- detecting, screening and classifying malnourished children and referral to the nearest health facility for treatment
- managing and treating selected common health problems and immunization of children and mothers
- collecting nutritional and health data including births and deaths, outbreak of infectious diseases and prevalence of malnutrition
- organizing arrangements to distribute drugs, ORS[1/], medicines, drinking water and sanitary facilities, and training in preparation of locally manufactured foods to wean infants
- organizing health, nutrition, child care, TBAs[2/] training and formal and non-formal education of girls belonging to village working groups
- organizing, managing and implementing manufacture, processing and trading of local products, including food products, animal farming, local women's arts and crafts and supply of training, production and marketing inputs

4.6 Social Infrastructure and Services

4.6.1 Transportation

(1) Roads

Construction of the road network in the urban area is based on a master plan issued in 1960 for the Metropolitan area of Islamabad and Rawalpindi. One third of the proposed road network has been completed. Right-of-ways in the urban area are mostly metalled roads with adequate widths to handle traffic. Farm-to-market roads are extended in the Study Area from several trunk roads serving the ICT.

The present road network in the Study Area consists of about 12km, 71km, 113km and 193km of national, provincial, capital and municipal roads, respectively. Municipal roads are mainly classified as Katcha roads used for agricultural activities. The table

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1/ ORS : Oral Rehydration Salt

2/ TBAs: Traditional Birth Attendants (Dais)

below shows roads in the Study Area by administrative classification and surface type.

ROAD NETWORK BY SURFACE TYPE

(unit: km)

Classification	Metalled Road	Shingle Road	Katcha Road	Total
National	12.0	-	-	12.0
Provincial	70.7	-	-	70.7
Capital	86.5	2.0	24.0	112.5
Municipal	60.2	8.1	124.5	192.8
Total	229.4	10.1	148.5	388.0

Note; i) The above table shows the length of road passable by motor vehicles.
ii) Road length was obtained from field survey. Where it was difficult to distinguish shingle roads, the roads were regarded as Katcha roads.

The area is served by about 390km of road of various types with an average density of 0.64km per km^2. This is more than the national level of 0.16km per km^2. However, 65% of municipal roads which are vital to life in rural area, are comprised of Katcha roads barely passable by tractors. A general map of the present road network is presented in FIG. 4.6-1.

(2) Registered Motor Vehicles

The number of registered motor vehicles in the Study Area as of 1981 is 337 (10,907 in the ICT), out of which motorcycles account for about 34%, motor cars and pickup trucks for 43%, and tractors for 12%. Average increase in registered vehicles in the ICT is 2,500 per year, with 6.7 per year per 1,000 persons. This is more than the national level of 1.7 and shows rapid progress in motorization.

In addition, traffic between villages and urban areas are estimated at 10% of the rural population per day. Purpose of travel is transport of goods, shopping, commuting, etc.

(3) Railways

The railway line running from Rawalpindi to Lahore crosses 10km of the southern part of the Study Area with a station at Sihala. Another 3km of railway from Rawalpindi to Peshawar grazes the westernmost edge of the Study Area with a station at Sang Jani. Monthly average earnings and freight, etc. are presented in the following table.

MONTHLY AVERAGE INCOME

Station	No. of Passengers	Passenger Income (Rs)	Other Income (Rs)	Freight Income (Rs)	No. of Wagons Loaded
Sihala	13,400	14,430	652	17,838	15
Sang Jani	3,300	3,490	-	11,678	120

Source: D.T.O. Pakistan Railways, Rawalpindi
(July 1984 - Mar. 1985)

Main freight at both stations are oil in the case of incoming freight and ballast in the case of outgoing freight. The stations are not utilized for shipping agricultural produce. At Sihala station, about 150 passengers commute by train to their offices.

Means of transportation in the Study Area consist mainly of roads, buses, light trucks, pedal cycles and animals; however, the rural road network is quite poor except for the area near trunk roads. Insufficient transportation facilities are a major obstacle to economic and social development and therefore, rural village link roads should be urgently improved.

4.6.2 Communications

(1) Mail Services

The Study Area has 12 sub-post offices and 26 branch post offices under the Islamabad General Post Office. This means one

post office serving about 3,400 people or an area of about 16km^2. This is sufficient to meet the minimum requirement according to the Universal Postal Union (UPU) standards with one post office serving 3,000-6,000 people or an area of 20-40km^2.

However, wide differences exist between the urban and rural areas.

MAIL SERVICE FACILITIES

	Sub-Post Office	Branch Post Office	Postmen	Mail Box
Urban Area	32	12	79	1,382
Rural Area (Study Area)	12	26	11	0

Source: Islamabad General Post Office, August 1985

(2) Telephones

About 150 telephones are presently installed in the Study Area. Except for the Pakistan Institute for Nuclear Science & Technology (PINSTEC), 18 are in Bhara Kau, 60 in Tarlai and 50 in Sihala. The number of telephones is less than the national level which is 200 people per telephone unit (1981) compared with 870 people per unit in the Study Area.

According to the expansion program, mini-exchange stations are under construction, with 100 lines at Sihala and 300 lines at Hummak. Construction of 100 lines at Bhara Kau by 1986/87 is also under consideration. There are no public telephone systems in the Islamabad urban area nor in the Study Area.

4.6.3 Water Use

Over 150,000 persons in 133 villages live in the Study Area. They depend on water obtained from shallow wells for drinking water and other domestic use. Spring water is used in hilly areas and drinking water is obtained from pressure-reducing valves of water pipelines in the villages along Simly Road.

(1) Present Usage of Ground Water

Present usage of ground water is clarified as follows by the questionnaire survey (TABLE 3.7-1) and field observations for 80 shallow wells (TABLE 3.7-2):

a) About 50% of wells lack water in the dry season. Many wells dry up in dry season in the upper part of ground water basins.

b) An average of 160 farmers obtain water from one well and more than 300 farmers in Tamair UC share one well located in the uppermost part of Malal Kas.

c) About 85% of wells are used for obtaining drinking water.

d) Water consumption per house per day is 20 to 40gal. (76 to 152ℓ), 3 to 6gal. per person per day (11.5 to 23ℓ).

e) Farmers obtain about 3t of water per day from one well.

f) Women and girls carry about 20ℓ of water in buckets or cans balanced on their head 500 to 1,000m distance. If wells dry up in dry season (especially during May and June), they go to other wells at greater distances (1-2 Km).

g) There are some watersellers in Taramri village selling ground water at Rs 2 per 40ℓand receive about Rs 40 of daily income which corresponds to that of common workers.

h) Well buckets with a rope are used in about 95% of wells and manual winches are used in deeper wells. Very few manual and electric pumps have been installled.

i) Construction cost for digging a shallow well is Rs 15,000 to 20,000 making it costly and practically impossible for farmers to own a private well.

The above results show that farmers obtain about 5gal. of water manually for drinking and other domestic uses from small shallow wells with many of these wells lacking water during the dry season. The farmers are committed to stabilizing the current ground water situation.

(2) Village Ponds

Over 50 village ponds are located in the Study Area, as shown in TABLE 4.6-1. Most of them are located near hill settlements at elevations from 500m to 600m. Scale of ponds is very small, mostly formed as a result of heavy rainfall. However, in some cases artificial ponds have been created through embankment construction by the farmers themselves.

The typical depth of ponds is about 1.5m, and the storage capacity of these ponds ranges from $10m^3$ to 5,000 m^3, with the majority around $10m^3$ - $30m^3$.

In dry season, ponds are generally empty, except for large ones. As for the larger ponds, water quality is a problem during this period. These large ponds supply drinking water for livestock, bathing, laundry, and a recreational site for swimming. Ponds thus serve an important social function as a site for conversation and exchange of information among villagers.

As for management, excavation works to remove sediment in the ponds are performed once every several years to maintain the storage capacity. These works are performed by all the villagers occasionally using machines such as bulldozers.

4.6.4 Electrification

Elecric power is supplied to the Study Area by the Mangla Dam station with a maximum generating capacity of 800MW and the Tarbela Dam with a capacity of 1,575MW.

Along with the above two stations there are six substations in the district, supplying electricity to the Study Area. These stations are controlled by WAPDA. Electrification under the present conditions in the Study Area is as follows:

Complete electrification ..... 44% (53 villages)
Partial electrification ..... 21% (26 villages)
No electrification ..... 35% (42 villages)

Electrification has made progress in the zone located near urban area and trunk roads, but has been delayed in the mountainous and outlying areas.

Based on the results of the questionnaire, villages strongly requesting electrification are Gokina, Talhar, Shah Allah Ditta, and Dhok Jori in UC Shah Allah Ditta and Jandala and Gagri in UC Sihala. It seems that villages in UC Shah Allah Ditta require electrification as the first priority because of the inconvenient conditions in the mountains. While villages in UC Sihala located along the Soan River have relatively sufficient water and land, elecrification remains underdeveloped. At present, electricity is used mostly for lighting in houses and very little for agricultural or milling use. In addition, an experimental solar power system utilizing irrigation pumps (caliber 75mm, 2m head, power generation of 525W) is now being conducted by ADBP in the Study Area. Electricity is supplied to 65% percent of all villages in the Study Area.

Monthly mean electric rate per house is Rs 46 as outlined in the following table.

DOMESTIC ELECTRIC RATES

Consumption (kWh)	Rate (Paisa/kWh)
1 - 50	37
51 - 250	44
251 - 600	55
above 601	77

Source : WAPDA, 1985

A plan is presently being implemented by WAPDA to establish an 11kV powerline on the basis of an estimated electric demand of 1kW/hr per household. The length of powerline extending from each substation is shown in the following table and on FIG. 4.6-2.

LENGTH OF THE POWERLINE AT EACH SUBSTATION

Name of Branch Lines	Length (km)
1. University Feeder	23.30
2. Chatter Feeder	5.00
3. Bhara Kau Feeder	40.61
4. I-9/1 Airport Feeder	35.00
5. Simly Feeder	65.00
6. Chaklala Feeder	46.55
7. National Park Feeder	38.75
8. Kahuta Feeder	13.00
Total	267.21

Source : WAPDA, Islamabad, 1985

4.6.5 Education

(1) Present Conditions

In 1978, a new education policy based on the Islamic theory was released by the Government.

The policy aims to unify the nation and people through education based in Islamic theory and thought. Planning calls for the expansion of primary education and technical and/or vocational education. However, primary school education is not yet compulsory at present, and the literacy rate (1981) is only 23.3%, the lowest rate among Asian countries.

For these reasons, the Government aims to raise the literacy rate to 45% by 1988 in the Sixth Five Year Plan (1983/88).

1) Participation Rate and Literacy

Rate of student participation in primary schools in 1982/83 was 90%. Literacy rates by sex in 1981 were higher than the national averages as indicated in the table below.

PARTICIPATION AND LITERACY RATES

Unit: %

Location	Primary	Secondary		Literacy Rate	
	I-V	VI-VIII	IX-X	Male	Female
Pakistan	48	26	15	35.1	16.0[1/]
Urban	72	52	39	55.3	37.3
Rural	40	15	6	26.2	7.3
Islamabad Proper	99	50		71.3	52.7
Study Area	90	25		49.6	15.9

1/ Population Census Organization, 1981
Source: Federal Government Educational Institution Directorate;
Literacy and Mass Education Commission (LAMEC);
the Sixth Five Year Plan, 1983-88

2) Schools and Students

The total number of schools in the Study Area under the Directorate of Federal Government Educational Institutions has now risen to 159 as of May 1984, out of which 114 are primary schools and 45 are secondary and/or middle schools. The number of students enrolled in primary schools is 23,907, in secondary schools, 5,088, and in vocational courses attached to two high schools, 50.

3) Teachers

Total number of teachers in the Study Area is estimated at 1,631, out of which 54% are employed in primary schools. One third of teachers are female, and the student teacher ratio (14.7) compares favorably with the national average (25.5)[1/].

1/ Source: Pakistan Economic Survey, 1983/84

(2) Problems of Education

1) Scattered Villages

A major problem in education is the scattered pattern of population in a large part of the Study Area. It is estimated that at least 10% of the population live in villages of less than 500 persons, which is about 46% of the total number of villages. Under these circumstances, the provision of a school building in each village becomes expensive because of the small number of students that are likely to be enrolled. The problem is further intensified if separate schools are provided for boys and girls.

2) Acquisition of School Land

Population in the Study Area is rapidly increasing and development of facilities to meet the increasing requirements is difficult. Most school plots are located on wasteland and/or broken ground containing deep ditches, boulders and undulating areas. This leaves little space for future expansion or development of play grounds and athletic fields for children.

Furthermore vertical expansion of existing primary and middle school buldings is impossible as no provisions were made for the same in the original designs.

According to present government policy, land for school buildings in rural areas is to be provided free of cost by the community. Since land throughout the rural area has become very costly, it is now extremely difficult to obtain required land from communities either by donation or by compensation.

3) Lack of Basic Facilities

Existing educational facilities are insufficient for quality education. For example 9 schools are presently almost shelterless.

The low installation rate of basic facilities required by educational insitutions clearly illustrates the scope of the problem as presented in the table below.

INSTALLATION RATES OF BASIC FACILITIES

Facilities	Institutions	Installation Rates (%)
Playground	Primary schools	26
	Secondary schools	45
Teaching Kits	Primary schools	51
Desks	Boys primary schools	16
	Girls primary schools	19
Chairs	Boys primary schools	16
	Girls primary schools	19
Staff Toilet	Boys primary schools	4
	Girls primary schools	7
	Boys middle schools	11
	Girls middle schools	0
	Boys high schools	23
	Girls high schools	60
Student Toilet	Boys primary schools	4
	Girls primary Schools	11
	Boys middle schools	5
	Girls middle schools	17
	Boys high schools	15
	Girls high schools	40

Source: Federal Government Educational Institution Directorate

4) Lack of Technical Education

Technical manpower, particularly trained manpower for development of agriculture and for increasing production, is vital to enhance the productive capacity in the Study Area and to ensure implementation of development plans. In consideration of the above, three technical schools were established in the Study Area in 1983. Each school has 4 courses, namely agriculture, electric, metalworking and wood work. However, agricultural courses are not yet included due to difficulties in recruiting teachers. This system should be strengthened in order to meet the need for direct participation of graduates from the Study Area in rural development.

4.6.6 Vocational Training

(1) Vocational School

As mentioned above, vocational courses in agriculture, electric, metalworking and woodwork have been established in principal since 1983/84 with one teacher and one assistant for each course. (However, the agriculture course has not yet opened due to the difficulty in recruiting a teacher.)

(2) Village Workshops

Vocational training facilities have been established in 20 villages as of September 1985, as an activity of the READ project mentioned before in section 4.5.4. The training is implemented at 14 locations with 155 trainees in woodworking, 3 locations with 30 trainees in blacksmithing and 2 locations with 22 trainees in bricklaying (TABLE 4.6-2). The facilities are prepared by the villages, with equipment and raw materials supplied by the project.

According to an evaluation study on the project in 1983 the following problems exist:

1) Insufficient training and education for instructors
2) Irregular attendance of trainees
3) Unstable supply of raw materials
4) Absence of acceptance criteria for trainees

4.6.7 Medical and Health Services

(1) Health Facilities

A total of three (3) Rural Health Centres (RHCs) and twelve (12) Basic Health Units (BHUs) are planned in the Study Area. Out of these one RHC and four BHUs are already completed and commissioned on the ground. Recently, three mobile clinics were distributed to the Health Department.

In the Department of Health Office ICT, there are a total of 69 sanctioned posts for health and medical services staff including doctors and technical personnel in the Study Area. Out of these, 27 posts (39%) are vacant.

Population per doctor and per medical staff is 64,000 and 5,333 respectively.

(2) Patients

The total number of patients who come to consult RHC and BHU in one year come to more than 100,000. However, about 9% of patients did not actually receive attention due to inadequacies of facilities and staff. In the month of May 1984 alone, more than 200 patients in 13 villages were examined by Tarlai RHC as part of its home visiting service, and 6 health lectures were held.

According to the monthly report of the RHC medical officer, female patients outnumber males, and adults outnumber children. The pattern of patients is indicated in the following table.

PATIENTS EXAMINED

(Unit: %)

Patients Examined	Tarlai RHC	Bhara Kau BHU	Rawat BHU	Jagiot BHU	Tamair BHU
Patients Examined					
Total	100	100	100	100	100
Male	38	41	41	41	37
Female	62	59	59	59	62
Children	45	44	40	43	35
Adults	55	56	60	57	65
Patients Attendant but Absconded	9	-	-	-	-

Source: Dept. of Health, ICT (Apr. 1984 - Feb. 1985)

(3) Present disease patterns in the Study Area are recorded each month by the RHC medical officer. Common diseases are as presented in the table below. Cases of respiratory diseases, including tuberculosis, are relatively numerous.

DISEASES IN THE STUDY AREA

(Unit: %)

Diseases	Tarlai RHC	Bhara Kau BHU	Rawat BHU
Gastro Misc	7	15	4
Worms	7	2	2
Diarrhea	7	7	4
Respiratory diseases	22	24	17
Anemia	7	6	3
Skin deseases	11	6	7
Miscellaneous	31	10	28

Source: Dept. Of Health, ICT (Apr. 1984 - Feb. 1985)

4.6.8 Security

(1) Fire Brigade

Fire fighting activities in ICT are under the auspices of the CDA Fire Brigade with 140 personnel and 9 aging vehicles of which one is an ambulance car. Therefore, these vehicles should be renewed in the near future (See Annex).

