATION OF THE PAST AND PRESENT HYGIENE EDUCATION ACTIVITIES IN NWFP

The Health and Hygiene Survey and general observation suggests that most of the practices, beliefs and taboos of rural population and especially of women concerning water and excreta may be among the major causes of child deaths, morbidity and malnutrition.

Various health and hygiene education experiences in the Province have been pointed out and evaluated separately in their strengths and weaknesses in some detail (see Section 2).

However, the general conclusion is that the existing levels are certainly far from being sufficient to cover the needs in health and hygiene education of rural population any serious manner.

The observation is that most of the health and hygiene education which is infact part of the mandates of many Government or other organisation health workers do not reach the main audience. When it comes to the Government Departments, the major causes of insufficient coverage are pointed out to be the following:

- insufficient female staff to reach women in rural areas;
- lack of finances and logistic support to the sector;
- view that hygiene education is a derogatory task compared to general health education;
- no access to new approaches in development of culture specific communication;
- lack of sense of prioritisation of goals resulting in the existing imbalanced investment between the Curative and Preventive Health Care Systems;
- use of age-old didactic methods instead of more interesting participatory methods such as active group discussions, audio-visual aids, etc.
- lack of research and underdeveloped communication material, etc.

Whereas NGOs and International Agencies involved in the sector do not face most of the problems pointed out above, some of them use participatory learning techniques, have trained female staff and have transport facilities, etc.

However, these are, usually concerned with a restricted population and cannot, without help, expand their activities to a large population.

TABLE-I

RURAL HEALTH FACILITIES BY DISTRICT : NWFP and FATA (January, 1987)

DISTRICTS	TOTAL POPULATION	NO. OF RHCs	POPULATION PER RHC	NO. OF BHUs	POPULATION PER BHU	DIPSEN-SARIES	POPULATION/ DISPENDARY
NWFP							
PESHAWAR		9		65		36	
MARDAN		6		39		20	
ABBOTABAD		1		57		51	
MANSEHRA		6		67		33	
KOHISTAN		2		12		0	
KOHAT		5		21		8	
[illegible]RAK		3		14		4	
BANNU		6		53		32	
D.I. KHAN		6		41		49	
SWAT		1		55		38	
DIR		7		54		27	
CHITRAL		3		15		25	
MALAKAND		0		15		18	
TOTAL		55		503		341	
FATA							
MOHMAND		1		12		6	
KHYBER		0		5		15	
KURRAM		0		8		10	
BAJAUR		1		7		15	
WAZIRISTAN		1		7		1	
S. WAZIRISTAN		0		7		2	
AKZAI		1		14		10	
TOTAL		4		60		59	

SOURCE : DOH, NWFP.

TABLE II

MAJOR COMMON DISEASES AMONG CHILDREN UNDER THE AGE OF 5 YEARS (*)

DISEASES	PESHAWAR (59) (%)	KOHAT (32) (%)	D.I.KHAN (57) (%)	MANSEHRA (35) (%)
1. DIARRHOEA	86.44	100.00	61.40	94.29
2. CHOLERA	71.10	100.00	14.00	85.70
3. TYPHOID	22.00	12.50	0.00	85.70
4. WORMS	49.15	3.10	5.20	71.40
5. ALL KIND OF FEVERS	5.00	3.10	1.70	0.00
6. MALARIA	0.00	18.70	1.70	0.00
7. STOMACH DISORDERS	6.70	0.00	0.00	0.00
8. MEASLES	3.40	0.00	0.00	0.00
9. WHOOPING COUGH	0.00	12.50	1.70	37.10
10. PNEUMONIA	0.00	3.10	0.00	0.00
11. POLIO	0.00	0.00	1.70	14.30
12. GOITER	3.40	0.00	0.00	0.00

(*) Reported by Mothers of Individual Households

NOTE : Figures in Brackets indicate Total No. of Mothers

TABLE III

FREQUENCY OF DEATH OF CHILDREN BELOW THE AGE OF 5 YEARS
(BELOW THE AGE OF 5 YEARS)

