CHAPTER 1 INTRODUCTION

The government of the Islamic Republic of Pakistan made a request to the government of Japan for technical cooperation for the Master Plan Study on the Islamabad Model Integrated Rural Area Development Project in 1984, with the objectives of improving social conditions and agricultural productivity and of achieving integrated development of the Islamabad rural area.

In response to the request, the Japanese government decided to render such cooperation and JICA prepared the Master Plan in March 1986. The government of Pakistan then requested the government of Japan to supply Japanese grant aid for the schemes identified as being of high priority through the Master Plan Study. In response to the request, the Japanese government decided to conduct a field investigation and entrusted the study to JICA. JICA dispatched the preliminary study team to Pakistan in January 1988 in order to evaluate the possibility of project implementation and to lay out the fundamental formation of project components.

Based on the results of preliminary study, the Japanese government decided to conduct the basic design study. JICA dispatched the basic design study team to Pakistan, headed by Mr. Takayuki HAZAMA, the Deputy Director of the Investigation and Research Department of the Japanese Institute of Irrigation and Drainage, from January 20 to March 5, 1989.

During the field survey period, the study team conducted data collection, topographic surveys, geological surveys, agro-economic surveys, groundwater surveys (pump-up test and electric sounding), water quality tests and market surveys and data collection on the construction materials.

The final discussion meeting was held on March 1, 1989 and the results of field surveys were discussed with the attendance of the First Secretary of the Embassy of Japan and the Administrator and Commissioner of ICTA. The member list of the basic design study team, the schedule of field surveys and minutes of the meeting are attached in the Appendices.

JICA summarized the results of the basic design study into the Draft Final Report. For the explanation of the report, JICA dispatched the team to Pakistan, headed by Mr. Tetsuya UMEZAKI, Deputy Director, Construction Department, Kyushu Regional Agricultural Office, Ministry of Agriculture, Forestry and Fisheries from May 21 to May 30, 1989. Minutes of the meeting are attached in the Appendices. Regarding the scope of work to be undertaken by the Pakistani side at the time of project implementation, the following items were confirmed through discussion meetings with ICTA.

- Land acquisition necessary for the Project
- Organization of water users association
- Construction of farm ditches by beneficiary farmers

CHAPTER 2 BACKGROUND OF THE PROJECT

2.1 General Condition of the Country

2.1.1 Land and Population

- Land : 796,000 km^2
- Population : 84,250,000 (1981 Census)

Pakistan consists of the Islamabad Capital Area, the four provinces of Punjab, Sind, Baluchistan and NWFP, and the Special Areas of FATA, FANA and AJK. Population, area and density are summarized as follows according to the 1981 census, excluding the population of AJK and FANA.

Region/Province	Population	Area (km^2)	Density (per km^2)
Islamabad	340,286	906	376
Punjab	47,292,441	205,344	230
Sind	19,028,666	140,914	135
NWFP	11,061,328	74,521	148
Baluchistan	4,332,376	347,190	12
FATA	2,198,547	27,220	81
PAKISTAN	84,253,644	796,095	106

The population growth rate is at 3.1% per annum according to the 1981 census and it is estimated that the population in 1988 is over 100 million. The death rate declined from 31.2 per thousand in 1941 to 17 in 1962, and to an estimated 11.8 in 1984. It may, however, be pointed out that the infant mortality rate is still very high, 126.7 per thousand compared to 50 or so in most of the South Asian countries. The crude birth rate, according to the Pakistan Demographic Survey (PDS)-1984, is 43.3 per thousand with the rural crude birth rate of 45.3 being higher than the urban rate of 39 per thousand.

The population distribution is 71.7% in rural areas and 28.3% in urban areas. The inter-censal growth rate per annum is 2.6% in rural area and 4.4% in urban areas.

According to the "Economic Survey 1987 - 88," the pattern of internal migration shows a considerable flow of population from rural to urban areas, as 87.6% of the total migrants were found to come from rural areas.