The number of fire calls is increasing in the urban area. Fire fighting in the rural area however, is greatly impeded by substandard road conditions, lack of water sources and communication difficulties.

NUMBER OF FIRES REPORTED IN ICT

Year	1977	1978	1979	1980	1981	1982	1983	1984
No.	33	75	116	108	185	103	126	190

Source: Fire Brigade, CDA, 1985

(2) Police

The rural area is under the jurisdiction of the Islamabad Police, IA with 4,200 personnel. The Police Stations, with two stations in the rural area (namely Bhara Kau and Shihala), are connected by police telephone, police wireless and ordinary telephone. There is also a police college at Sihala.

Comparative crime reports (See Annex) are summarized in the following table.

COMPARATIVE CRIME STATEMENTS IN ICT

Year 1/	Rural Area	Urban Area	Total
1984	182	200	382
1985	177	205	382

1/ Jan. to Jun. in 1984 and 1985

Source: Islamabad Police, July 1985

4.7 Economic Activities

In order to provide an economic base to the national capital, the following three district zones have been created for different categories of industries. In addition to those discussed below, non agricultural activities of retailing, short distance hauling, construction, etc. are also carried on in the Study Area.

(1) Industrial and Trading Center (Urban Area)

This center is located on the northern side of Khyaban-e-Suhrawardy between the residential area and offices of the attached departments. The basic aim of this sector is to establish light consumer and service industries in the near proximity of the residential sectors. This is reserved for the establishment and running of bakeries, dairies, flour mills, laundries, specialized textile industries, rubber and plastic industries, mills, automobile service stations and workshops, repair shops for household goods and effects, printing and publishing companies, art studios, etc.

(2) Manufacturing Industrial Area (Urban Area)

This area is located along Khyaban-e-Sir Syed in the I-series sector where all types of industries, small, medium and large, have been established. Industrial enterprises require fast

communication links for growth and in view of this requirement, the area is connected with all the major cities of Pakistan by road and rail links. All other infrastructures such as electricity, water, gas, telephones, etc., which are prerequisites for modern industries are available in the area. Allotment has already been made to about 280 industrial units, more than half of which are presently functioning while others are under construction.

(3) The Subsidiary Industrial Area Along Kahuta Road (UC Sihala - Rural Area)

The area is located between the Soan River and G.T. Road along the bank of the Soan River away from Islamabad urban complex. This area was created to accommodate industries requiring a river side location which use large quantities of water, cause dust, noise, or other pollution or for some reason are not suitable for location in the manufacturing industrial area.

Among the industrial establishments located in the above industrial zones, the following table shows the number of industrial establishments registered with the Industries and Mineral Development Department of IA.

INDUSTRIAL ESTABLISHMENTS REGISTERED IN IA OFFICE
(as of December 31, 1982)

Type of Establishment	No. of Establishments	Workers Employed
1. Brick Kilns	3	135
2. Chemical Industries	32	770
3. Drugs and Pharmaceutical	3	81
4. Electronic Industries	2	529
5. Engineering Industries	32	3,252
6. Food & Beverages	24	1,482
7. Ice & Cold Storage	8	60
8. Marble Processing Industries	14	254
9. Printing Press	6	739
10. Textile	2	158
11. Tobacco Industries	1	30
12. Wood Industries	9	192
Total	136	7,682

Note: Above figures include the number of establishments in the urban area.

Source: Industries and Mineral Development Department, IA

Some registered establishments may no longer be functioning, while some functioning establishments may not be registered in the above list.

There are no firm data on cottage and rural industries in Islamabad rural area. During the field study, the Team found some cottage industries such as pottery, blacksmithing, shoe-making, woodworking, etc. However, the Team was unable to draw up an inventory of the same due to the previously mentioned unavailability of data.

CHAPTER V

AGRICULTURE

5.1 General

Located adjacent to the twin cities of Islamabad and Rawalpindi, the socioeconomy of the Study Area is greatly influenced by urban development. However, the economy of the Area is still dependent on agriculture and the society is strongly related with agricultural activities as indicated by agricutural population accounting for 85% of the total population.

In spite of the importance of agriculture to the regional society and economy, the agricultural sector primarily consists of traditional dry farming and livestock raising, the productivity of which is low. This low productivity is reflected in such distinctive features as the small farming scale and a predominant majority of part-time farmers.

DISTINCTIVE FEATURES OF AGRICULTURE IN THE STUDY AREA

1. Population				
Total Population	152,164 (100%)			
Agricultural Population	129,200 (85%)			
2. Farm Households				
Total No. of Households	20,800 (100%)			
No. of Farm Households	14,170 (68%)	(100%)	(100%)	
No. of Cultivators	12,100	- (85%)	-	
No. of Landless Livestock Holders	2,070	- (15%)	-	
No. of Farm Households with Livestock	12,830	-	-	(90%)
3. Cultivated Area				
Total Cultivated Area	23,120ha			
Total Cultivated Area/No. of Cultivators &/Farm Households	1.9ha & 1.6ha			
Total Cultivated Area/Total Population &/Agricultural Population	0.15ha & 0.18			

4. Livestock

Total No. of Head (Adult cow units)	48,590
No. of Head/Farm Households with Livestock (Adult cow units)	3.8 head

5. Farm Economy[1/]

No. of Farm Households with Primary Income Sources from Agriculture	6,800 (48%)
No. of Farm Households with Primary Income Source from Non-agricultural Sector	7,370 (52%)

1/ Assumed based on questionnaire survey.

Source: Village survey by LGRD, Land Revenue Dept. & questionnaire survey.

Development of the capital has greatly affected the agricultural sector in the Study Area resulting in the following major trends:

a) Increased dependency on non-agricultural employment and an increase in number of part-time farmers;

b) Rising labor cost and partial shortages of farm labor forces;

c) Stagnation of crop production (except for vegetables);

d) Expansion of tractor utilization and decrease in draft-animal population;

e) Expansion of vegetable production and poultry farms; and,

f) Increase in milk animals.

The agricultural sector in the Study Area is gradually being transformed into agricultural patterns found in close proximity to urban areas; however, the full potential of the Area remains undeveloped.

5.2 Land Use and Land Tenure

5.2.1 Soil and Land Use

(1) Soil Characteristics and Distribution

Soils in the Study Area are derived from wind deposits, alluvial deposits, residual weathered materials of sedimentary rocks and mountain outwash deposits and are classified into six soil groups, one soil complex and miscellaneous land types on the basis of parent materials, texture classes and topographic conditions (TABLE 5.2-1 & FIG. 5.2-1).

1) Soils Derived from Alluvial Deposits

Well-drained, medium-textured soils developed from old alluvial deposits of the Soan River and comparatively recent deposits from the Kurang River are found in narrow belts of flat lowland along the rivers. Ground water resources are available for irrigation and most of the irrigated land in the Study Area is distributed in the area. The soils are deep, brown to yellowish brown in colour and have favorable chemical and physical characteristics. The soils have high agricultural potential with few limitations for crop production and are classified into two soil groups based on differences in parent materials as outlined below.

Soil Groups	Area		Classification by Soil Taxonomy
	ha	%1/	
Level to nearly level, deep, medium-textured soil derived from Soan River deposits	270	0.5	Inceptisols
Level to nearly level, deep, medium-textured soil derived from Kurang River deposits	920	1.5	Entisols

1/ Percent to the Study Area,59,500 ha

2) Soils Derived from Wind Deposits

Medium to fine textured soils developed from calcareous wind deposits are most extensively distributed in the Study Area and occupy over 50% of total cultivated land. According to the age of the deposit, different soils are formed and these soils are subclassified on the basis of difference in soil texture.

a) Fine Textured Soil Derived from Wind Deposits

The soil has deep, grayish brown, medium-textured (CL-SiC) solum and is mainly distributed in flat lands. The profile is decalcified to a greater depth as a result of leaching and usually underlain by a layer of lime concretions. The soil is not susceptible to erosion and is suitable for rainfed farming. Major limitations of the soil

for crop production are physical conditions such as existence of plow pans and poor arability. Soil fertility is generally low although expansion of the root zone by deep plowing would greatly improve crop productivity.

Soil Group	Area		Classification by Soil Taxonomy
	ha	%1/	
Nearly level, deep, fine-textured soil	610	1.0	Alfisols

1/ Percent to the Study Area

b) Medium-textured Soils Derived from Wind Deposits

Deep, brown to dark brown, calcareous medium-textured soils (SiL) are extensively distributed in level to gently sloping lands in the Study Area. Lands are embanked to form segmented fields and erosion hazard is considerably reduced in spite of high erodibility of the soils. However, runoff and resultant loss of surface soil are a major problem with farming in the area. Therefore, soil and water conservation measures such as land levelling and improvement of levees should be undertaken. Plow pan formations are generally recognized and deep plowing is an important farming practice. Soil fertility is usually low, although it varies depending on the amount of organic material applied in the past.
The soils are divided into two groups on the basis of topographic conditions determining runoff.

Soil Groups	Area		Classification by Soil Taxonomy
	ha	%1/	
Level to nearly level, deep, medium-textured soil	4,640	7.8	Inceptisols
Gently sloping, deep, medium-textured soil	8,240	13.8	Inceptisols

1/ Percent to the Study Area

3) Soils Derived from Mountain Outwash Deposits

Calcareous medium-textured soils (L-SiL) developed from mountain outwash deposits derived mainly from shales of the Murree Hills are widely distributed south of Rawal Dam. The soils are deep and reddish brown in color. Lands are generally flat with partial undulation and the risk of runoff and soil loss is less compared with lands developed on wind deposits. However, soil and water conservation measures relevant to the topographic conditions are a prerequisite due to high erodibility of the soils. Physical conditions of the soils are comparatively good and their agricultural potential is high despite limitations such as plow pan and low fertility.

Soil Group	Area		Classification by Soil Taxonomy
	ha	%1/	
Level to nearly level, deep, medium-textured soil	2.150	3.6	Inceptisols

1/ Percent to the Study Area

4) Residual Soils

Sandy to clayey soils derived from weathered sedimentary rock materials are distributed on ridges and trough uplands, piedmont slopes and in the southern end of the Study Area. Variations in land form and soil depth are marked and soil distribution is complicated. Major limitations for crop production are restriction of effective soil depth and the occurence of rock outcrops. The risk of water and soil loss is also high. However, crop yield would consideraly increase with improvements in farming practices such as application of fertilizer. The soils are classified as a soil complex as it is impossible to map soil distribution.

Soil Group	Area		Classification by Soil Taxonomy
	ha	%1/	
Soil complex of gently sloping, moderately deep, medium to fine textured soils and shallow, coarse-textured soils	6.290	10.6	Inceptisols

1/ Percent to the Study Area

5) Miscellaneous Land Types1/

a) Rough Broken Land and Stony Land

This land type consists of eroded land, rocky land and stony land and occupies a large portion of the Study Area. Both water runoff and soil erosion are serious and most eroded land is dissected by gully erosion with marked micro-topographic variations. A considerable portion of lands classified into this land type could be developed for range and afforestation purposes. This type occupies 12,710ha or 21.4% of the Study Area.

b) Mountain and Hilly Area

This land type represents mountainous areas such as the Margalla Hills and hilly areas such as the piedment slopes, and over half of the areas are designated as reserved forests. The land type occupies 18,370ha or 30.9% of the Study Area.

c) Others

This land type includes right-of-ways institutional area such as NARC and PINSTEC site and industrial area designated by CDA occupying 5,300ha or 8.9% of the Study Area.

(Soil classification is indicated in TABLE 5.2-1).

(2) Land Use

Land use characteristics are summarized below.

1/ Including culturable wasteland and unculturable wasteland in the plains.

1) Cultivated Land (23,120 ha, 38.9% of the Study Area)

Cultivated land accounts for about 40% of the Study Area and is primarily utilized for annual crop production under the dry farming system. However, during fallow periods, grazing is practiced in some areas. The lands are generally bench terraced and/or levelled and also embanked to form segmented narrow fields in order to protect soil from erosion and conserve runoff. These practices prevent rationalization of farming operations. Accordingly, soil conservation measures as well as the inheritance system contribute to fragmentation and scattering of farmland.

Irrigated area is limited to small patches of land, located mainly along the major streams; the Kurang and Soan rivers. The same is usually utilized for vegetable cultivation.

2) Culturable Wasteland (3,630 ha, 6.1% of the Study Area)

According to the Pakistan Census of Agriculture , culturable wasteland is defined as uncultivated farm area which is fit for cultivation but was not cropped during the census year nor in the previous year. In the Study Area, the term has been extended to include eroded land presently uncultivated which could be brought under continuous cultivation after implementation of earthworks such as leveling and terracing as pointed out in the Report of the Punjab Barani Commission, 1976. Culturable wasteland seems to be mainly comprised of farmland deserted due to erosion or other reasons and generally utilized for grazing.

3) Unculturable Wasteland (17,090 ha, 28.7% of the Study Area)

Unculturable wasteland includes rough broken land and stony land occupying a large area in the plains (unculturable wasteland in the plains is 9,080ha, or 15.3% of the Study Area) and hill areas (8,101ha or 13.5% of the Study Area, excluding reserved forests). Most of the unculturable wasteland is unused. Only some parts of the same are utilized for

grazing or as borrow areas for brick making. Mountain and hilly area is rocky land with shallow surface soil and covered with sparse shrubs.

4) Reserved Forests (10,360 ha, 17.4% of the Study Area)

The Margalla Hills located to the north and northwest and the mountains located to the north and northeast of the Study Area are designated as reserved forests and use of the same is controlled. The area is mostly composed of rocky hills with shallow soil depth mainly covered with shrubs.

5) Right-of-way

This includes rivers, roads and villages and is estimated to account for about 7% of the Study Area. Villages are scattered and road density is low.

6) Institutional and Industrial Areas

These consist of areas utilized or planned for institutions such as NARC, PINSTEC and the National Health Institute and the industrial area designated by CDA. They account for about 2% of the Study Area and often occupy good farmland.

7) Land Acquired by CDA

According to the data prepared by the Land Revenue Department, lands acquired by the CDA amount to about 4,500ha and occupy large parts of the Study Area. Major uses of these lands are: i) poultry & vegetable schemes; ii) institutional areas; iii) model village; and, iv) industrial area.

5.2.2 Land Tenure and Farm Size

(1) Land Tenure

1) Landholding Patterns

The distinctive feature of landholding in ICT is the great majority of small-scale landholders as indicated in the following table.

INDIVIDUAL LANDHOLDING PATTERNS IN ICT (IN 1984)1/

Scale of Holding ha	No. of Holders No.	(%)	Total Area of Holding ha	(%)	Average Holding per Holder ha
less than 0.4	37,323	(65)	7,780	(14)	0.2
0.4 - 2.0	15,674	(27)	20,380	(36)	1.3
2.0 - 4.8	2,933	(5)	10,100	(18)	3.4
4.8 - 10	1,053	(2)	7,900	(14)	7.5
10 - 20	344	(0.6)	4,360	(8)	12.7
more than 20	135	(0.2)	5,600	(10)	41.5
Total	57,462	(100)	56,120	(100)	1.0

1/ All area under rural conditions in ICT included except for reserved forests and common land.

Source: Assistant Commissioner's Office, IA

Landholders with less than 0.4ha of land account for about 65% of total landholders and the average landholding size of the same is as small as 0.2ha. Further fractionalization of landholdings is anticipated taking into account the present system of inheritance. On the other hand, large scale landholders with more than 20ha represent only 0.2% of the total number of landholders, while they occupy about 10% of the total area. The average holding scale of the same, however, is about half of the maximum individual holding in unirrigated areas as stipulated in the amended Land Reforms Act. Land is usually obtained by inheritance in the Study Area but it can be acquired by lease, rent, share, or purchase. Land acquisition on the basis of share cropping and lease is more common in the Study Area because there is little opportunity for farmers to accumulate sufficient capital to purchase land.

2) Land Tenure Patterns of Cultivated Land

According to the estimation of the Agriculture Department, IA, land tenure patterns in the Study Area are fairly consistent with those in Rawalpindi District calculated on the basis of the 1980 agricultural census as presented below.

CULTIVATED LAND BY TENURE CLASSIFICATION IN THE STUDY AREA

Tenure Classification	% of Total Cultivated Land
Owner Cultivated Land	75
Owner-cum-tenant Cultivated Land	15
Tenant Cultivated Land	10

Source: Agriculture Dept, IA.

CULTIVATED LAND AND FARM HOUSEHOLDS BY TENURE CLASSIFICATION IN RAWALPINDI DISTRICT[1/]

	Farm Household by Tenure Classification			
	Owner	Owner-cum-tenant	Tenant	Total
% of Total Cultivated Land	75	22	3	100
% of Total Farm Households	81	14	5	100

1/ Including ICT at the time of the census.

Source: Pakistan Census of Agriculture 1980, Province Report, Punjab.

Share cropping is the prevailing form of tenant farming in the Study Area. Under this system, the share of produce is generally 50:50.