DESCRIPTION	PESHAWAR		KOHAT		D.I.KHAN		MASNEHRA	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)
No. OF RESPONDENTS REPORTING DEATHS	37	52.71	18	56.25	25	43.86	12	34.29
No. OF DEATHS	62		35		48		16	
MALE CHILDREN	32	51.61	16	45.71	23	47.92	9	56.25
FEMALE CHILDREN	30	48.39	19	54.29	25	52.08	7	43.75

TABLE IV

DEATHS COMPILED BY AGE GROUPS

DESCRIPTION	PESHAWAR		KOHAT		D.I.KHAN		MASNEHRA	
	No	(%)	No.	(%)	No	(%)	No.	(%)
GROUP I	9	39.13	4	40.00	2	22.22	3	33.33
GROUP II	9	39.13	3	30.00	4	44.44	3	33.33
GROUP III	5	21.74	3	30.00	3	33.33	3	33.33

NOTE :

Group I : 1-5 Months
Group II : 6 Months-2 Years
Group III : >2-5 Years

TABLE V

CHILD DEATHS BY CAUSES
(REPORTED BY MOTHERS WHO LOST CHILDREN UNDER 5 YRS OF AGE)

DISEASES	PESHAWAR	KOHAT	D.I.KHAN	MANSEHRA
FEVER	13.30	4.17	–	–
DIARRHOEA	43.30	16.67	8.30	–
CHOLERA	3.30	–	–	–
TYPHOID	3.30	–	–	–
WHOOPING COUGH	3.30	–	–	–
NOT KNOWN (*)	33.50	77.16	91.70	100.00

(*) The Causes of death of very young Children are often not known, however it may also be suspected that the data-collectors did not investigate enough leaving the column empty.

TABLE VI

PERCEIVED CAUSES OF DISEASES AMONG CHILDREN UNDER THE AGE OF 5 YRS

DISEASE	CAUSE	PESHAWAR (%)	KOHAT (%)	D.I.K (%)	MANSEHRA (%)
ALL KINDS OF FEVER	A.E. OF DISEASES	-	-	1.75	14.29
	CLIMATIC CONDITIONS	87.5	30.51	3.51	77.14
	IMPURE WATER	-	-	3.51	-
	LACK OF CARE	3.13	25.42	-	-
	MALNUTRITION	-	-	1.75	-
	UNHYGIENIC CONDITION	9.38	16.95	38.6	-
	UNHYGIENIC FOOD	-	16.95	1.75	-
FALLEN FONTANAL	A.E. OF DISEASES	-	-	7.02	5.71
	CLIMATIC CONDITIONS	-	32.2	5.26	-
	FEAR	43.75	18.64	-	71.43
	LACK OF CARE	-	3.39	-	-
	OTHERS	6.25	-	21.05	-
	SHORTAGE OF WATER	-	-	-	2.86
	UNHYGIENIC FOOD	-	13.56	-	-
	WEAKNESS	-	-	7.02	2.86
EYES TURNED UP	A.E. OF DISEASES	-	-	3.51	37.14
	CLIMATIC CONDITIONS	-	-	8.77	-
	FEAR	62.5	18.64	-	-
	LACK OF CARE	3.13	22.03	-	-
	NO VACCINATION	3.13	-	-	-
	SAYA	-	-	-	2.86
	UNHYGIENIC FOOD	3.13	10.17	-	-
	WEAKNESS	3.13	-	3.51	34.29
JERKS	A.E. OF DISEASES	-	16.95	-	57.14
	CLIMATIC CONDITIONS	-	-	1.75	-
	NO VACCINATION	18.75	5.08	-	-
	WEAKNESS	40.63	16.95	3.51	-
TURNED HANDS & FEET	A.E. OF DISEASES	53.13	11.86	-	37.14
	CLIMATIC CONDITIONS	-	-	7.02	-
	IMPURE WATER	3.13	3.39	-	-
	LACK OF CARE	6.25	-	-	-
	NO VACCINATION	3.13	-	-	-
	SAYA	-	3.39	-	5.71
	UNHYGIENIC CONDITION	-	13.56	-	-
	UNHYGIENIC FOOD	-	27.12	-	-
	WEAKNESS	31.25	10.17	3.51	-
DIARRHOEA	A.E. OF DISEASES	-	3.39	-	-
	IMPURE WATER	-	6.78	-	2.86
	MALNUTRITION	6.25	-	-	-
	OTHERS	6.25	-	7.02	8.57
	OVER EATING	-	-	3.51	-
	UNHYGIENIC CONDITION	34.38	13.56	50.88	5.71
	UNHYGIENIC FOOD	43.75	47.46	5.26	65.71
	WEAKNESS	6.25	13.56	-	-
INACAPACITY TO EAT	A.E. OF DISEASES	-	-	3.51	29.57
	OVER EATING	-	-		5.71
	WEAKNESS	-	-	1.75	34.29