(2) Farm Size

Data is unavailable for distributions of farm size in the Study Area. However, general features of distributions in the Study Area can be inferred from the data on Rawalpindi District based on the 1980 agricultural census as shown in the following table.

FARM SIZE DISTRIBUTION BY TENURE CLASSIFICATION IN RAWALPINDI DISTRICT

Farm size 1/ ha	Owner %	Owner-cum-tenant %	Tenant %	Total %
less than 1	44	11	52	40
1 - 2	22	18	13	21
2 - 4.8	24	50	30	28
4.8 - 10	6	17	3	8
10 - 20	4	4	1	4
more than 20	0	0	0	0
Average Farm Size 1/(ha)	2.3	3.8	1.6	2.5
Average Net Farm Size 1/(ha)	1.7	2.8	1.6	1.9

1/: Farm size includes uncultivated land. The overall percentage of cultivated land to total farm area is 74%; therefore the average net farm size per farm household is estimated by multiplying 0.74, except for average net farm size per tenant farm household.

Source: Pakistan Census of Agriculture 1980, Province Report, Punjab.

Based on the above table and data obtained from other sources, features of farm size in the Study Area are estimated as follows:

a) Over 95% of the farm households in the Study Area are small-scale farmers with a farm size of less than 10ha.

b) More than 60% of the farm households have a farm size of less than 2ha, and are engaged in farming of marginal level .

c) Most of the farm households have family members employed in non-agricultural sectors in order to supplement their household income.

Data on fragmentation in Rawalpindi District from the same census reveal that there are an average of 6.8 registered plots per farm. The number of registered plots in Rawalpindi District is 1.6 times the average number at the provincial level as well as the national level. The same tendency of fragmentation in the Study Area could be inferred from this feature of Rawalpindi District.

5.3 Irrigation and Drainage Facility

5.3.1 Irrigation Facility

Agriculture in the Study Area is almost exclusively carried out under rainfed conditions and irrigation farming is seldom practiced. However, small scale ground water irrigation from wells has been continued in places along rivers where ground water resources are available. In addition, development of surface water by constructing mini dams has been planned in recent years, in accordance with socioeconomic development and increased tendency toward improvement of farming among progressive farmers. According to the village survey by the LGRD in 1985, irrigated area in the Study Area totals about 188ha and the same by water source is presented in the table below.

IRRIGATED AREAS BY WATER SOURCE

(Unit: ha)

Tube Well	Well	Pond	Total
11	102	75	188

(1) Ground Water Irrigation Facility

Ground water irrigation is mostly carried out by shallow wells installed with Persian wheel. Along the Gumreh Kas, about 10 shallow wells constructed over 100 years ago are used for irrigation purpose and average irrigated area per well is about

2 ha. However, year-round irrigation is difficult and irrigation period is generally limited to 4 months from September to December due to shortages of water.

The use of tubewell for irrigation is not common in the Area and the same is limited to NARC and a very few advanced farmers. Experimantation on small-scale pump irrigation (75mm dia; 2m head; generating output of 525W; pump discharge of $1m^3/min$) by solar energy system is currently being carried out by ADBP, and an interest in agricultural modernization among farmers is high.

(2) Surface Water Irrigation Facility

Surface water irrigation has recenty been introduced in the Study Area utilizing reservoirs of mini-dams constructed by Soil Conservation Department, IA. In addition, eleven (11) proposed sites for mini-dams (FIG. 5.3-1), as shown in the table below are selected, three of which are now under construction. These proposed mini-dams are planned for multipurposes including land conservation, irrigation and fish farming. Accordingly, irrigation scale of the mini-dams is very small and beneficiary area per dam is around 5 to 20ha, and number of beneficiary farmers is around 5 to 7.

PROPOSED MINI-DAMS IN THE STUDY AREA

No.	Location	No. of Beneficiary Farmers	Beneficiary Area(ha)
1.	Lubana	15	46.5
2.	Muhrian	5	20.2
3.	Sikrila	5	14.2
4.	Charah	4	20.2
5.	Chak	6	16.2
6.	Sihala	3	18.2
7.	Kunjan	6	22.3
8.	Gokina	5	4.9
9.	Nara Sayaddan	6	6.1
10.	Banghial	5	10.1
11.	Shah Darah	6	7.3

Source: Soil Conservation Dept. IA, 1985

5.3.2 Drainage Facility

In the Study Area, fields are not equipped with farm drains and excess rainfall is drained from plot to plot. Therefore, a few fields in the low land area are sometimes flooded for 2 or 3 days after heavy rain.

Water logging damage for crops is seldom reported in the Area because ground water level is generally deep. On the other hand, most of the fields in the Area are susceptible to soil erosion caused by run off of heavy rains in monsoon season. Accordingly, improvement of drainage facilities is urgently reguired for land conservation.

5.4 Crop Sector

5.4.1 Cropping System

Crop production in the Study Area is almost exclusively dependent on rainfed farming with two cropping seasons; winter (Rabi-October/November to April) and summer (Kharif-July to October), as shown in FIG. 5.4-1. The most important crop is winter wheat and the same occupies about 90% of the cropped area in Rabi season or about half of the annually cropped area in the Study Area. In most of the wheat cropped area, however, mixed cropping with oil seeds (rape & mustard) for green fodder production is practiced. Other winter crops such as fodder crops and gram are also cultivated but the cropped area is limited. Maize, pulses and feed grains (sorghum and millet) are major summer crops. Fodder crops are also cultivated in Kharif season. Rabi season when the staple food, wheat, is cultivated is regarded as the main cropping season. Irrigated lands which are limited in area are usually utilized for vegetable cultivation in both seasons. Fruit cultivation has been promoted in recent years, but is rarely practiced in the Study Area.

The main cropping system in the Study Area is the dry farming system typical to Barani areas known as "Dofasli dosala". In this system, crop production is carried out under the rotation system with two crops in two years, including wheat as the principal crop (wheat/summer crop-fallow/fallow). Meanwhile, dry farming with one crop per year and intensive cropping of two crops in a year, as indicated hereunder, are also common cropping systems in the Study Area. However, cropping systems are not always fixed and vary depending on the yearly rainfall pattern.

Under the dry farming system practiced in the Study Area, fallow land is ploughed several times in the monsoon season in order to control weed growth and to conserve soil moisture by providing surface mulch.

CROPPING SYSTEMS IN THE STUDY AREA

1st Year	2nd Year	Remarks
1. Wheat/summer crop	Fallow/fallow	Dofasli dosala
2. Wheat/fallow	Wheat/fallow	
3. Fallow/summer crop	Fallow/summer crop	
4. Wheat/summer crop	Wheat/summer crop	Limited to fertile land close to villages

5.4.2 Cropping Intensity, Cropping Pattern and Cropped Area

Cropping intensity, cropping pattern and cropped area over the past three years in the area representing most of the Study Area are calculated as shown in TABLE 5.4.-1 on the basis of village-wise data on land use and cropped area prepared by the Land Revenue Department and data supplied by CDA. Although the cropping system may vary somewhat from field to field, overall annual differences in cropping intensity (about 105%), cropping pattern and cropped area of the Study Area are minimal. Based on the above understanding, present cropping conditions in the entire Study Area are estimated as shown in TABLE 5.4.-2.

5.4.3 Yield and Production

Crop yields in the Study Area primarily depend on rainfall distribution. Similarly, considerable differences in yield occur because of differences in cultivation practices and land conditions. Accordingly, reported yields differ from year to year and depending on sources of information as shown in TABLE 5.4.-3. Average yields are low for all crops in the Study Area. However, yield of wheat, the most important crop in the Area, has been increasing in accordance with an increase in the cropped area of improved varieties since the 1979/80 crop year (TABLE 5.4-4). The introduction of improved varieties and the increased usage of fertilizer

accompanying the same may have contributed to this trend towards yield increase. On the other hand, yields of other crops remain at a low level. Average yields are far below the potential yields obtained in experimental croppings by NARC. Therefore, a considerable potential is expected for increased crop productivity through improvement of farming practices such as introduction of new varieties and improvement of land preparation, fertilization and cultivation methods.

Present production of major crops in the Study Area is presented in the following table, based on average yields from 1978/79 to 1982/83 and estimated cropped area of each crop.

PRESENT CROP PRODUCTION IN THE STUDY AREA

	Wheat	Oil Seeds 2/	Maize	Pulses 3/	Feed Grains 4/
Cropped Area (ha)	11,400	500	5,000	4,800	900
Average Yield (kg/ha) 1/	1,020	490	700	450	490
Production (t)	11,628	245	3,500	2,160	441

1/ According to Agricultural Statistics of Pakistan, 1979 - 1983
2/ Rape & mustard
3/ Mung & mash, average yield of two crops
4/ Sorghum & millet; represented by the average yield of sorghum

5.4.4 Farming Practices

The majority of farmers in the Study Area are engaged in subsistence level farming, returns from which are insufficient to maintain their livelihood. Consequently, they are compelled to work in urban areas in order to obtain supplemental non-agricultural income. Therefore, except for vegetable cultivation in irrigated areas, traditional farming practices perpetually neglect necessary cultivation technologies, resulting in low crop productivity in the Study Area. Prevailing farming practices in the Study Area are summarized hereunder.

(1) Land Preparation

Land preparation includes plowing and planking operations for seedbed preparation before sowing and preparatory tillage during the fallow period. These operations are usually performed with tractors. However, draft animals are also employed for plowing lands which are not accessible by tractor or when farmers are unable to obtain tractor hiring services. Plowing depth is as shallow as 10 to 15cm and this has resulted in the formation of hard pan below the plow layer.

Seedbed preparation generally comprises two plowings with a cultivator and one planking. Preparatory tillage during the fallow period is generally practiced from July untill the wheat sowing season. Several plowings after rainfall are commonly carried out in order to conserve soil moisture. Demand for tractor hiring services is therefore concentrated during the few days after a rainfall.

(2) Sowing

Wheat planting is performed by hand sowing (broadcasting), by animal-drawn single row drills and by tractor-drawn seed drills. The proportion of area cropped by each of these sowing methods is roughly estimated at 50%, 30% and 20%, respectively. Other crops are almost entirely sown by hand.

The use of improved varieties of wheat (Lyalpur 73, Pak 81; etc.) is spreading over most of the Study Area and the same accounts for about 95% of the area under wheat cultivation. Cultivation of improved varieties of maize (Neelum, etc.), on the other hand, is limited to about 10% of the total area. As for other crops, local varieties are almost exclusively cultivated.

(3) Fertilization and Other Farming Practices

Fertilization is generally practiced in wheat cultivation and it is estimated that about 70-80% of farmers use fertilizer for the same. Fertilizer application for maize, on the other hand, is less common. Fertilizers used in the Study Area are mostly di-ammonium phosphate and urea. Amount of fertilizer applied for wheat is

usually 125kg of di-ammonium phosphate per ha. Application of organic matter is uncommon, limited to farmland adjacent to villages. Weeding is seldom practiced for any type of crop and chemical spray for plant protection is limited to vegetables and fruits.

(4) Harvesting

Harvesting of crops is almost entirely manual, although wheat cutters have recently been introduced in the Study Area. Wheat threshing is mostly performed by tractor drawn threshers and partly by animal treading. Threshing operations for other crops are manual or by animal treading.

5.5 Farm Machinery

Land preparation and wheat threshing are extensively mechanized in the Study Area. Generally, farmers use cultivators for land preparation, and rarely use mould board plows or disk plows. In order to verify the advantage of deep plowing NARC is undertaking experiments on mould board and disk plowing. Under the Crop Maximization Project implemented with cooperation of the Italian government, the use of mould board plows and disk plows is promoted in five Union Councils. In the Study Area, tractors with 40-50HP engines are mainly utilized. Most of these tractors were imported from EC countries, and manufacturers of the tractors maintain dealerships in Pakistan. The use of tractors is not limited to farming. They are also utilized for transportation. The total number of the tractors used for farming operations in the Area is about 225 units.(TABLE 5.5-1&5.5-2)

The tractor hiring service is extended to farmers by either private owners or Markaz, but the number of tractors are insufficient to meet the peak demand for land preparation in July. Farmers in the Study Area usually use tractors or draft animals for land preparation rather than using manual labor. Owners of tractors with more than 40-50HP engines are limited to a few big landowners and the farmers who cannot afford to buy large-sized tractors are eager for cheaper small-sized tractors which they can afford to purchase for their own use. To meet such demands, ADBP has introduced 14 HP tractors for demonstration purposes, and adaptability of the same for Barani areas is being tested in its affiliated farm facilities.

Presently, 22 units of tractors with 48-90HP engine are operated by Markaz hiring services and service charges for tilling with a cultivator are Rs 30 to 55 per hour depending on the size of tractor. Other kinds of farm machinery are also available for hire. In addition, 7 units of bulldozers are used for heavy duty work. Hiring service charges are fixed for each operation as shown in TABLE 5.5-3.

5.6 Livestock Sector

5.6.1 General

Animals play an important role in the agriculture sector of the Study Area and in the life of the rural people, supplying milk, meat, draft power as well as dung for fuel and also providing an important source of cash income. Tradionally, a large number of animals such as cows and buffalo have been stocked for draft or production purposes in the Study Area. In recent years, the number of draft cattle has been decreasing due to expansion of farm mechanization while stocking of buffalo for milk production is increasing. The present situation of livestock holdings and the main indexes of the livestock sector in the Study Area, based on the statistical data prepared by the Livestock and Dairy Development Department, IA, are shown in TABLE 5.6-1 and 5.6-2. Further, the main indexes of the livestock sector in Rawalpindi District, including the Study Area, are indicated in TABLE 5.6-3. On the basis of these tables and the results of questionnaire survey, general features of the livestock sector in the Study Area are summarized as follows:

a) The major livestock in the Study Area are milch animals (cow and buffalo), goat and bull. However, most bulls are slaughtered after being fattened for about a year.

b) Almost all the farm households (approx. 90%) keep livestock and most livestock holders stock milch animals.

c) The average number of holdings per livestock holder is about 6.6 head and when converted into adult cow units, the same becomes around 4 units. Poultry is stocked by almost all farm households and average holding size is about 6 birds per household.

d) In the Study Area, the number of livestock raised exceeds the available land area. Cultivated area per adult cow unit is calculated at about 0.5ha.

e) Major breeds of livestock and their purposes are as follows:

	Breed	Purpose
Cattle	Dhanni breed	Milk production & draft purpose
Buffalo	Nili Rabi breed	Milk production
Goat	Teddy breed	Meat production
Sheep	Native breed	Wool & meat production

f) Most of the livestock holders hold both large animals (cattle, buffalo and draft animals) and small animals (goat, sheep and poultry), while total holding size is not large.

g) It seems that livestock holding size has little relation to farm size. The size may depend on availability of labor forces, requirement of draft power and family consumption of livestock products.

h) Average holding size of landless livestock holders is estimated to be equal to or less than that of cultivators.

i) Considerable numbers of milch cows are utlitized for draft purposes and this is the reason for stocks of Dhanni breed, a breed with high draft ability.

j) Average holding size of one livestock holder is estimated as follows:

Milk animals (including young stock)	2-3 heads
Goat & sheep	2-4 heads
Bull & male buffalo (including young stock)	
	3-4 heads 1/
	1-2 heads 2/

1/ livestock holders stocking draft animals
2/ livestock holders not stocking draft animals

5.6.2 Livestock Raising in the Study Area

Because of expansion of farm mechanization, livestock raising in the Study Area may be at a transition stage from a subsistence system primarily aimed at draft power and family consumption to a system aimed at income generation. Livestock raising at present is still carried out under a conventional system, dependent on insufficient and low quality feed and on the labor of women, children and the aged. Animal feed mainly depends on crop residues of wheat, maize, sorghum and others and on grazing, as green fodder production is limited. Milch animals are usually fed crop residues and green fodder such as rape, mustard and fodder crops, while draft animals, goat and sheep are usually grazed in fallow land,

wasteland and hilly areas. Feeding of concentrate is also practiced but in limited quantity.

As indicated by the excess number of livestock compared with cultivated land, livestock raising in the Study Area is largely dependent on natural vegetation for feed supply. Specifically, nutrient supplies from cultivated area in the Study Area only satisfy about 30%, 32% and 15% of maintenance requirements for dry matter, TDN and DCP, respectively (TABLE 5.6-4). Meanwhile, productivity of natural grassland varies depending on rainfall distribution throughout a year. Seasonal variation of grass production is extreme and most of the annual production of grasses is concentrated in monsoon season (July - September).

Forage production of well conserved natural grassland is reportedly about 3 to 4t/ha (air dried basis); however, almost all the grasslands in the Study Area have been degraded by past overgrazing and erosion and their productivity is considerably lower than that of conserved grasslands. Therefore, it cannot be assumed that forage supply from the grasslands in the Study Area could supplement the shortage of nutrient requirements previously mentioned. In particular, animal feeding during the dry spells (November to January and May to June) may have to depend largely on crop residues which are limited in supply. Accordingly, it is concluded that livestock raising in the Study Area is practiced under conditions of significant feed shortage, which is the main cause of low productivity of the livestock sector.

Another major cause of low productivity is poor genetic quality of animals. The importance of genetic improvement is well recognized in the Study Area, even though animal breeding is still carried out in the traditional manner and artificial insemination was practiced on cows only 680 times in 1984/85. In Punjab Province, however, artificial insemination was first introduced in 1965 and presently the same services for cows and buffalo are considerably extended. Major breeds introduced are Sahiwal, Friesian, Jersey and cross breeds of Sahiwal and European breeds. In addition, the new Semen Production Unit (S.P.U.) will be established in 1986/87 at Rawalpindi. In the Study Area, demand of farmers for artificial insemination services is strong and these services could play an important role in the genetic improvement of livestock in future.

Poultry farming in the Study Area is classified into two types; domestic production by farmers primarily for family consumption and intensive commercial production by poultry farms. Commercial poultry farming was originally promoted by CDA under the Poultry and Vegetable Scheme. The number of poultry farms has now increased to 162 and the birds maintained on these farms total 145,000, forming an important supply base of poultry products to urban areas. The number of poultry farms by type are as listed below.

POULTRY FARMS IN THE STUDY AREA

Type of Farm	No. of Farms
Broiler farm	118
Layer farm	14
Breeding farm	30

Source: Livestock & Dairy Development Dept., IA , March, 1985.

5.6.3 Livestock Production

Livestock husbandry in the Study Area consists of a large number of small scale husbandry units and no firm data are available on production. Therefore, it is not possible to obtain figures for all livestock production in the Study Area. However, for milk production, the following is estimated based on various data and information.

ESTIMATED MILK PRODUCTION IN THE STUDY AREA

(1) Annual Milk Production per Head

Cow (cows raised only for milk production purposes)

Daily milk yield 2.0-2.5 ℓ (lactating period)

Annual milk production 600-750 ℓ

Average Yield (average milk production of cows including cows stocked for dual purposes of milking and draft power)

Daily milk yield 1.0 ℓ (lactating period)

Annual milk production 300 ℓ

Buffalo Cow

Daily milk yield	4.5 ℓ (lactating period)
Annual milk production	1,350 ℓ

(2) Annual Milk Production in the Study Area

Number of adult milch animals in the Area (from TABLE 5.6-1)

Cow: 16,860 head, Buffalo cow: 8,400 head

Annual milk production: 16,400t

5.6.4 Animal Health

Animal diseases and parasites are also major causes of low productivity of livestock husbandry in the Study Area. Parasites in particular, do considerable damage to growth of animals. Economically important diseases and parasites in the Area are identified as follows:

Cattle/buffalo	mastitis, foot and mouth disease, hemorrhagic septicaemia, black quarter, tick infection, intestine parasite
Goat/sheep	mastitis, anthrax, footrot, intestine parasite, tick infection
Poultry	newcastle disease, coccidiosis, intestine parasite

Veterinary services are under the jurisdication of the Livestock and Dairy Development Department of IA, and facilities in ICT include 3 veterinary hospitals (Tarlai and Bhara Kau Markaz, Rawat UC) and 3 veterinary dispensaries[1/] (Charah and Sihala UC, Golra Sharif) and 1 mobile veterinary unit. One veterinary hospital is established in each Markaz territory and provides treatment, vaccination and deworming services, while the veterinary dispensary provides vaccination and deworming services. Veterinary services are free of charge in principle, and are fairly extensive. However, facilities and equipment for veterinary services are poor and adequate service networks covering remote areas have not been established. The veterinary services provided in the Study Area in 1984 are shown below.

1/ The veterinary dispensary is called a veterinary center in the Study Area.

VETERINARY SERVICES PROVIDED IN 1984

No.of Treatments	Deworming	Vaccinations
18,790	13,187	59,481

Source: Livestock & Dairy Development Dept., IA

5.7 Farm Management

Farming patterns in the Study Area are classified into three patterns, namely, i) farming consisting of crop production (upland field crop production) and livestock husbandry, ii) farming solely depending on crop production, and, iii) farming solely depending on livestock husbandry. Almost all the cultivators are engaged in agriculture under the farming pattern of crop production and livestock husbandry, in which crop production aimed primarily at grain production and livestock raising for multipurposes such as draft power, milk production and meat production, are carried out. Crop production is practiced under a cropping system in which winter wheat is cropped as a principal crop and summer crops such as pulses are cultivated as secondary crops, while cropping is characterized by low productivity. In livestock husbandry, milk production is considered the main activity.

With regard to farmers engaging in the first farming pattern (crop production ¡ livestock husbandry), farming scale for both crop production and livestock husbandry is generally small and there is little difference in farming scale among farmers. Farming scale of most of these farmers is estimated at a cultivated area of 0.5 to 2ha and a livestock holding size of around 4 head in adult cow units. Similary, farming scales of farmers conducting the second and the third farming patterns, are small for both crop production and livestock husbandry. In general, cultivaled area of the former is estimated at 0.5 to 2ha and livestock holding size of the latter is estimated at 4 head in adult cow units. In other words, their farming scales are almost the same as the farming scale of each sector of the farmers conducting the first farming pattern. Other than the above farming patterns only a few farmers are engaged in farming based on vegetable cultivation.

It may be inferred from farming scale and traditional farming practices that farming operations are mostly carried out by family labor and there is little demand for hired labor in the Study Area. In addition, most of the farm households are part-time, and young and middle aged family members usually seek non-agricultural job opportunities. Therefore, women, children and the aged are a very important part of the farm labor force in the Study Area.

As shown in the estimated production costs and returns of major crops and livestock husbandry (TABLE 5.7-1), and farm income from the agricultural sector (TABLE 5.7-2), returns from agricultural activities in the Study Area are limited. Furthermore it is estimated that most of the farmers in the Area do not obtain sufficient farm income to cover household expenses as indicated in TABLE 5.7-3. Therefore, as mentioned earlier, many farmers in the Study Area must work for non-agricultural income in urban areas in order to secure their livelihood.

5.8 Inland Fisheries

Fish is an important protein source with high nutritional value at a low cost and potential demand for fish is considered high in both Islamabad and Rawalpindi. In addition, inland fisheries development will contribute to diversification of the agricultural sector and economic activities in the Study Area. Inland fisheries development in the Area is in an initial stage, and there are many problems to be solved such as development of water bodies for fisheries, facilities, technical development, extension and development of demand for fish.

5.8.1 Water Resources for Fisheries in ICT

Water resources developed for fisheries in ICT are reservoirs (Rawal Lake, Simly Lake), village ponds, rivers and streams and mini-dams. Their area totals 1,770ha as shown in the following table.

WATER SURFACE FOR FISHERIES IN ICT

Water Surface	No.	Area (ha)	Development Body
Simly Lake	1	970	IA
Rawal Lake	1	730	IA
Village Ponds	13	10	Private sector 8ha
& Mini-dams			IA 2ha
Rivers & Streams1/	-	60	IA

1/ Rivers & streams used for inland fisheries.
Source: Fisheries Department, IA

However, water bodies, currently utilited for fisheries in the Study Area total only 70ha with the exclusion of Rawal Lake and Simly Lake which are under the jurisdiction of CDA. Thus, development of water bodies for fisheries in the Area is not advanced. Furtheremore, only a part of the development potential for inland fisheries at Rawal and Simly Lakes has been realized. In addition, inland fisheries development in ICT is mostly carried out by the Fisheries Department of IA and there is little participation of rural people in the development of fisheries.

5.8.2 Present Conditions of Inland Fisheries

Inland fisheries in ICT depend on fish farming in reservoirs and village ponds, and stocking rivers with fish fry. In 1984, about one million fish fry were stocked in ICT water resources. Fish farming is usually practiced under a polyculture system in which different species of fish are stocked at the same time.

Fish species presently stocked and stocking seasons are as follows:

Species		Stocking Season
Indigenous Species	Catla catla (Taila)	Oct. - Dec.
	Cirrhina mirgala (Mori)	
	Tor putitora (Mahaseer)	
	Labeo rohita (Rohu)	
Exotic Species	Cyprinous carpio (Gulfam)	Apr. - May

Fish fry required for stocking are procured from the natural spawning grounds in ICT and by purchasing from other regions. However, only 25,000 fry of Tor putitora can be collected annually from the streams in ICT. Therefore, almost all the requirements for fish fry are purchased every year from other regions. In ICT, the Fish Hatchery and Research Centre of the Punjab Government was established in 1984. The objective of the Centre is to produce fish fry required in Rawalpindi District; however, the annual production capacity of the Centre is only 2 million fish fry against the annual demand of 3.2 million required in approximately 1,300ha of inland water surface in the District. Potential requirement for fish fry in ICT is estimated at about 5 million per year; therefore, meeting this demand is a major task facing the development of inland fisheries in ICT.

Harvesting of stocked fish in ICT is usually carried out by rural inhabitants who have been granted fishery rights and the main harvesting season is November to January when the demand for fish is high. All fishing activities in Simly Lake and fish netting in Rawal Lake are presently prohibited. According to the Fisheries Department of IA, fish production in recent years was 200t in 1982, 150t in 1983 and 75t in 1984. The reduction of fish production after 1983 resulted from suspension of fishery right auctions since 1983 and a ban of netting in 1984, both at Rawal Lake.

5.8.3 Productivity of Fish Farming

In Pakistan, inland fish farming utilizing village ponds or small-scale reservoirs has been promoted in rural areas as a means of income generation for farmers, and small-scale fish ponds have been constructed by a few progressive farmers in the Study Area. However, productivity of fish farming generally varies greatly depending on water bodies used and management practices. Accordingly, profitability of fish farming is similarly variable. An example of differences in productivity due to differences in water bodies or managememt practices is presented in the following table.

PRODUCTIVITY OF FISH FARMING AND MANAGEMENT PRACTICES

1. Productivity of Experimental Fish Pond[1/]

Fish Species	Annual Growth Rate (kg/fish)	Annual Growth Rate[2/] (kg/ha)
Cyprinous carpio	1.0	3,500
Cirrhina mrigala	0.8 - 1.0	2,800 - 3,500
Labeo rohita	0.8 - 1.0	2,800 - 3,500
Catla catla	1 - 1.2	3,500 - 4,200

2. Productivity of Well Managed Fish Pond

Stocking Rate	5,000-6,300 fishes/ha
Survival Rate	70%
Annual Production	2,000-3,000 kg/ha

3. Productivity of Fish Farming in Small Dams[3/] (Reservoirs)

Fish farming in reservoirs by private sector	180 kg/ha
Fish farming in reservoirs by public sector	60 - 70 kg/ha

1/ Source: Fish Hatchery and Research Centre, Punjab Province.
2/ Annual growth rate per fish x survival rate 0.7 x stocking rate 5,000 fishes/ha.
3/ Source: An Evaluation of Small Dams Programme in Punjab, PERI.

5.9 Marketing and Processing of Agricultural Products

5.9.1 Marketing of Agricultural Products

(1) Marketing Channels

An organized marketing system is not established in the Study Area because: i)most agricultural products are consumed by the farm family or within the Study Area itself and marketable surplus is limited. ii)underdevelopment of farm to market roads; and, iii)difficulty in organizing farmers. In addition, public marketing facilities are not established. Marketing of

agricultural products is usually carried out by middlemen or their agents residing in villages, resulting in multiple marketing channels. The destination and consumer markets for surplus products are generally in Islamabad and Rawalpindi. Typical marketing channels for major agricultural products in the Study Area are as shown below.

Crops

Producer ——— Village shop keeper ——— Rawalpindi markets
(middleman or his agent)

- Main marketing commodities are pulses and maize.
- Transportation: field — middleman ... draft animal
middleman — market ... vehicle

Livestock products (milk)

Producer ——————————— Consumer in urban areas

Producer ——— Retail shops in urban areas ——— Consumer

- According to the survey by PARC, marketing quantity is estimated at about 50% of total production.
- Delivery of milk to urban areas usually depends on a milkman riding a biycle or a motorcycle.

Livestock products (meat)

Producer ——— Middleman ——— Slaughter house ——— Market

Producer — Animal open market — Slaughter house — Market

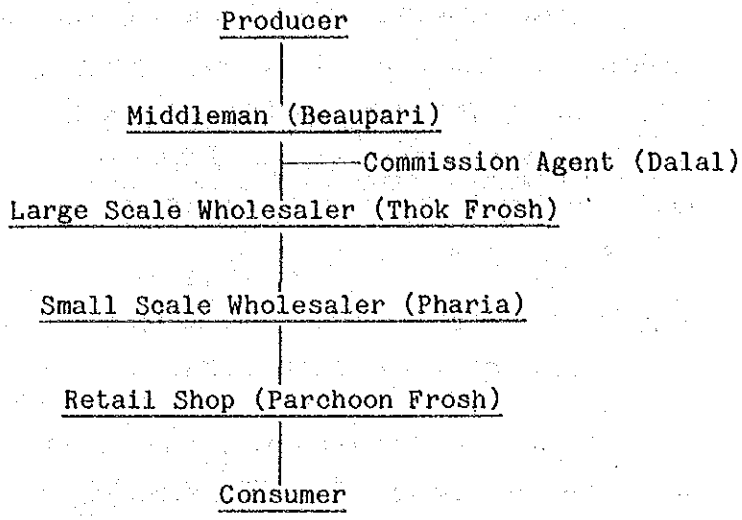
- In the Study Area, animal open markets are held regulary.
- A slaughter house for large animals is located in Sihala UC (slaughtering capacity: 300 heads/day) and two slaughter houses for small animals are in Rawalpindi.
- Slaughter at road side by a village butcher is common in the Study Area.

Vegetables

Producer ——————————————————— Markets

- Vegetables are usually shipped to the open markets in Islamabad and the wholesale market (Raja Bazar) in Rawalpindi.

The normal marketing channel, from producer to consumer, of agricultural products shipped to the wholesale market (Raja Bazar) is as follows:



(2) Marketing Facilities

Existing marketing facilities are quite inadequate consisting only of small road side vending stalls and village shops in the Study Area. Draft animals and manpower still play an important role in transportation. Therefore, except for farmers in the vicinity of cities, marketing is a problem for the majority of farmers in the Area.

Marketing facilities in the twin cities of Rawalpindi and Islamabad carry the responsibility of satisfying the demand of the population in the Capital area for both agricultural and non-agricultural commodities. Major markets for agricultural products in the cities are as shown in the following table. They represent large potential markets for the future expansion of agricultural production in the Study Area.

MAJOR MARKETS OF AGRICULTURAL PRODUCTS IN RAWALPINDI AND ISLAMABAD

Market	Type of Market	No. of Stalls	Location
Friday Market	Retail Market	2,000[1/]	Islamabad
Sunday Market	Retail Market	800[1/]	Islamabad
Tuesday Market	Retail Market	600[1/]	Islamabad
Friday Market	Retail Market	400[1/]	Rawalpindi
Raja Bazar	Wholesale Market	1,500[2/]	Rawalpindi

1/ Estimate of total number of stalls in the market.
2/ Estimated number of stalls handling agricultural products in the market.

Source: Marketing Committee, Rawalpindi and Municipal office, CDA.

The three retail markets in Islamabad are organized by CDA with the objective of establishing a direct marketing system for agricultural products. About half of the market stalls sell edible farm produce such as vegetables, fruit and eggs.

Marketing facilities in the urban area include private cold storages for imported perishables such as fruits and vegetables at 5 locations in Islamabad.

5.9.2 Processing of Agricultural Products

Processing of agricultural products produced in the Study Area is mostly for family consumption since surplus of agricultural products are limited and the processing facilities of the urban areas are located close by. Therefore, agricultural processing activities of locally produced materials are limited to the traditional sectors such as small-scale flour milling (mainly power driven chaki mill, 30 mills in the Study Area) and oil extraction by donkey-driven oil presses. On the other hand, processing of agricultural products procured outside of the Study Area, such as dairy products, is carried out on an industrial scale, including secondary processing in the industrial area designated by CDA.

Two milk plants have been constructed in the Study Area; but one is not in operation and the other (Zakia Dairy Farm) is operated at far below the production capacity. The following are idenfified as the causes of poor operation.

a) Low preference of consumers for processed milk.
b) Short preservation period of processed milk.1/
c) Problems of procurement and transportation of raw material.

The current situation of milk plant operations in Zakia Dairy Farm is as follows:

Processing capacity	2,000 ℓ/hr (Swedish milk plant)
Current processing quantity . . .	2,000 ℓ/day
Butter production	50 kg/day
Supply source of raw material . .	Gujrat District

5.10 Supporting Services

5.10.1 Agricultural Research and Extension

(1) Agricultural Research Institutions

At present the bulk of agricultural research in Pakistan is carried out in provincial research institutions and universities, with the Pakistan Agricultural Research Council (PARC) coordinating and financing most of the agricultural research programs.

The major goal of the National Agricultural Research Center (NARC) located in Islamabad is to conduct research, requiring a well-equipped, properly staffed and funded central institution, available to all scientists in the country, in areas of national importance where such research is not currently being undertaken or is seriously inadequate. Agricultural research works in the ICT are fully dependent upon PARC and NARC for coordination and technology transfer as well as training programs.

1/ In Zakia Dairy Farm, the introduction of a UHT (Ultra heated treatment) milk plant is planned for production of long-life milk.