TABLE VII

TREATMENT OF DISEASES OF CHILDREN BELOW THE AGE OF 5 YRS.

DISTRICT	DISEASE	SELF (%)	HAKIM (%)	PIR (%)	DOC/DISP (%)
PESHAWAR	ALL KINDS OF FEVER	12.50	6.30	3.10	81.30
	FALLEN FONTANAL	12.50	25.00	6.30	25.00
	EYES TURNED UP	3.10	15.60	46.90	21.90
	JERKS	3.10	18.80	46.90	28.10
	TURNED HANDS & FEET	3.10	18.80	53.10	28.10
	DIARRHOEA	6.30	18.80	21.90	78.10
	INCAPACITY TO EAT	3.10	9.40	18.80	71.90
KOHAT	ALL KINDS OF FEVER	22.00	8.50	5.10	81.40
	FALLEN FONTANAL	32.20	1.70	8.40	50.80
	EYES TURNED UP	0.00	0.00	6.80	67.80
	JERKS	0.00	0.00	10.20	72.90
	TURNED HANDS & FEET	1.70	0.00	6.80	62.70
	DIARRHOEA	22.00	0.00	1.70	81.10
	INCAPACITY TO EAT	0.00	0.00	5.10	62.70
D.I. KHAN	ALL KINDS OF FEVER	8.80	5.30	10.50	93.00
	FALLEN FONTANAL	7.00	0.00	38.60	43.90
	EYES TURNED UP	3.50	0.00	22.80	12.10
	JERKS	0.00	1.80	22.80	45.60
	TURNED HANDS & FEET	0.00	1.80	15.80	56.10
	DIARRHOEA	22.00	1.80	5.30	84.20
	INCAPACITY TO EAT	1.80	1.80	7.00	43.30
MANSEHRA	ALL KINDS OF FEVER	2.90	0.00	0.00	91.40
	FALLEN FONTANAL	28.60	2.90	0.00	28.60
	EYES TURNED UP	0.00	0.00	28.60	22.90
	JERKS	0.00	0.00	17.10	20.00
	TURNED HANDS & FEET	0.00	0.00	31.40	14.30
	DIARRHOEA	8.60	0.00	11.40	100.00
	INCAPACITY TO EAT	0.00	0.00	2.90	68.60