(2) Agricultural Extension Services

When Islamabad Capital Territory was separated from Punjab Province in July, 1980 the agricultural extension services of the Punjab Government continued to be used under the Islamabad Administration. From June, 1985 however, agricultural extension services were transferred to the NARC (FIG. 5.10-1).

The NARC Technology Transfer Unit (TTU) consists of the following five components:

a) Agricultural Extension
b) Soil Conservation
c) Fisheries
d) Livestock and Dairy Development
e) Cooperatives (Rural Wing)

The main functions of each component are described hereunder.

1) Agricultural Extension

Agricultural extension is primarily conducted through the Markaz for dissemination of new and improved technology. Extension includes arrangement of farm inputs supply, motivation of the farmers to optimize farm productivity, and education in crop production and fruit and vegetable cultivation.

Farmers are trained through such activities as field days, agricultural fairs, exhibitions, distribution of pamphlets, visits to farmer's fields and establishment of demonstration plots. Extension activities also include researcher assisted experimental programs for developing suitable intensive technology.

As shown in FIG.5.10-2, agricultural extension personnel in the three Markaz are limited. There are only two Agricultural Officers posted in the area versus the requirement of one for every Markaz. Field Assistants, field level extension workers who should be posted at each of the 11 Union Councils, number only five and on the average one Field Assistant must cover an area of about 4,600ha.

2) Soil Conservation

The ICT is punctuated with hilly tracts and ridges and traversed by a network of springs and streams such as the Soan and the Kurang. Accordingly, soil conservation deals with provision of agricultural machinery for farming and soil conservation works, and harnessing of surface water. Conservation activities include reclaiming cultivable waste land with the help of earth moving machinery, preventing erosion of afforested areas, constructing spills and gabions, improving ponds, and constructing mini-dams.

In the rural area of ICT, 6 bulldozers and 22 tractors under the Department of Soil Conservation are available for the farmers on a subsidized hiring basis. These machines are operated and managed by the technical staff who are controlled by the Assistant Agricultural Engineer (FIG.5.10-3). Most of the farmers in ICT are small landholders engaged in non-agricultural sectors in order to earn an adequate income. In the Barani area of ICT, the time of sowing is extremely critical resulting in a high demand for tractors among the farmers.

Analysis of collected local data indicates that the present tractor hiring system of the Markaz is unable to meet the farmers demands. Moreover, the present machinery service lacks a workshop, spare parts stock and mechanical staff.

3) Fisheries

Located in the foothills of the Margala Hills, the ICT is traversed by local flows feeding modest water reservoirs such as Rawal Lake and the newly built Simly Lake. Besides providing attractive recreational sites these areas offer an opportunity to develop a variety of fisheries. The main focus of fishery development under the Department of Fisheries, TTU (FIG.5.10-4) is to produce fish in community water ponds. Activities include issuance of leases and licenses for developments of these natural resources under a proper legal framework. Intensive supervision and

patrolling are undertaken to check illegal fishing and damage to the natural resources. Another important activity is stocking of fingerlings in ponds and dams. To promote fish resources, ten units of fish culture facilities have been provided for development in the rural area.

Factors such as topography, climatic conditions, size of holding and per capita income of the farmers of the area indicate that fish farming has great potential for contributing to the rural economy as well as offering a valuable source of protein. Therefore, all dams/reservoirs being developed for soil conservation are planned for fish production as well as for irrigation purposes. Private farmers are exihibiting increased attention to fish farming.

4) Livestock and Dairy Development

The rural ICT has abundant potential for cattle and dairy development. Livestock and dairy development activities under the Department of Livestock include improving livestock and poultry breeds to optimize their productivity, education of farmers about preparation and use of a balanced diet for livestock and poultry, and control and prevention of diseases. Treatment, deworming and vaccination against diseases such as Haemorrhagic, Septicemia, Black Quarter, Foot and Mouth, Entero-Texamaemia, New Castle and other diseases are also important activities.

In order to carry out the above functions, three veterinary hospitals have been established one each at Rawat, Tarlai and Bhara Kau each headed by a Veterinary Officer. Besides these hospitals, there are four Veterinary Centres, one each at Sihala, Tarlai, Charah and Bhara Kau. (FIG.5.10-5). A mobile veterinary team is also functioning in the area to extend the facilities to the farmers' homes.

5) Cooperatives (Rural Wing)

The promotion of cooperatives is mainly carried out by the LGRD and Department of Cooperatives.

Under the TTU, a scheme to integrate village cooperatives at the Markaz level has been introduced. All the registered bodies in the Markaz area which promote agricultural output in the villages are federated at the Markaz level. These groups are being gradually entrusted with a variety of commercial Makaz activities such as bulk procurement of production inputs, hiring of farm machinery and marketing of farm products. It is expected that this will replace individual resourcefulness with collective resourcefulness thereby substantially benefiting the people of the area.

5.10.2 Agricultural Inputs Supply Institutions

(1) Punjab Agricultural Development and Supplies Corporation (PADSC)

The Punjab Agricultural Development and Supplies Corporation is a semi-government organization which was established through legislation in 1973. This corporation is responsible for suitable arrangement for procurement, storage and distribution to the farmers of agricultural inputs such as seed, agro-chemicals, agricultural machinery and tools and fertilizers.

Six Regional Managers are posted in the respective Regional Offices of Punjab Province under the Managing Director at the headquarters in Lahore. Rawalpindi Regional Office is one of these offices and is supported by District Managers at the district level, by Assistant Managers at the sub-division level, and by Sales Supervisors at their sales points.

Since 1982, there have been only two sales points at Tarlai and Sihala, which is an insufficient number to adequately fulfill farmers' requirements. In view of the volume of local demand for agricultural inputs, two other sales points at Rawat and Bhara Kau were recently established. However, it is still inadequate for direct supply of fertilizer to the farmers houses. Therefore, the District Office has established a seasonal mobile sales points using its own facilities and private contractors.

The PADSC distributes about 34% of imported fertilizers and 40% of total fertilizers at the national level. Distribution of the remainder is handled by the Gaugi Fertilizer Co. and National Fertilizer Corporation as well as by the private sector.

(2) Punjab Seed Corporation (PSC)

The Punjab Seed Corporation (PSC) distributes certified wheat, cotton and paddy seed to farmers and has its own seed multiplication farms in strategical locations covering a total area of about 4,000 ha in the Punjab Province. Breeder seed is supplied by agricultural research institutes from which basic seed is produced in the said seed multiplication farms. Basic seed is then given to registered contract seed growers for production of certified seed.

During the process of seed production, the multiplication farms are inspected and supervised by PSC Field Inspectors and Field Staff of the Ministry of Agriculture in order to avoid disease infestation and insect pests as well as to ensure maintenance of genetic purity. Harvested crop is brought to the Seed Processing Centres located at Sahiwal, Rahimyarkhan and Khanewal for processing.

Before processing, the seed samples undergo laboratory tests by the PSC and Ministry of Agriculture. After processing including seed testing, the seed is certified by the Seed Certification Committee established by the Federal Government.

Certified seed is supplied to PADSC and PSC sales points as well as to private dealers for distribution among the farmers. PADSC and PSC have established networks of the sales points in Punjab Province, but in ICT the distribution arrangments are insufficient to meet local requirements. There is no PSC sales point in Islamabad; however, two PADSC sales points at Tarlai and Sihala have been in operation since 1982 and two other sales points at Bhara Kau and Rawat were recently established.

In 1984/85, only 41t of certified wheat seed and 59kg of maize seed was sold to farmers through PADSC's sales points whereas

the total requirement of wheat seed is estimated at about 2,800t. If certified seed is to be replaced by seed produced by the farmers themselves based on the rotational period of once in four years, then the basic certified seed requirement is calculated at about 700t per year. Therefore, PADSC supply through its sales points represents only about 6% of the basic seed requirement.

5.10.3 Agricultural Finance Agencies

(1) Provincial Cooperative Bank (PCB)

1) Organization

The Federal Bank for Coopertives (FBC) was established on 9 October, 1976 under the Regulation of Cooperative Banking Ordinance, 1976 (IX of 1976) and incorporated under the FBC Act 1977 (IX of 1977). It is jointly owned by the Federal Government, the provincial governments and the State Bank of Pakistan to provide credit facilities to Provincial Cooperative Banks and multi-unit societies and to regulate their operation. Before October, 1976 the Central Cooperative Banks (CCB) were operating in all districts of the country in order to provide credit for cooperative societies. However, some Central Cooperative Banks were financially weak and the Government re-organized them into a Provincial Cooperative Bank System (FIG.5.10-6).

The Punjab Provincial Cooperative Bank embraces 8 Zonal banks. Five district bank branches and 17 offices are situated in Rawalpindi Division providing financial assistance to cooperatives (FIG.5.10-7).

Before July 1980, the cooperative societies of ICT were full members of the Cooperative Bank in Rawalpindi which provided financing and facilities. Since 21 September, 1981 however, credit facilities have been provided to cooperative societies on a non-members basis with a government guarantee originally of Rs 5 million and recently increased to Rs 10 million.

2) Mode of Credit

Under the Islamic mode of credit, the interest or profit system has been totally abolished[1]/. Credit is advanced by the PCB to their cooperative societies on a 10% markup. When a society gets a loan from the PCB, the 10% markup is paid to the society's account and after repayment by the society within the target period, 3% of the markup is credited to the society's account as a bonus. At the same time a reimbursement statement is also submitted to the Bank along with credit money by the society. This statement is forwarded to the Federal Bank for Cooperatives for transmission to the State Bank of Pakistan.

The new system of credit has almost eliminated cash credit. Instead, credit takes the form of agro-inputs. Formerly, interest on a loan increased with time whereas under the new system no increase occurs in the markup regardless of the credit period. Instead the 3% bonus which is credited to the member provides an incentive to the individual for timely repayment.

1/ Before the Islamic mode of credit was implemented in April, 1985, the procedure was as follows:

1) Rs 6,000 was advanced to a member having a maximum of 12.5 acres, annually on an interest subsidy share. Farmers were not required to pay the interest provided they fulfilled other given conditions. Interest was to be paid by the Federal Government as a subsidy. The member was bound to repay the amount within the given period which is normally from sowing to harvesting of a crop (8-10 months).

2) For those members of a society who did not qualify for interest subsidy, a 12% interest was charged. In such a case, profit was divided with 2% profit for the concerned society, 3% credited to the Provincial Cooperative Bank, a 1% margin kept by the Federal Bank for Cooperatives, and the remaining 6% kept by the State Bank of Pakistan.

3) Advancement of Crop Loans

As tabulated in TABLE 5.10-1, crop loans to cooperative societies provided by the Punjab Provincial Cooperative Bank in the ICT have remarkably increased. Recent loans for Rabi crops increased to 2.6 times those in 1981-82 while loans for Kharif crops increased 1.6 times the rate of the previous year.

A high level of loan recovery was achieved with a ratio above 97% which is the highest recovery rate in comparison with similar type crop loans in other South East Asian countries. This is due to the Islamic no-interest loan system.

(2) Agricultural Development Bank of Pakistan (ADBP)

The Agricultural Development Bank of Pakistan was established in February, 1961 under the Agricultural Development Bank Ordinance by merging the former Agricultural Development Finance Corporation and the Agricultural Bank of Pakistan.

The bank provides credit to individuals as well as to corporate bodies engaged in agriculture, which according to the Bank's charter, includes crop cultivation, horticulture, fisheries, forestry, animal husbandry, poultry farming, dairy farming, bee-keeping and sericulture. Credit facilities are also provided to cottage industries in rural areas. In order to meet the various types of credit requirements the Bank is authorized to advance short, medium and long term loans.

Short-term loans are given for a period not exceeding 18 months for financing agricultural production and marketing. Such loans help the farmers to finance inputs like seeds and fertilizers, pay labor wages, and hire bullock carts and small agricultural implements, besides enabling them to hold produce until a fair price can be obtained.

Medium-term loans are advanced for a period exceeding 18 months but not exceeding five years for the purchase of

agricultural implements. Long-term loans are given for a period exceeding five years for development purposes; for financing activities like construction of warehouses, cold storage, purchase of tractors and other machinery, installation of tubewells, purchase of means of transportation, establishment of agro-industries as well as for cattle and sheep breeding, dairy farming, poultry farming and land reclamation.

ADBP also provides project-oriented credit for the needs of all types of farmers such as i) package loan, ii) sustenance of Green Revolution, iii) special area development iv) special crop or produce development, v) part of IRD Center (Markaz) projects, vi) development of marketing distribution for agricultural products, vii) group loans to mutual aid societies and farmers' association, and viii) agro-based unit credit.

(3) Commercial Banks

Pakistan has a well developed commercial banking system with more than 7,335 branches which cover most of rural Pakistan. A scheme for agricultural loans by commercial banks was introduced by the State Bank of Pakistan towards the end of 1972 in which the State Bank undertook to reimburse 50% of the bonafide losses incurred by commercial banks in small agricultural loans. In order to help small and landless farmers, banks were also authorized under the scheme to grant loans of up to Rs 2,000 against two sureties, if no other security was available. This limit was raised to Rs 4,000 effective from 13 April, 1977 to Rs 5,000 effective from 5 July, 1980 and Rs 6,000 effective from 29 July, 1980, and to Rs 25,000 per year effective from 4 August, 1983.

From 1973 onwards minimum annual targets for loans to small farmers have been fixed for nationalized commercial banks. These targets have been increased from year to year and commercial banks are subjected to penalties if their targets are not achieved.

5.10.4 Farmers' Organizations

(1) Farmers' Cooperative Societies

1) Historical Background

Cooperatives are universally recognized as the most effective insitutions for meeting the production inputs and marketing needs of the farming community. The cooperative movement was introduced in the sub-continent of Indo-Pakistan with the first Cooperative Act in 1904 in order to promote thrift and self-help among the farming community in particular as well as among small industry craftsmen and the lowest income brackets which are the backbone of the agricultural society. Currently existing cooperative institutions are regulated by the Cooperative Act of 1925 which was amended in 1962.

2) Classification of Cooperative Societies

In the Study Area, there are 81 cooperative societies registered with the Cooperative Department as given in Tables 5.10-2 and 5.10-3. The activities of most of these are related to agriculture except one Religious School Teachers Society. Almost all thrift and credit societies except multipurpose societies, are registered with unlimited liability in which each member of the society is liable to repay the entire payable amount. In the case of limited liability the liability of each member is determined according to the share of money at the time of registration which is normally ten times one member's share.

A society which has a member from another society must be registered with limited liability. Liability of a society is designated at the time of registration.

3) Grading of the Society

According to an order issued by the government, cooperative societies are divided into 4 different categories called A, B, C and D Grades.

Societies of A Grade can receive business privileges from other agencies independently without departmental recommendation. Societies of B Grade can also apply to the Provincial Cooperative Bank for a loan, but the bank authority can refer the application to the department for recommendation by at least one Field officer. Loan applications for C Grade societies, however, are considered if they come through the channels of recommendation from sub-inspector to the Circle Registrar. Lastly, bankrupt societies are called D Grade societies. These societies are not permitted to work or to conduct any type of business activity until all liabilities have been cleared.

All cooperative societies related to agriculture in ICT are Grade C.

4) Constraints

Through the Master Plan Study, constraints on the cooperative movement in the area were identified as follows:

a) Lack of Education: Lack of education and cooperative knowledge is the main obstacle to success of the cooperatives.

b) Individualism: Due to strong individualism among the members, it is difficult to foster a spirit of cooperation. Others are content to depend upon the government rather than try to alleviate the situation through their own efforts.

c) Social Customs: Although transfer of ownership or cultivation rights is a prerequisite for cooperative farming, farmers do not want to transfer these rights, as agricultural land is considered a symbol of social status in the farming community.

d) Leadership: Local leadership plays an important role in the success of cooperatives. In the Study Area, the groundwork must be laid for the establishment of valuable cooperative institutions.

e) Society: The cooperative concept was imported from the United Kingdom and should be modified to suit local customs and requirements.

(2) Irrigators' Cooperative Societies

Presently, there are five Irrigators' Cooperative Societies registered in the Department of Cooperatives. All these societies within the Study Area are formed among the beneficiaries of mini-dams. These societies function as nascent Water Users Associations (See Annex).

Background of Talhar Irrigation Cooperative Society

Islamabad Capital Territory is a Barani area; however, there are some pockets where portions of cultivated land are irrigated by Persian wheels, lift irrigation, or gravity flow through unlined canals along perennial streams.

In Talhar, katcha (unlined) water courses are used for irrigation. Local farmers have planted fruit trees on both sides of the stream which are a main source of income to the farming community.

In view of the needs and conditions of the area, an irrigation scheme was formulated by the Department of Local Government and Rural Development with the collaboration of Cooperatives and Soil Conservation departments. Under the scheme, the Talhar Irrigation Cooperative Society was registered under the Cooperative Act to be responsible for the execution, operation and maintenance of the scheme. A check wall in the stream has been built to divert water into the water course which is brick-lined to reduce water loss. The objectives of the Society are to:

a) ensure a regular supply of water for irrigation purposes;
b) increase fruit and vegetable production by providing sufficient irrigation water;
c) increase the real income of fruit and vegetable growers; and,
d) enhance the supply of fruit and vegetables to the local market of Islamabad.

The society consists of 26 members and share capital of Rs 1,200. The managing committee consists of 5 members, one

President, Vice-President, Treasurer, Comittee Member and Honourary Secretary elected by the members in a general meeting. The society may assess and collect a water rate from the members to generate income resources for maintenance and other operational purposes.

5.11 Agricultural Development Policy

Agriculture and rural development is one of the most important objectives in the national development policy of Pakistan and its importance is emphasized in the Sixth Five Year Plan. The agricultural development strategies conceived in the Plan, as summarized below aim at: i) development of Barani areas, ii) support of small-scale farmers, iii) modernization of agriculture, iv) organization of farmers; and, v) diversification of the agricultural sector. The strategies are:

a) Extension of integrated technologies including use of improved seeds, chemical ferilizer and agricultural chemicals and establishment of adequate agricultural credit services required for the extension of these technologies;

b) Organization, training and education of farmers for rationalization of water use and improvement of water supply;

c) Farm mechanization, introduction of small tractors and farm machinery;

d) Modernization of agricultural extension services and diversification of the extension system;

e) Diversification of the agricultural sector;

f) Agricultural development focused on small and medium scale farmers;

g) Development of Barani areas[1/];

h) Expansion of export of agricultural products and domestic production of presently imported crops such as oil crops and high-protein crops, soybean in particular; and

i) Development of potential for forestry and fishery.

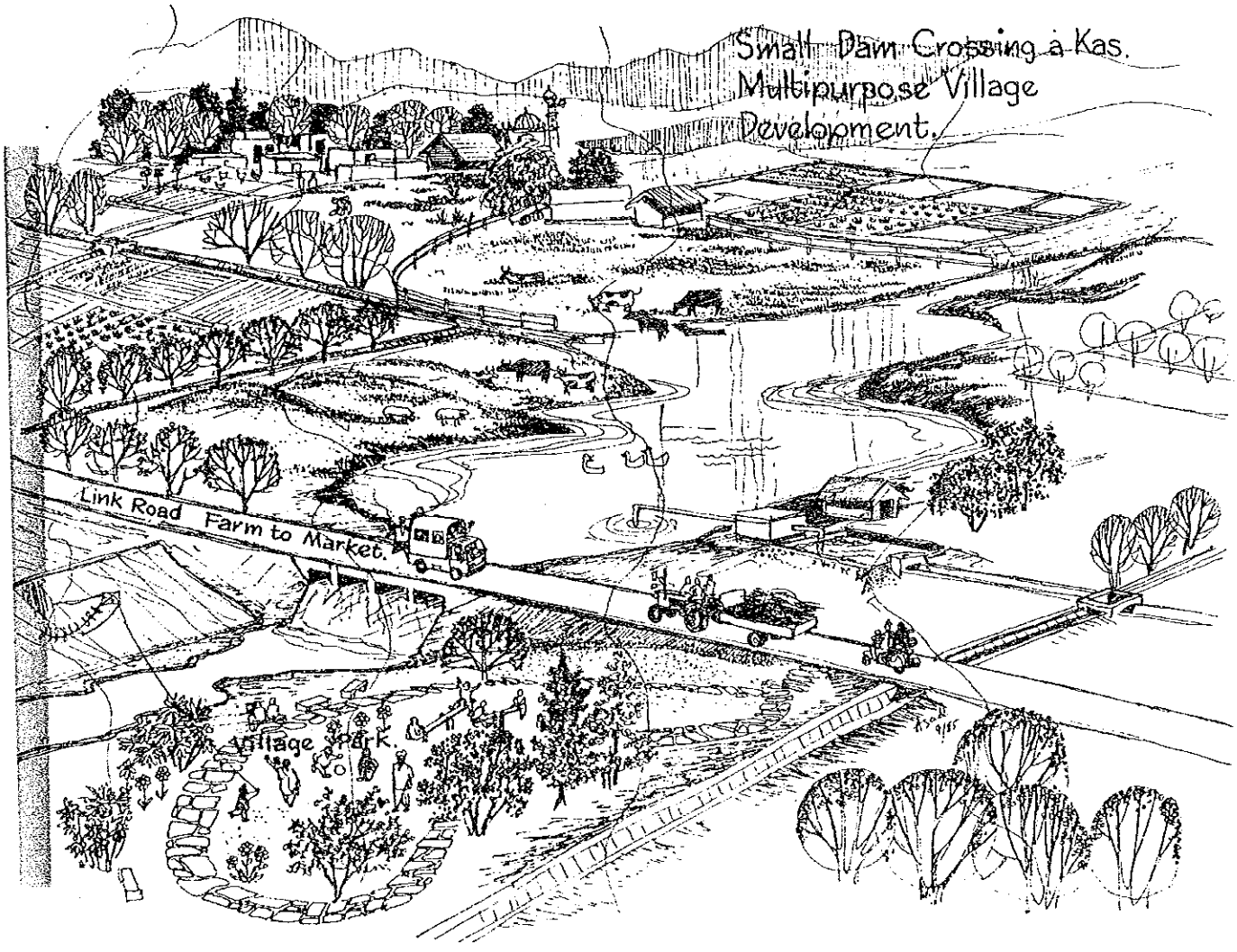
Accordingly, it is recongnized that improvement of the economic condition of small farmers in the Barani area through modernization and diversification of the agricultural sector is one of the most important agricultural development objectives in Pakistan.

1/ See Chapter VI for further details.

PART III

DEVELOPMENT STRATEGY

ILLUSTRATION No.5



For that We pour forth
Water in abundance,

And We split the earth
In fragments,

And produce therein Corn,

And Grapes and nutritious Plants,

And Olives and Dates,

And enclosed Gardens,
Dense with lofty trees,

And Fruits and Fodder,

For use and convenience
To you and your cattle.

Abasa (LXXX-25,26,27,28,29,30,31,32)

CHAPTER VI

PRESENT STATUS AND DEVELOPMENT

6.1 Characteristics of the Barani Area

6.1.1 Barani Area

In the Pakistan Census of Agriculture (1980) Barani area is defined as cultivated area not artificially irrigated and dependent soley on rainfall for cultivation. The area under Barani cultivation in Pakistan accounts for about 5 million ha or 24% of total cultivated land (20.4 million ha) and is most extensively distributed in Punjab Province. Agriculture and rural development of the Barani areas has been perennially given lower priority leading to income disparities and inequitable distribution of wealth, resulting in widespread poverty in the said areas.

Agricultural production in the Barani areas is prone to much higher risks, and crop yields are considerably lower than in irrigated areas due to low and irregular rainfall. Furthermore, soil erosion during the monsoon season also presents a great problem in these areas. Agriculture based on the dry farming system is predominant and fallowing in the monsoon season in an important farming practice in order to conserve rainfall. The most important crop is winter wheat, cultivation of which depends on conserved monsoon rainfall and winter rainfall. Livestock raising is also a primary activity and an important source of income.

Development of farming technologies and systems designed to minimize risks and optimize economic returns as well as soil and water conservation measures are of paramount importance for the development of Barani areas.

In the Sixth Five Year Plan, special emphasis is placed on the development of Barani areas and the following countermeasures for the development of the agricultural sector are proposed.

a) increased use of fertilizers
b) improvement of tillage
c) soil and water conservation
d) extension of improved varieties and livestock breeds

e) introduction of appropriate farming systems (including livestock husbandry) condusive to more diversified intensive production
f) improvement of range management practices
g) improvement of livestock nutrition status
h) proper mechanization
i) proper weed and animal disease control

6.1.2 Irrigated Agriculture and Barani Agriculture

Barani agriculture is characterized by traditional farming practices featuring low productivity and limited supplies of inputs. For the development of agricultural productivity in the Barani areas, irrigation, use of better seed and fertilizer, improvement of farming technologies and adequate agricultural credit services are essential. The current lack of irrigation places severe limitations on the effectiveness of any new technology or inputs introduced into these areas. The effect of irrigation on crop yields is evident from the differences in average yields of major crops between irrigated land and un-irrigated land (Barani) as shown in the table. The average yield of wheat in irrigated land of the Punjab, for example, is 1,895kg/ha compared with 935kg/ha in Barani.

DIFFERENCES IN YIELDS BETWEEN IRRIGATED LAND AND BARANI IN PUNJAB PROVINCE

Unit: kg/ha

	1980-81		1981-82		1982-83		Average	
	Irrigated	Barani	Irrigated	Barani	Irrigated	Barani	Irrigated	Barani
Wheat	1,950	890	-	-	1,840	980	1,895	935
Maize	1,400	660	1,360	660	1,410	660	1,390	660

Source: Agriculture Statistics of Pakistan, 1981 and 1983.

The economic impact of irrigation on crop production which resulted from changes in cropping pattern, cropping intensity, production costs and from enhancement of productivity are summarized as shown in the following table, based on the evaluation study on existing small dams in Rawalpindi Division made by the Punjab Economic Research Institute (PERI).1/

1/ An Evaluation of Small Dams Programme in Punjab, 1984, PERI

COST OF PRODUCTION AND FINANCIAL RETURNS PER ha ON IRRIGATED AND BARANI FARMS

Unit: Rs/ha

	Irrigated	Barani	Increase (%)1/
Cost of Production2/	1,379	761	618 (81)
Gross Return2/	4,679	2,172	2,507 (115)
Net Return3/	3,165	1,376	1,789(130)
(Rate of Return, %)4/	(68)	(63)	
Net Profit5/	1,614	1	1,613(-)
(Rate of Profit, %)4/	(34)	(0)	

1/ Comparison between irrigated and Barani (Irrigated - Barani) & rate of incease.

2/ Average annual cost of production and gross return per ha of irrigated and Barani farms at 6 small dam projects in Rawalpindi Division. Major crops: wheat, maize, pulses.

3/ (Gross Return-Cost of Production)

4/ Net Return/Gross Return x 100 & Net Profit/Gross Return x 100

5/ Gross Return - (Cost of Production + opportunity cost of family labor); not including rent of land.
irrigated farms = 4,679 - (1,514 + 1,551)
Barani farms = 2,172 - (796 + 1,375)

Source: An Evaluation of Small Dams Programme in Punjab, 1984, PERI.

From the table, economic features of crop production under irrigated and Barani farming are assumed as follows:

a) Cost of production, gross return, net return and financial profitability could be substantially enhanced by the introduction of irrigation. Little profit however, can be expected from crop production in the Barani areas. When rent of land is included in the cost of production as in the case of tenant operation, returns from the crop sector are significantly low even in irrigated areas.

b) Increased cost of production by introduction of irrigation indicates that irrigation would bring about increased supply of inputs by farmers and will generate more demand for agricultural support services such as credit and technical extension.

c) Based on net returns, farm size per farm household required for achieving a household income of Rs 12,000 per year originating from the crop sector is calculated as follows:

FARMING SCALE REQUIRED FOR EARNING Rs 12,000/YEAR

Unit: ha

	Cropped Area Required	Farm Size
Irrigated Areas	3.8	2.5
Barani Areas	8.7	10.2

Note: Owner cultivation and no income from livestock sector are assumed. Cropping intensities are assumed as; 150% for irrigated areas and 85% for Barani areas.

The impact of irrigation on the livestock sector has special importance in the Barani areas as income from the same constitutes a considerable share of the farmer's income. According to the previously mentioned study by PERI, irrigation brought about expansion of fodder production, increase in livestock holdings per farm household and changes in the composition of livestock.

6.1.3 Punjab Barani Tract and the Study Area

The Punjab Barani Tract including the Study Area delineated by ABAD is mainly located in the north of the Province comprising Pothwar Plateau, Murree Hills, Salt Range, Indus Plains and the piedmont plains of the Himalayas, and covers about 7.5 million ha or about 37% of the Province. The Tract includes all or part of ten districts, namely, Rawalpindi, Jhelum, Attock, Gujrat, Sialkot, Bhakkar, Khushab, Mianwali, D.G. Khan and Rajanpur (FIG. 6.1-1). The general features of the Tract are summarized in TABLE 6.1-1.

Spreading extensively from the northern end to the southern end of Province, the Tract exhibits a wide range of physical and climatic conditions. Climatic differences are especially remarkable and average annual rainfall varies from less than 200mm in the southern end of the Tract to over 1500mm in the northernmost end.

Based on annual rainfall which is the most important element affecting land use, the Tract can be classified into the following three climatic zones.

Moderate - rainfall zone	- Areas having an annual rainfall of more than 750mm
Low - rainfall zone	- Areas having an annual rainfall between 300 to 750mm
Arid zone	- Areas having an annual rainfall of less than 300mm

The moderate - rainfall zone covers the most important areas of the Barani Tract as far as crop production is concerned. Wheat is by far the most important crop occupying most of the cropped area in winter. Maize is usually a dominant crop in summer. In the low - rainfall zone, wheat and millet predominate and are sown in winter and in summer, respectively. In the arid zone, on the other hand, the rainfall is not adequate for crop production. Cultivation, therefore, depends on the collection of runoff from hill torrents with millet as the most common crop in the zone.

The Study Area, having an average annual rainfall of about 1,100mm, is endowed with favorable climatic conditions in comparison with most of the areas in the Barani Tract. The advantage of the Study Area in terms of land use is indicated by the high cropping intensity achieved in the Area as shown in the following table.

CROPPING INTENSITY OF DIFFERENT CLIMATIC ZONES IN 1981/82

Climatic Zones	District	Average Annual Rainfall (mm)	Cropping Intensity (%)
Moderate-rainfall zone	the Study Area	1,100	105
Low-rainfall zone	Attock	547	90
Arid zone	G.K. Khan	173	72

Source: Punjab Barani Tract in Figures, ABAD, 1984

However, unpredictable rainfall still limits crop productivity in the Study Area and farmers are forced to cope with unstable farm management. In addition, even though climatic conditions of the Area are more favorable when compared with other Barani areas, the farm scale of most farmers in the Area is too small to obtain a sufficient farm income.

6.2 Present Stage and Progress of Development

6.2.1 Background

The Islamabad Capital Territory is located in the Barani area of Pothwar Plateau, where agricultural production is unstable due to dependence on rainfall. Moreover, the small and fragmented landholdings hinder local farmers from using more profitable mechanized cultivation and modern agricultural techniques.

The socioeconomic condition of the farming community has improved to some extent with the efforts being made under the Integrated Rural Development Programme since 1976; however, much more needs to be done to ameliorate the conditions of the rural farmer. Agricultural methods in this area remained conventional untill 1975-76, and even when other parts of the Punjab were benefitting from the introduction of new farm technology under the province's Green Revolution Programme , farmers in the ICT remained largely neglected. At that time there were no tractors nor other agricultural machinery, and application of chemical fertilizers was not practiced at all.

The establishment of the IRD Markaz, however, provided extension services and introduced modern agriculture to the local farmers through demonstrations of agricultural machinery, improved seed and chemical fertilizer. A farm-to-market road program was started to provide marketing facilities to the local farmers as well as better communication to the entire population. Similarly, small-scale sanitation and drinking water schemes were also started to improve the socioeconomic conditions of the rural populace.

The first step to provide agricultural extension services to the rural area of Islamabad was the creation of a district level Agricultural Department in July 1980, which was further strengthened at the time of complete federalization of Islamabad on January, 1981. Subsequently, agriculture related departments were operationally transferred to PARC which is a well established organization equipped to deal with the various problems in agriculture.

Another element which has also changed the socioeconomic structure of the local area is the shifting of the capital from Karachi to Islamabad. The shifting of government offices to Islamabad and construction of new government and private buildings on a large scale

provided employment opportunities to the local population thereby reducing the problems of unemployment.

As in other parts of the country, a large number of local people work overseas for their livelihood. The resultant foreign remittances have also upgraded living standards. The main profession in this area two to three decades previously was military service with 80% of manpower involved in the same. Now the trend has changed; young men go abroad or prefer to join civil sectors rather than go into military service.

Interviews of Study Area residents by the Team indicated that the local population attributes rises in living standards over the past 10 years to appropriate governmental measures towards agricultural development.

6.2.2 Future Plan

In order to propose a future plan, local problems should be identified to which solutions may be proposed. Main problems in the Study Area are as follows:

- Fragmented and small landholdings
- Lack of irrigation as well as drinking water
- Ineffective communication system
- Illiteracy
- Unemployment

Manpower can be divided into four major classes; farmers, employees (civil and military), laborers (skilled and unskilled) and overseas workers.

In view of the above mentioned problems, the following are proposed for improvement of rural living conditions.

a) Land conservation;
b) Mechanized and cooperative farming;
c) Small irrigation dams, lift pumps and tubewell schemes;
d) Village link road network;
e) Provision of better educational facilities; and,
f) Establishment of small income generating projects to attract investment from overseas workers and cottage industries to promote local skills as well as to create

employment opportunities for the working class in the rural area of ICT.

The current Sixth Five Year Plan of the Government embodies the above objectives and these are in complete congruence with national level deveopment plans.

6.3 Constraints

At present, the magnitude of the problems facing the people in the rural area of ICT is large. Area residents are affected by varying degrees of low income, lack of food, illiteracy, harmful food habits, lack of clean drinking water, insanitary environment, lack of supplies inputs and credit, and absence of marketing and distribution networks. Women in particular remain largely by-passed by any gains in agricultural production, education, medical services, nutrition and sanitation education and participation in income generating activities.