TABLE VIII

USE OF HEALTH FACILITIES BY MOTHERS FOR THEMSELVES & THEIR CHILDREN

DISTRICT	PERSON	CH. DIS (%)	FD (%)	FA (%)
PESHAWAR	BASIC HEALTH UNIT	0.00	0.00	0.00
	DOCTOR	64.40	3.40	0.00
	LADY DOCTOR	0.00	40.70	0.00
	TBA	0.00	10.20	0.00
	MOULVI	0.00	0.00	0.00
	HAKEEM	0.00	0.00	0.00
	PIR	0.00	0.00	0.00
	FAMILY HEAD/MEMBERS	3.40	1.70	32.20
	ELDER W	25.40	33.90	45.80
	RELATIVES	6.80	5.10	5.10
KOHAT	BASIC HEALTH UNIT	0.00	0.00	0.00
	DOCTOR	100.00	0.00	0.00
	LADY DOCTOR	3.10	78.10	0.00
	TBA	0.00	46.90	0.00
	MOULVI	0.00	0.00	0.00
	HAKEEM	0.00	0.00	0.00
	PIR	0.00	0.00	0.00
	FAMILY HEAD/MEMBERS	0.00	0.00	0.00
	ELDER W	0.00	0.00	93.80
	RELATIVES	0.00	0.00	0.00
D I KHAN	BASIC HEALTH UNIT	0.00	0.00	0.00
	DOCTOR	61.40	0.00	0.00
	LADY DOCTOR	5.30	35.10	0.00
	TBA	0.00	31.60	0.00
	MOULVI	0.00	0.00	0.00
	HAKEEM	3.50	0.00	0.00
	PIR	0.00	1.80	0.00
	FAMILY HEAD/MEMBERS	0.00	0.00	0.00
	ELDER W	28.10	8.80	0.00
	RELATIVES	0.00	0.00	0.00
MANSEHRA	BASIC HEALTH UNIT	0.00	0.00	0.00
	DOCTOR	100.00	0.00	0.00
	LADY DOCTOR	0.00	100.00	0.00
	TBA	22.90	11.40	0.00
	MOULVI	0.00	0.00	0.00
	HAKEEM	0.00	0.00	0.00
	PIR	0.00	0.00	0.00
	FAMILY HEAD/MEMBERS	0.00	0.00	0.00
	ELDER W	0.00	0.00	0.00
	RELATIVES	0.00	0.00	0.00

TABLE IX

PRACTICE OF WASHING HANDS (FEMALE RESPONDTENS)

When do You feel the need to Wash Hands ?

TYPE	PESHAWAR (%)	KOHAT (%)	D.I.KHAN (%)	MANSEHRA (%)
BEFORE COOKING	5.08	0.00	0.00	68.57
AFTER MEALS	23.73	0.00	0.00	71.43
AFTER COMPLETING DAYS WORK	22.02	0.00	0.00	48.57
OFTEN	66.10	0.00	0.00	40.00
BEFORE PRAYING	5.08	0.00	0.00	68.57
AFTER DEFACATION	13.56	0.00	0.00	28.57
AFTER CLEANING CHILDREN	3.39	0.00	0.00	5.71
MANY TIMES	1.69	0.00	0.00	0.00
OTHERS	0.00	0.00	0.00	8.57

NOTE : In Kohat and D.I. Khan this Question was not attempted by the Investigators.

TABLE X

REASONS TO INSTALL A LATRINE INSIDE YOUR HOUSE (FEMALE RESP.)

REASONS	PESHAWAR (%)	KOHAT (%)	D.I.KHAN (%)
TO GET RID OF BAD SMELL	77.97	12.50	75.44
FOR PARDAH	79.66	0.00	50.88
FOR CLEANLINESS	83.05	34.38	29.82
FOR COMFORT	74.58	100.00	19.30
STATUS CONSCIOUS	30.51	0.00	0.00
TOILET EXISTS	6.78	0.00	0.00
OTHERS	0.00	0.00	0.00

TABLE XI

REASONS FOR NOT INSTALLING A LATRINE INSIDE YOUR HOUSE (FEMALE RESP.)

REASONS	PESHAWAR (%)	KOHAT (%)	D.I.KHAN (%)
SMALL HOUSE	27.12	34.38	10.53
KACHA GHAR	17.12	0.00	35.09
RENTED LAND	18.64	0.00	3.51
SHORTAGE OF WATER	8.47	0.00	15.79
EXPENSIVE	22.03	100.00	75.44
DUE TO BAD SMELL	3.39	0.00	0.00
NOT IMPRESSIVE	0.00	0.00	0.00
NO OBJECTION	40.68	0.00	3.51
OTHERS	0.00	0.00	0.00

TABLE XII

DISEASES CAUSED BY WATER (AWARENESS AMONG WOMEN)