Therefore, partial or sectoral countermeasures are insufficient as the above problems are closely interrelated. In order to solve these problems a long term Master Plan should be undertaken for integrated promotion of production and income generating activities, and improvement of rural living conditions. Most important, however, the Master Plan should be firmly focused on the needs and aspirations of the people themselves.

6.4 Development Demands of the Local People

Present conditions in the rural area were studied and various surveys were implemented to identify the interests of the rural inhabitants. On the basis of discussions with IA officials, and the 1981 census, 450 households in villages were selected for visitation and interview. At the UC level, discussions were held with UC chairman and councilors. Furthermore, representatives to all of the 68 panchayats in the Study Area were asked to select 5 items from a 50-item-list of potential development objectives as most indicative of the aspirations of Area residents.

The rural area is divided into more than 133 villages which are grouped into 11 Union Councils with different natural and social conditions. Accordingly, development demands vary somewhat with location.

These demands however, as gleaned from the above surveys and interviews, were classified into major categories as shown in the following table. Furthermore, it was confirmed that there is no discrepancy between present government policy and survey results which will accordingly be very useful in formulation of the Master Plan (TABLE 6.4-1 and Annex).

PRIORITY LIST FOR RURAL DEVELOPMENT

Government Policy			Survey of Desires of Local Population (Study Team)			
			Questionnaire Survey 450 samples			
Order of Priority	Planning Commission Guideline	IA[1] 5 Year Plan Priority	Production Goods	Betterment of Living[3]	Discussion Meeting (11 UC)	Questionnaire Survey (68 Panchayats)
1	Road	Road	Farm machinery	Drinking Water	Water Development[4]	Drinking Water
2	Drinking Water	Drinking Water	Vehicles	Medical & Health	Agricultural Machinery [5]	Agricultural Machinery
3	Electrification	Electrification	Land[2]	Gas (Fuel)	Agricultural Develop. Station[6]	Road
4	Education	Agricultural Extension	Poultry	Road	Animal Husbandry & Meadow Develop.[7]	Irrigation
5	Medical & Health	Skilled Training	Well Pump	Electricity	Vocational Training	Animal Husbandry
6	-	-	Domestic Animals	Cottage Industry	Road & Medical Services	Electrification[8]

Note: 1/ Education is not included
2/ Farm land
3/ Education is not included
4/ Including irrigation, mini-hydropower, horticulture fish fry etc.
5/ Lease system
6/ Supporting facilities for agriculture village life
7/ Including land conservation & environment
8/ Including mail box, public telephone

CHAPTER VII

LOCAL CHARACTERISTICS OF THE STUDY AREA

7.1 Introduction

Islamabad rural area is spread over a gross land area of 59,500ha and contains a number of rural communities. The basic administrative unit in Islamabad rural area is the Union Council composed of a set of villages consiting of several Panchayats. There are 11 UC's in the Study Area. Each UC has its own unique local characteristics, influenced not only by geographic, ecological and social conditions but also by the leadership of its chairman. Analysis of the characteristics of each UC is important in determining the project components of the Master Plan Study. Accordingly, a study of each UC was carried out to obtain current information during the second stage field survey. The study included:(i) discussions with Panchayat members and progressive farmers from each UC, and (ii) fact-finding surveys at each UC office to obtain basic data.

Several facts which had been overlooked during the first stage field survey were discovered and the results of the first stage survey were revised accordingly. It was also made clear that identification of the needs and requirements of farmers at the Punchayat level would be most suitable for rural development planning. Information obtained at this grassroots level would supplement the analysis of the existing official data, providing an accurate image of how peasant farmers view their own needs and problems.

Problems and contradictions of the rural area can only be grasped through direct contact with the rural people concerned, and their representatives.

7.2 Summary of Major Findings

Major findings obtained from the locality study are summarized as below.

(1) Barani Farming

Farmers in Islamabad rural area are generally unsatisfied with traditional Barani dry farming which has been conducted for many centuries in this region, and are interested in introducing advanced farming technology.

(2) Improvement of Barani Farming

Two approaches were identified for the improvement of Barani farming: one is the introduction of intensive modern farming technology, namely the upland irrigation method which would facilitate efficient management of even small plots of land. Another approach is reclamation of wasteland, thereby increasing landholdings as suggested by the Union Councillors of Shah Darah village (UC Bhara Kau). It is noteworthy that these proposals were suggested mainly by Panchayat members from UCs with relatively inferior soils and topographical conditions like Bhara Kau, Phulgran, Tamair, and Charah.

(3) Farmers in the Rural Community

The 1981 Census Report indicates that the working population engaged in the agricultural sector in the Islamabad rural area accounts for only about 39% of the labor force. This might give the impression that the remaining 61% engaged in activities outside the agricultural sector. In fact however, the majority of the rural population (about 85%) belong to farm households. Between 25% - 75% (the figure varies by UC) are considered to be part-time farmers who cannot sustain themselves from agricultural activities alone. These farmers are compelled to engage in non-agricultural activities because they are unable to survive on farming alone due to small landholdings and low productivity. For instance, an average farm household with 0.8ha (2 acres) of land in the hilly area produces only approximately 350 - 700kg of Rabi wheat per year which is only sufficient to feed an average family (6 persons) for several months.

(4) Average Farm Size

Average farm size in Islamabad rural area is characteristically small. Excluding larger farms of more than 10.0ha, the average farm size is only 0.8ha (1.9 acres). The small size is partly due to uneven distribution of landholdings and partly due to fragmentation of land by inheritance. Fragmentation of land by inheritance is becoming a serious social problem in the rural area of Pakistan.

(5) Common Land

Common land is land which has been reserved for the common purpose of the persons residing in a community. Villages in the hilly area usually have a larger area of common land compared to other villages in relatively flat areas. It has been observed that the majority of common land consists of uncultivable wasteland. In some cases, cultivators as well as cattle breeders encroach on common land. These people reclaim the land without knowing that it may not be legally regarded as their own.

(6) Supplemental Works in the Urban Area

An increasing number of people, particularly in hilly areas, are migrating to the urban area in search of supplemental work. Even if they find work, their net income per day is very low due to transportation fees from their village to Islamabad. (It costs about Rs 5 from Tamair to Islamabad by bus.) Moreover, job prospects in the urban area are not always promising. However, they need supplemental work to maintain their livelihood and supplemental job opportunities are thus a serious issue for small farmers in the rural area. Although most farmers realize that it is difficult to maintain their livelihood by farming alone, they rarely sell their small plots of land. Field survey results reveal that most of the rural population maintain a self-identity as farmers even if they are employed in non-agricultural sectors.

(7) Overseas Workers

Migratory workers to neighboring Middle East countries account for nearly 10% of the male labor force. The percentage of

overseas workers in some villages (Shah Allah Ditta, Phulgran, etc.) is less than in other villages partly due to inability to pay the deposit money to go abroad and partly due to lack of skilled/semi-skilled workers. Remittance from overseas workers contributes significantly to maintaining the livelihood of their families.

(8) Farmer Demands

During discussions with farmer representatives, an inquiry was made as to what items they require most to improve their living. The requirements identified are dependent on the situation in each UC and therefore exhibit some variation. Some similarities however, were found. The item ranked first on every occasion was "water", meaning irrigation water and/or clean drinking water. The items ranked second and third were village link roads and acquisition of heavy equipment like tractors and bulldozers. One common item was vocational training to obtain jobs in Pakistan as well as overseas countries. It is noteworthy that almost every UC responded positively to establishment of rural industries in or nearby their villages.

(9) Job Creation for Women

The Team was keenly interested in creating job opportunities for women in the rural area as their participation is indispensable for successful rural development. Although the Team had anticipated possible constraints to rural women working outside their homes in Islamic society, no negative response was expressed by rural representatives on this subject. All participants responded in the affirmative when questioned whether or not they would agree to let their wives and daughters work in a factory if a factory for women was established in the vicinity of their villages.

The role of women in rural Islamic communities is quite important. In addition to household matters which include cooking, childcare, and household chores, they must haul drinking water for their family, cut grass to feed cattle and collect and haul

firewood long distances. In addition they occasionally assist with farm work without remuneration. Women in the rural area are constantly busy with little time for significant amusement or leisure. Priority should be given to improvement of the living conditions of women in the rural area including the creation of job opportunities. This would allow them their own income, giving them more independence, protecting their rights and helping them to gradually improve their postion in society.

(10) Cooperative Movements

Farmers' responses to cooperatives differ from one UC to another. In general, UCs located in relatively flat areas like Koral, Rawat, Tarlai Kalan and Kirpa have few cooperative activities at the present moment. People in these UCs, however, exhibit a desire for increased cooperative activities and facilities. People in the mountainous areas display a sense of solidarity which would help facilitate the promotion of cooperative societies.

In principle, a cooperative society should be organized and managed by rural people at the grassroot level on the basis of mutual trust and cooperation. However, in the initial stages of development, a certain degree of institutional guidance is necessary.

As outlined above, the locality study of each UC contributed to formulation of the Master Plan strategy, and locality characteristics can be effectively utilized to ensure that components reflect the real needs of farmers in the proposed area.

7.3 Role of Union Council and Panchayat

At the village level, there is a unanimously elected body of local leaders called Panchayat. The main task of the Panchayat is to organize the rural people to identify needs, formulate plans of action and develop local resources for self-management of projects. A set of villages forms a Union Council which is the basic administrative unit under the provision of the Capital Territory Local Government Ordinance, 1979.

In Islamabad rural area, the UC and Panchayat execute important tasks in rural development planning and execution. Application of any development scheme is prepared at the UC level and submitted to the Rural Areas Coordination Committee (RACC) for approval. Schemes are assessed by the RACC and then submitted to the Islamabad Development Working Party (IDWP) for final approval. The IDWP consists of an Administrator, Deputy Commissioner, Director of Development and Finance and representatives from CDA and Ministry of Finance. If the scheme is approved, it is included in the Annual Development Programme, which is submitted to the Ministry of Finance through the Ministry of Interior for approval.

As mentioned above, development planning and execution in Islamabad rural area are implemented at the Panchayat as well as UC level. Therefore, discussion with Panchayat members and Union Councillors is one of the most important factors in formulation of the Master Plan.

Meetings were held from 21 July to 24 July, 1985 at each UC office. A large number of farmer representatives participated with full support from RACC and LGRD. It has been fully understood by the Team that the Panchayat and UC play very important roles as mediators between the farmers and the governmental agencies concerned.

CHAPTER VIII

STRATEGY AND METHOD OF PROJECT PLANNING

8.1 Necessity of Integrated Rural Development

Most agricultural development schemes during the 1960s and 1970s in Asian developing countries concentrated solely on increasing agricultural production through provision of directly productive components such as irrigation facilities, farm inputs, agricultural machinery and other agriculture related facilities. Such an approach was necessary in order to meet the growing demand for food resulting from a striking population increase in developing countries. The results were the introduction of high yielding varieties (HYVs) of wheat and rice by IRRI, which led to new farming technology and the construction of large-scale irrigation facilities to increase agricultural production, particularly of food crops.

It is doubtful, however, whether the implementation of these development schemes contributed much to the betterment of life of the rural poor. It is pointed out by many people that beneficiaries of most agricultural development schemes in the past were not small-scale farmers and the landless but a few large-scale farmers and merchants. It is believed that the unequal distribution of income between the rich and the poor may have actually escalated after the implementation of many of these schemes.

At the end of the 1960s, more than half of the rural population in Pakistan lived on a family income of less than US$50 per year. Still today, however, problems of rural poverty and rural unemployment remain largely unchanged in Pakistan.

Introduction of a modern system of agriculture, i.e. seed, fertilizer, water management technology etc., increased agricultural production to some extent of food crops like wheat, rice and maize. However, it became clear that small-scale farmers and landless families who constituted 80-90% of the total rural population could not benefit much from modern technology because of lack of capital for investment in the purchase of production inputs.

Under these circumstances, the necessity of integrated rural development became apparent. Based on the concept that rural development is a strategy designed to improve the economic and social life of the rural people, development activities should not concentrate solely on directly productive components but also on productive support components (e.g. improved extension services, marketing facilities and training) and social infrastructure (e.g. drinking water supplies, health, education, etc.). Facilities and services provided under an integrated rural development program are to be made available for the entire rural population. Benefits from projects of this nature can not be directly valued in monetary terms, but they provide the sound foundation to support long term, sutained social and economic progress.

8.2 Target Groups and Project Planning

Integrated rural development attempts to address a number of fundamental problems in rural areas. Where needed, it also deals with reformation of the fundamental and traditional relationships which rule the distribution of natural resources and income in rural communities. A comprehensive approach is required, therefore, for the planning of integrated rural development.

Development strategy concentrating merely on agricultural activities is insufficient to solve the problems in rural communities. Considering that the rural poor comprise the majority of the rural population in Pakistan as well as other developing countries, emphasis on indirectly productive operations, e.g. improvement of health and education, expansion of communications and improvement of housing, are essential. Integrated rural development programs are regarded as a part of a country's overall development strategy. If the rural poor are not justly regarded as the national resources that they are, they will remain largely excluded from the benefits of development schemes and consequently fail to realize their incalculable potential as the foundation for sound nation building.

Ideally increased economic and social growth would lead to a reduction in poverty as the benefits of an expanding economy spread among the people. Under the situations of limited natural resources and unequal distribution of income, however, a large portion of the benefits from

conventional projects tend to spread only among the high-income classes at the initial stage of project implementation, leaving small-scale farmers and landless families behind. The most important task in the integrated rural development approach therefore is to involve the rural poor in direct participation in project planning and implementation at all stages to ensure that every segment of the population enjoys an equitable distribution of the fruits of development.

Taking into account the above, the approach for integrated rural development project planning is outlined as follows:

a) The Master Plan is to be formulated to extend the benefits of development to the rural poor.

b) One of the major objectives of rural development is to raise income levels of the rural poor.

c) Participation of the beneficiaries in project planning and implementation should be given top priority.

In formulation of the Master Plan, it is necessary to grasp the aspirations and needs of the rural people at the grassroot level and to incorporate them as the central element in project planning.

8.3 First Step for Project Planning

The fundamental goal of integrated rural development is reduction of poverty. In the formulation of integrated rural development programs or projects, economic investments for agricultural development, industrial development, transportation and communication development, etc. and social infrastructure investments for health, education, drinking water supply, etc. are effectively combined to yield multi-fold improvement of benefits in the project area over what could be achieved through isolated implementation of independent schemes. Objectives of project components include employment generation, equal distribution of income, improvement of living conditions and modernization of the rural environment. Conponents are thoroughly integrated, and designed for sequential implementation on the basis of assigned priority.

The following items constitute the background factors governing formulation of the Master Plan.

a) Specific position of the Study Area as the capital area of Pakistan.

b) Vast land area of about 60,000ha including 23,120ha of cultivated land.

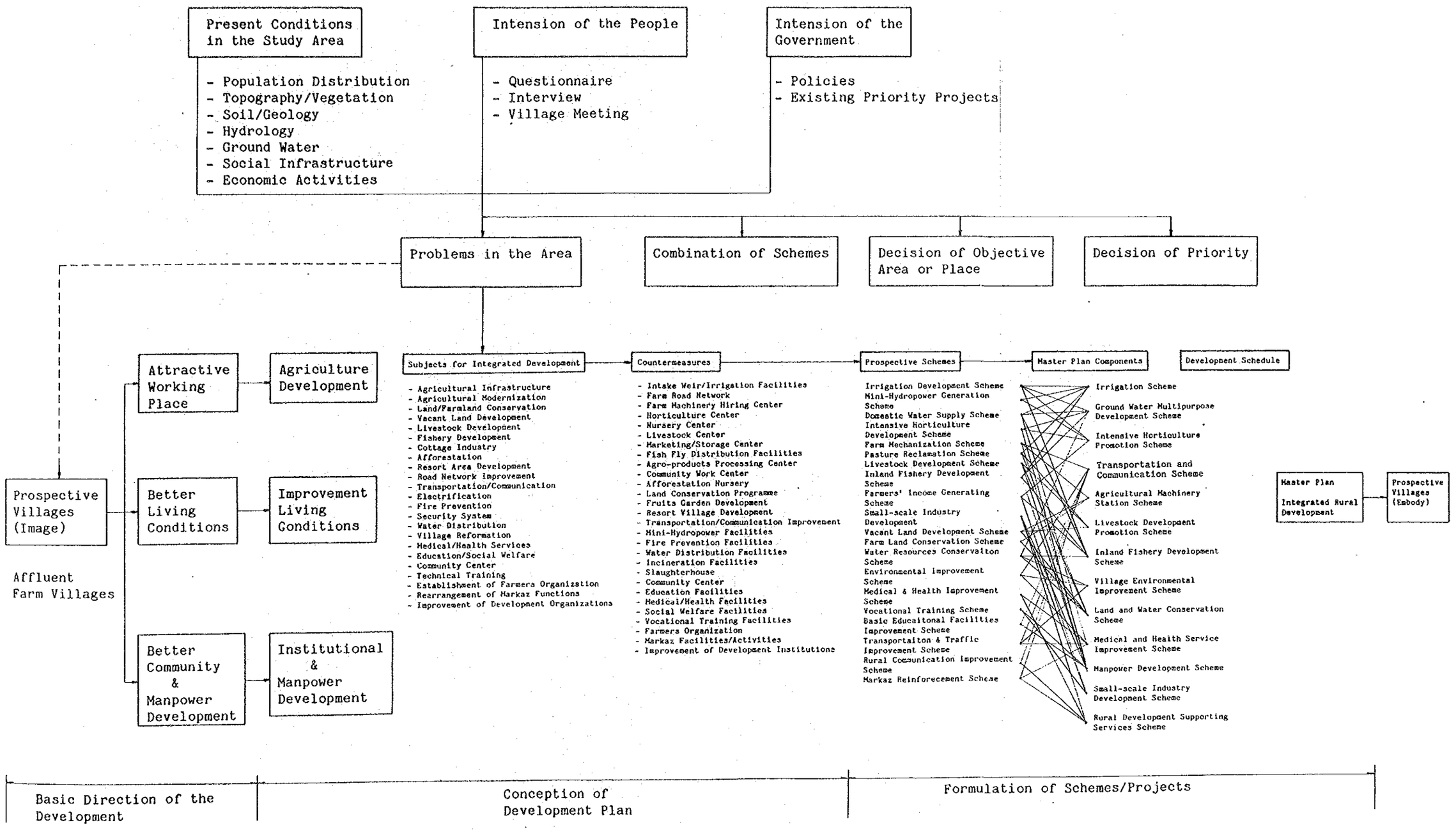
c) Semi-arid area with insufficient water resources.

d) Identification of people's demands and needs and incorporating them into the project.

e) Low investment efficiency due to emphasis on the welfare of rural population at large.