DISEASE	PESHAWAR (%)	KOHAT (%)	D.I.KHAN (%)	MANSEHRA (%)
DIARRHOEA	52.54	100.00	1.75	51.43
CHOLERA	42.37	100.00	1.75	0.00
WORMS	40.68	0.00	5.26	71.43
STOMACH DISORDERS	23.73	53.13	5.26	31.43
MALARIA	3.39	0.00	0.00	80.00
SKIN DISEASES	3.39	0.00	7.02	14.29
KIDNEY TROUBLE	5.09	12.50	0.00	0.00
COLD/TEMPARATURE	0.00	0.00	3.51	5.71
TYPHOID	3.39	0.00	0.00	5.71
GOITER	3.39	0.00	0.00	2.86
OTHERS	1.69	0.00	1.75	0.00
COUGH	0.00	0.00	0.00	2.86
JAUNDICE	1.69	0.00	0.00	0.00

TABLE XIII

WATER SOURCES CONSIDERED TO BE SAFE FOR DRINKING (FEMALE RESP.)

TYPE	PESHAWAR (%)	KOHAT (%)	D.I.KHAN (%)	MANSEHRA (%)
STAND POST	57.63	100.00	56.14	74.29
WELL	39.15	0.00	5.26	22.86
TANK	0.00	0.00	29.82	0.00
TUBE-WELL	23.73	0.00	1.75	2.86
RAIN WATER POND	0.00	0.00	12.28	0.00
RIVER/STREAM	0.00	0.00	0.00	11.43

TABLE XIV

INFORMATION ABOUT O.R.S., IMMUNISATION & FORMULA MILK
WITH SOURCES OF INFORMATION (FEMALE RESPONDENTS)

DESCRIPTION	SOURCE	PESHAWAR (%)	KOHAT (%)	D.I.KHAN (%)	MANSEHRA (%)
NIMKOL	DR/DISPENSER	30.5	-	66.7	-
	RADIO, TV	37.3	-	8.8	-
	OTHERS	-	-	1.8	-
	NO SOURCE MENTIONE	13.6	-	-	-
	NO ANSWERS	15.3	100.0	22.8	-
VACCINATION	DR/DISPENSER	20.3	-	61.4	-
	RADIO, TV	30.5	-	10.5	-
	MOBILE TEAM	3.4	-	-	-
	OTHERS	-	-	1.8	-
	NO SOURCE MENTIONE	10.2	100.0	5.3	-
	NO ANSWERS	28.8	-	21.1	-
POWDERED MILK	DR/DISPENSER	16.9	-	19.3	-
	RADIO, TV	16.9	-	10.5	-
	OTHERS	-	-	1.8	-
	MOBILE TEAM	3.4	-	-	-
	NO SOURCE MENTIONE	16.9	100.0	10.5	-
	NO ANSWERS	45.8	-	57.9	-

APPENDIX 16

APPENDIX 16: ESTIMATION OF DISTRICT BACKWARDNESS

Backwardness in terms of water supply of the Districts in the province was established using a non-parametric approach and four criteria:

Districts with low water supply coverage were considered to have a high degree of backwardness. Low coverage was measured two ways and the results combined into a single rating:

- Districts with percentage coverage less than 30 % were given 10 points, with coverage between 30 % and 50 %, 5 points and with coverage greater than 50 %, 0 points;

- Districts with more than 300,000 people not covered were given 10 points, 100,000 to 300,000 not covered, 5 points, and less than 100,000 not covered, 0 points; and

- the point ratings for each District were then combined, and those receiving 20 - 30 points were rated as having high backwardness, 10 - 20 points, medium backwardness and less than 10 points, low backwardness;

Districts in which people have to travel long distances to a source of potable water were considered to have a high degree of backwardness. Distance was based on the type of service being provided in the province. Because PHED decides whether to provide house connections, stand posts or community tanks in part on the availability of water, there is a correlation between the type of service provided and the distance people would have to travel - for example, house connections are only provided where there are significant amounts of water available, and community tanks where there is little available or it has to be pumped long distances. Districts where house connections are common were considered to have low levels of backwardness, where stand posts are used in most systems to be medium and where community tanks are most common, high;

level of economic development - Districts were rated as having high, medium or low levels of economic development as measured by per capita incomes which

were estimated using the crop cash value per capita as listed in the 1980 Agricultural Census; and

Districts with significant non-ADP sectoral investment (usually in the form of Donor financed projects) are considered not to be backward.