The problems in the Study Area were identified as a result of analysis of field investigations, and countermeasures were carefully examined taking into consideration the present physical and socio-economic situation in the Study Area. During this process, development schemes in other countries and problems arising from similar schemes in the past were reviewed. As a result of these studies and reviews, problems requiring urgent attention in each sector were identified and are categorized into the following four primary sectors: a) water resources development; b) agricultural development; c) infrastructure development; and d) development of human resources and rural industries. Schemes of high priority were subsequently formulated to address these problem areas and then incorporated into the Master Plan for integrated rural development. This process is indicated in the following Figure.

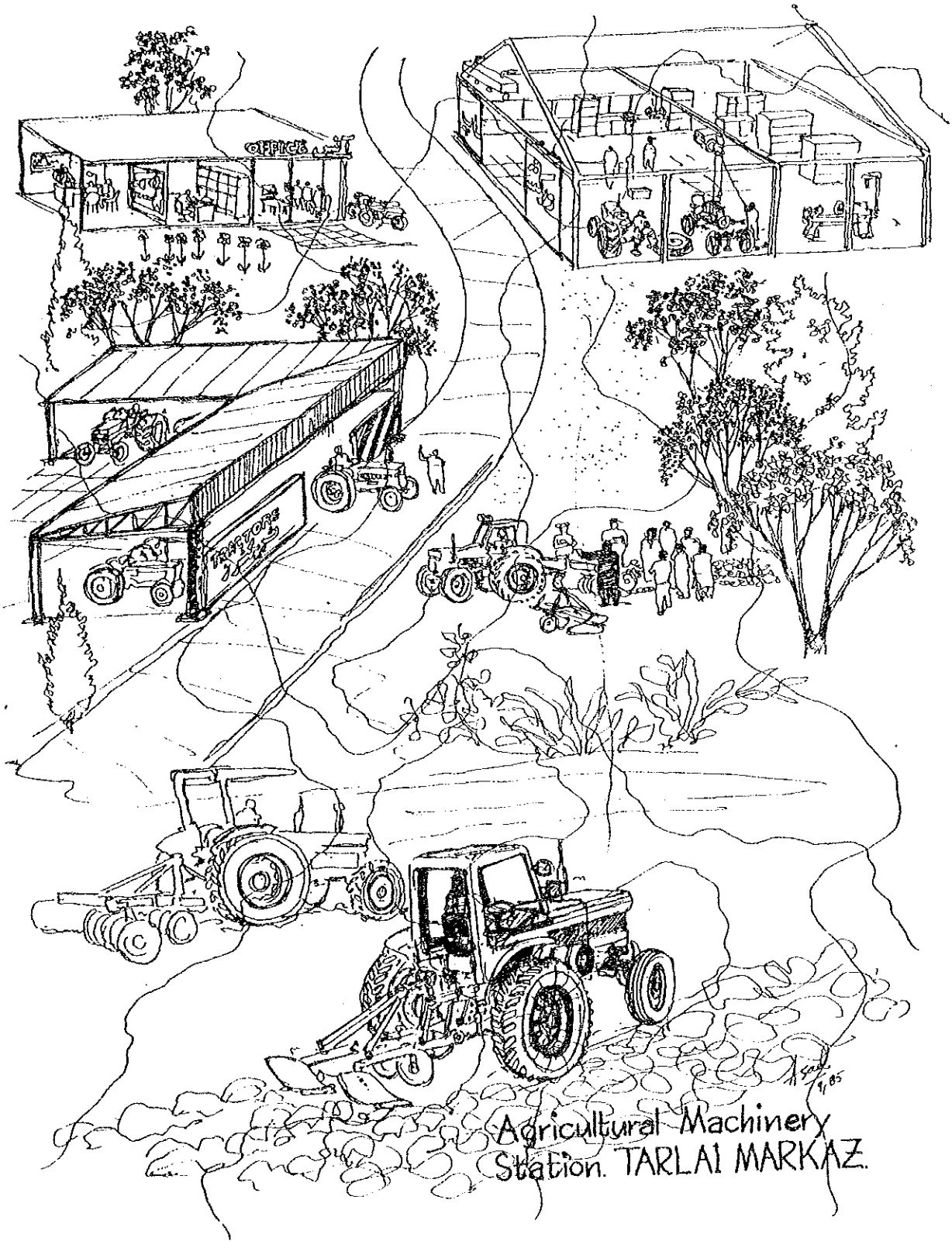
CONCEPT OF BASIC APPROACH FOR THE INTEGRATED RURAL DEVELOPMENT IN PAKISTAN



PART IV

SECTORAL DEVELOPMENT PLAN

ILLUSTRATION No.6



Say: "O ye
My servants who believe!
Fear your Lord.
Good is (the reward)
For those who do good
In this world.
Spacious is God's earth!
Those who patiently persevere
Will truly receive
A reward without measure!"

Zumar (XXX IX-10)

CHAPTER IX

DEVELOPMENT OF WATER RESOURCES

9.1 Existing Water Resources

There are two dams in the Study Area, namely Rawal and Simly dams. The Rawal Dam is located in the Kurang River which runs from the east through the cities of Islamabad and Rawalpindi. Water resources provided by the Rawal Dam have been used mainly for tap water to the city of Rawalpindi and partly for irrigation purposes in cropped areas near Rawal Dam. This dam was constructed in 1962 and its water resources have since made a significant contribution to the development of the area. The Simly Dam was constructed about 30km from Islamabad in 1982. The site is situated in the valley of the upper Soan River beside the Karor road in the northeasternmost part of the ICT. The water resources from this dam have supplied most of the city water for the capital, Islamabad.

The general features of these two dams are presented in the following table.

GENERAL FEATURES OF RAWAL AND SIMLY DAMS

Name	Rawal Dam	Simly Dam
Dam type	Concrete arch-gravity dam	Rockfill dam with inclined core
Catchment area	273km^2 (106mile^2)	153km^2 (59mile^2)
Full water level	534m (1,752ft)	699.5m (2,295ft)
Low water level	524.9m (1,722ft)	679.4m (2,229ft)
Effective head	9.1m (30ft)	20.1m (66ft)
Total capacity	58,590,000m^3 (47,500 A.F)	35,400,000m^3 (28,700 A.F)
Dead capacity	14,930,000m^3 (12,100 A.F)	10,790,000m^3 (8,750 A.F)
Effective capacity	43,660,000m^3 (35,400 A.F)	24,610,000m^3 (19,950 AF.)
Height of dam	10.0m (32.8ft)	80.0m (263ft)
Crest length	65.0m (213 ft)	308.0m (1,010ft)
Utilization water capacity (city water)	95,500m^3/day (21,000,000gal/day)	109,100m^3/day (24,000,000gal/day)

During the dry season from March to June, water levels of both Rawal and Simly dams drop rapidly causing urban water supply to Islamabad to decrease dramatically. Furthermore, while irrigation water is in great demand for wheat heading in rural areas during March and April, it is impractical to use these reservoirs as water resources for rural development due to the demands for domestic water service already being made on them. Therefore, it would be necessary to exploit some other water resources.

Fortunately, there exist a number of rivers, namely the Kurang, Soan, Gumreh Kas, Malal Kas, etc., which have potential for development of water resources in the Study Area. There are two development options available: i) using river surface water directly; and ii) using ground water provided by percolation of rainfall and rivers. These development methods are further discussed below.

9.2 Development of Surface Water Resources

9.2.1 Development of River and Torrent Water Resources

About 60% of annual rainfall is concentrated during a period of two and half months from the end of June to the beginning of September. On the other hand, dry spells frequently continue during the two months of the dry season. Prior to the rainy season, all social and agricultural activities are at a low due to high temperatures in April and May. During the rainy season, floods caused by heavy precipitation with torrent discharge threaten the welfare of rural inhabitants. While it is important to utilize river water for rural people, it is difficult under such limiting weather and topographical conditions.

(1) Water Resources Development Potential in Each River Basin

1) Kurang River

The Kurang River originating in the Murree Hills flows to the Rawal Lake with ample discharge. Its catchment area is measured at 273km^2 at the Rawal Dam and 356km^2 at the cross point of Islamabad Highway. The annual rainfall at Murree is about 160% of that at Rawalpindi. Accordingly, the Kurang River water discharge is greater compared with other rivers in the Study Area. The river is already developed

through the Rawal Dam. Spillover from Rawal Dam amounts to an annual average of about 47MCM for 23 years as presented in TABLE 3.6-4. As this amount has had a tendency to increase gradually in recent years, the development of the Kurang River merits close consideration as a prospective water resource for the development of rural as well as urban areas in the ICT.

A scheme for construction of a regulating reservoir was developed by the Team to exploit the water resources of the Kurang River (FIG. 9.2-1). There is a favorable dam site about 10km upstream from Rawal Lake where a large-scale dam with a regulating reservoir could be constructed. With regards to use of the dam for agricultural purposes, there is only a small area of farmland to be irrigated nearby and an irrigation canal of considerable length would have to be constructed in order to expand the irrigated area. Small-scale hydropower could be generated by using the dam water head and the resultant power could be utilized for irrigation pumps to extend farmland. In consideration of drought conditions in the dry season, coordinated use of both the proposed and existing dams should be considered.

Judging from the above factors, the dam should be made as large as possible and detailed investigation is necessary to determine the dam scale. As other rivers in the Study Area are generally small with insufficient discharge, the Kurang River represents a crucial water resource for the Study Area.

2) Soan River

The Soan River flows from the east of the Study Area to the south along the ICT boundary, joining the Khad, Ling and other rivers. The river runs southwestwards after joining the Kurang River in the southern part of the Study Area. The catchment area ranges from 326km^2 at Charah in the east to 1,684km^2 just upstream of the Kurang River confluence. The Simly Dam is located in the upper reaches of the Soan River, near the ICT boundary. No surface discharge is observed in the river course between the dam and confluence of the

Khad Nala River except during flood periods. There is an appropriate site for a regulating reservoir in the valley where the southern rocky ridge of Charah reaches the Soan River (FIG. 9.2-2). Available water resources from this dam could be used to irrigate Charah, Kirpa, and the area located in the southern portion of the ridge. Construction of an irrigation canal may be necessary to expand the irrigated area.

The dam also has potential for development of small-scale hydropower, and pumping lift irrigation by hydropower constitutes an extremely effective potential water use.

Though the Simly Dam has been used for water supply to the Islamabad urban area, the crest gate has not yet been installed. However, it is currently in the planning stages. Serious floods occurred during dam construction with flood water over-topping the coffer-dam. Judging from rainfall characteristics and topographic conditions in the area, estimated flood discharge is of short duration only. Accordingly, the crest gate could be operated to prevent overflow in the rainy season by establishment of a limited water level. The storage capacity of 10MCM available by the gate could be used effectively in the dry season. The southwesternmost edge of Simly Lake lies contiguous to the uppermost basin of Malal Kas. Water diversion to Malal Kas is possible by using the gate to maintain a higher water level in the dam. Because sufficient water resources are not available in the Study Area, this alternative should be carefully considered along with its attendant mini-hydropower development potential.

In addition, use of underground flow is possible where the Soan River runs through the southern part of the Study Area. At this point the river course is wide, features a moderate gradient, and deep sediment deposits.

3) Gumreh Kas

The Gumreh Kas flows towards the middle part of the Study Area from the northeast to the southwest and then joins

the Kurang River downstream from the Rawal Dam. The river basin with a width of 4km to 5km, a length of about 25km and a catchment area of 128km^2 is mostly within the Study Area except for the mountainous zone of the uppermost reaches.

River runoff selected at two or three river sites was observed at the beginning and end of the dry season and just after heavy precipitation. From these observations, the runoff was determined to be quite unstable. Surface flow in the river does not appear at all during the dry season and discharge by precipitation in the rainy season flows quite rapidly with high turbidity. This suggests that gradual return of percolated rainfall to the river course is rare. From the viewpoint of topographical and geological conditions in the basin of Gumreh Kas, there is no available dam site having adequate reservoir capacity. Furthermore, the river bed sits deep, and is far from the surrounding farmland in the upper and middle reaches of Gumreh Kas.

Regarding the water use plan, a number of small-scale weirs are suitable and currently in use for such water resource development as storage of river water at strategic sites to help delay river runoff.

Suitable weir sites exist, of which two are located at an elevation of about 580m (1,900 ft) in tributaries of the upper reaches of the river, three at the elevation of 550m (1,800 ft) in those of the middle reaches and two in the lower reaches. As farmland lies contiguous to both banks of the main stream course in its lower reaches, subriverbed underground flow has potential for development (FIG. 9.2-3).

Only limited water resources are available for development in Gumreh Kas. An increase in water demand for this area would certainly create problems due to the present lack of water. Part of the Kurang River flow however, could be diverted to the upper reaches of the Gumreh Kas by construction of a dam in the upper Kurang River.

4) Malal Kas

The river basin of the Malal Kas falls completely within the Study Area and has a catchment area of 99km^2. The Malal Kas has the same topographical and geological characteristics as the Gumreh Kas. Accordingly, the technique of water use development is almost the same. However, sections of surface water were observed by the Team under severe dry season conditions. Livestock drank from the river bank while rural inhabitants bathed and washed laundry in the clean flow of the rocky course. On this basis, it is judged that the flow in the upper reaches of the Malal Kas is more abundant than that of the Gumreh Kas.

Though the Malal Kas discharges several liters per second which would be enough to supplement evaporation loss which occurs from water surfaces and maintain good water quality in the event that a reservoir was established on the river. Excluding the lower course of the river featuring scoured riverbed with its advanced gully erosion, there are two or three suitable dam sites in the Malal Kas (FIG. 9.2-4). Since the water resources of the Malal Kas are as limited as those of the Gumreh Kas, water diversion from the Soan River is necessary to meet increased water demand in the future.

5) Mountainous and Hilly Area

a) North Area of Rawal Lake

There is an appropriate dam site at the tributary running from the Marglla Hills on the Kurang River on the basis of the catchment area and river runoff. The villages of Shah Darah and Subhan would benefit from this dam construction, although only limited amounts of water are used at both villages. Provision of water service facilities merits attention rather than water volume. In addition, mini-hydropower generation is possible at this location for electrification of local villages.

b) Northern Part of Islamabad

The Nala Nilan runs to the Khanpur Lake beyond the Margalla Hills. There are two villages, Gokina and Talhar, one on each side of the river. Both villages are located in the valley where spring water from the hills is abundant but farmland is narrow. It is therefore unnecessary to use large quantities of river water; however, gully erosion of poor land is a problem due to the steep river gradient. Construction of a stepped chute and debris barrier are considered. Mini-hydropower generation is possible with the above facilities to power water service facilities connected to a water tank situated at an appropriate elevation.

c) Shah Allah Ditta

The village of Shah Allah Ditta makes effective use of spring water from the Margalla Hills. However, water amounts are insufficient during the dry season. If water resources were additionally available for irrigation, these could be effectively utilized for the extensive farm area. There is a potential dam site at the foot of the hills that would allow a reservoir for irrigation purposes (FIG. 9.2-5).

(2) Plan for Multipurpose Use of River Basin and Facilities

Current and planned facilities such as dams and weirs storing surface water of rivers and torrents in the Study Area have potential use for a variety of purposes including irrigation. Mini-dams have both a primary impact on farm productivity as well as indirect effect on overall improvement of the village living environment. Although the individual improvement of each scheme is small and limited in scale, they are highly pertinent to the needs of the inhabitants and in sum will significantly contribute to the development of the Study Area. The effects will be gradually extended to the entire Study Area through implementation of numerous individual schemes.