Since the backwardness assessment was to be used to nominate Districts which should receive a greater ADP allocation than others, Districts in which the estimated coverage exceeded 70 %, the target coverage for 1993, were excluded from the exercise. As a result, all Districts except Mansehra (77 %), Malakand (76 %), Mardan (82 %), Peshawar (82 %) and Karak (89 %) were rated on this basis with the results presented in Tables 1 - 5.

Table 2 Estimation of District Water Supply Backwardness on the Basis of Nee

District	Physio. Region	% of Pop. Covered	No. of Points	Pop. Uncovered	No. of Points	Backwardness Low	Med.	High
Chitral	North	59	0	103,964	5	X		
Dir	North	21	10	796,770	10			X
Swat	North	33	5	973,182	10		X	
Kohistan	North	25	10	427,061	10			X
Mansehra	North	77	DISTRICT NOT RATED DUE TO PRESENT COVERAGE					
Malakand	North	76	DISTRICT NOT RATED DUE TO PRESENT COVERAGE					
Abbottabad	North	59	0	474,359	10		X	
Mardan	Central	82	DISTRICT NOT RATED DUE TO PRESENT COVERAGE					
Peshawar	Central	82	DISTRICT NOT RATED DUE TO PRESENT COVERAGE					
Kohat	South	44	5	265,594	5		X	
Karak	South	89	DISTRICT NOT RATED DUE TO PRESENT COVERAGE					
Bannu	South	51	0	384,255	10		X	
D.I. Khan	South	59	0	263,576	5	X		

Table 1 Summary Estimation of District Water Supply Backwardness

District	Physio. Region	Rating on the Basis of Need	Distance	Econ. Dev	Other Inv	Summary Rating
Chitral	North	Low	Low	High	Low	Medium
Dir	North	High	Low	High	Low	High
Swat	North	Medium	Low	Medium	Low	Low
Kohistan	North	High	High	High	High	High
Mansehra	North	DISTRICT NOT RATED DUE TO PRESENT COVERAGE				
Malakand	North	DISTRICT NOT RATED DUE TO PRESENT COVERAGE				
Abbottabad	North	Medium	Medium	Medium	High	Medium
Mardan	Central	DISTRICT NOT RATED DUE TO PRESENT COVERAGE				
Peshawar	Central	DISTRICT NOT RATED DUE TO PRESENT COVERAGE				
Kohat	South	Medium	Low	Medium	High	Medium
Karak	South	DISTRICT NOT RATED DUE TO PRESENT COVERAGE				
Bannu	South	Medium	Low	Medium	High	Medium
D.I. Khan	South	Low	High	Medium	High	High

Table 3 Estimation of District Water Supply Backwardness on the Basis of Distance

District	Physio. Region	% House Connect.	% Stand Posts	% Commun. Tanks*	Backwardness Low	Backwardness Medium	Backwardness High	Weight 0,1,2
Chitral	North	80	20	0	X			20
Dir	North	65	11	24	X			59
Swat	North	61	8	31	X			70
Kohistan	North	5	37	58			X	153
Mansehra	North	DISTRICT NOT RATED DUE TO PRESENT COVERAGE						126
Malakand	North	DISTRICT NOT RATED DUE TO PRESENT COVERAGE						40
Abbottabad	North	59	24	17		X		58
Mardan	Central	DISTRICT NOT RATED DUE TO PRESENT COVERAGE						28
Peshawar	Central	DISTRICT NOT RATED DUE TO PRESENT COVERAGE						17
Kohat	South	62	8	30	X			68
Karak	South	DISTRICT NOT RATED DUE TO PRESENT COVERAGE						80
Bannu	South	62	4	34	X			72
D.I. Khan	South	30	0	70			X	140

Table 4 Est. of Water Supply Backwardness on the Basis of Economic Development

District	Physio. Region	Economic Development			Backwardness		
		Low	Medium	High	Low	Medium	High
Chitral	North	X					X
Dir	North	X					X
Swat	North		X			X	
Kohistan	North	X					X
Mansehra	North	DISTRICT NOT RATED DUE TO PRESENT COVERAGE					
Malakand	North	DISTRICT NOT RATED DUE TO PRESENT COVERAGE					X
Abbottabad	North		X			X	
Mardan	Central	DISTRICT NOT RATED DUE TO PRESENT COVERAGE					
Peshawar	Central	DISTRICT NOT RATED DUE TO PRESENT COVERAGE					
Kohat	South		X			X	
Karak	South	DISTRICT NOT RATED DUE TO PRESENT COVERAGE					X
Bannu	South		X			X	
D.I. Khan	South		X			X	

Table 5 Est. of Water Supply Backwardness on the Basis of Non-ADP Investment

District	Physio. Region	Non-ADP Investment		Rating	
		Yes	No	Low	High
Chitral	North	ADB		X	
Dir	North	KFW		X	
Swat	North	KFW		X	
Kohistan	North		X		X
Mansehra	North	DISTRICT NOT RATED DUE TO PRESENT COVERAGE			
Malakand	North	DISTRICT NOT RATED DUE TO PRESENT COVERAGE			
Abbottabad	North		X		X
Mardan	Central	DISTRICT NOT RATED DUE TO PRESENT COVERAGE			
Peshawar	Central	DISTRICT NOT RATED DUE TO PRESENT COVERAGE			
Kohat	South		X		X
Karak	South	DISTRICT NOT RATED DUE TO PRESENT COVERAGE			
Bannu	South		X		X
D.I. Khan	South		X		X

APPENDIX 17

APPENDIX 17: **PROS AND CONS OF VARIOUS COST ECOVERY MECHANISMS**

1. **Indirect Taxation**

1.1 Pros

1.1.1 In the presence of a low willingness to pay along with a medium to high ability to pay, indirect taxation probably constitutes a good, not so apparent method of achieving full or partial recovery of costs. However, in the context of NWFP, with approximately 60 % of the households indicating a medium to high level of willingness to pay, the need for a less explicit method does not arise.

1.1.2 If it is charged as a surcharge on an existing tax, there are no additional administrative costs.

1.1.3 If it is linked to a progressive tax, those with higher ability to pay will pay more than those with lower ability to pay.

1.2 Cons

1.2.1 The most serious problem with indirect taxation is that it does not directly link costs to consumption.

1.2.2 Secondly, it becomes difficult to exclude from the tax those people who do not directly benefit from the service.

It is the Local Councils which have the mandate to levy taxes or surcharges. It is proposed that communities be made responsible for the operation and maintenance of the schemes. Hence the collecting and the maintaining agencies will not be the same.

2. **Water Tariffs**

2.1 Pros

2.1.1 The biggest advantage of this form of collection is that it is the user charge in the real sense of the term and it directly links costs with the benefit of the service. In areas where willingness to pay is not a problem, like in NWFP, this mechanism can be used successfully.

2.2 Cons

2.2.1 The advantage of the link to usage is eroded unless metering takes place. Metering is not a realistic option in the province's rural water schemes due to its initial cost and the recurring costs which are made necessary through reading and maintaining the meters.

2.2.2 In the case of stand post schemes, tariff collection becomes a problem because stand posts are public goods and exclusion in case of non payment is very difficult. However, since two thirds of PHED schemes are house connections, this problem is valid for a relatively small section of the consumers.

3. **Community Collection**

3.1 Pros

3.1.1 The biggest advantage of this collection mechanism is that the community's money stays in the community.

3.1.2 Since collection is done by the people who know the economic state of each household, cross subsidisation can easily be achieved by subsidizing, or in extreme cases exempting, vulnerable groups - widows, the disabled or the poor.

3.1.3 The community decides how much money should be collected and thereby directly controls the level of service it wants.

3.1.4 Social pressure can be brought to bear on payment defaulters.

3.2 Cons

3.2.1 Where tribal structures are strong, as is the case in most areas of NWFP, the general presence of mutual mistrust makes the implementation difficult.