Rural - Urban Population

(Population in Million)

	1961	1972	1981
Population (Total)	46.20*	65.31	84.25
Rural	35.80	48.72	60.41
Urban	10.40	16.59	23.84
% Share in total	100.00	100.00	100.00
Rural	77.48	74.60	71.70
Urban	22.52	25.40	28.30
Inter-censal growth rate (% p.a.)			
Total	3.02	3.1	
Rural	2.69	2.6	
Urban	4.10	4.4	

* Adjusted for under enumeration as assumed by Planning Commission
Source: Population Census Organization

2.1.2 National Economy

(1) Gross National Product

With GNP of Rs.649.1 billion at current factor cost in 1987 - 88 and an estimated population of 103.8 million, Pakistan's per capita national income amounts to Rs.6,252 or Rs.6,906 at current market prices (US$394). At this level of per capita income, Pakistan stands close to the uppermost ceiling of US$400 per capita indicated by the World Bank in their latest "World Development Report" (1987) to identify the low income group countries. That report has listed 37 countries in the "Low Income Group," of which per

capita GNP is given only for 31 countries for the year 1985. With per capita GNP of US$380 in that year, Pakistan holds the 2nd topmost position (with Sri Lanka) among the 31 low income countries.

Sectoral products and share are summarized in the table below. The agricultural sector shows the highest share (22.2%) against total GNP.

Gross National Product (1987 - 88)

(at current factor cost/prices)

Sector	Products (Rs. million)	% Share of GDP	% Share of GNP
Agriculture	143,917	23.3%	22.2%
Agriculture	91,861	(14.9)	(14.2)
Livestock	47,393	(7.7)	(7.3)
Forestry	705	(0.1)	(0.1)
Fishery	3,958	(0.6)	(0.6)
Mining & Quarrying	14,767	2.4	2.3
Manufacturing	108,060	17.5	16.6
Construction	39,242	6.3	6.0
Transport, Storage & Communication	48,504	7.8	7.5
Wholesale & Retail Trade	98,611	16.0	15.2
Others	164,935	26.7	25.4
Total (GDP)	618,036	100.0	-
Net Factor Income from Abroad	31,096	-	4.8
Total (GNP)	649,132	-	100.0

Source: Economic Survey 1987 - 88

(2) Economic Growth Rate

Pakistan's economy has been able to generate an overall GDP growth rate of 5.7% during 1987 - 88 and 5.8% in 1987 - 88. These growth rates are somewhat lower than the average GDP growth rate of 6.9% attained during the period from 1978 to 1986.

The growth in the economy of Pakistan was adversely affected by setbacks in its largest single sector--agriculture--for two years in succession in 1986 - 87 and 1987 - 88. Firstly, the untimely heavy rains at the time of harvesting *rabi* crops in 1986 - 87 damaged the wheat output, placing it at 12.9 million tons. Secondly, untimely rains created major post-harvest losses estimated at 0.89 million tons, bringing down the net wheat output to 12.01 million tons in 1986 - 87. Thirdly, the climatic factors were highly unfavourable in the subsequent year. At the time of the sowing of *rabi* crops, persistent drought conditions affected all major crops except cotton, and the worst outcome was averted largely due to the release of irrigation water from the big reservoirs of Tarbela and Mangla dams. Again, wheat production which was targeted at 15.0 million tons was limited to 12.93 million tons.

The GNP growth rate attained 4.7% in 1986 - 87 and 4.9% in 1987 - 88. These rates are lower than GDP growth rates because of decreasing net factor income from abroad which decreased by 17.7% in 1987 - 88 compared with the previous year. Sectoral growth is summarized below. It shows stable growth in the manufacturing sector but large fluctuations of growth rates in the agricultural sector which reflects the unstable nature of Pakistan's agriculture against weather condition.

Sectoral Growth Rates

(Percent)

		1982-83	1983-84	1984-85	1985-86	1986-87 (R)	1987-88 (E)
I.	Commodity Sector	5.8	2.2	9.4	7.5	5.1	5.7
	Agriculture	3.8	-6.0	12.2	6.4	2.2	4.5
	Manufacturing	7.0	7.9	8.1	7.5	7.5	7.6
	Mining & Quarrying	4.2	2.2	23.0	20.7	5.4	7.5
	Construction	12.0	17.4	3.0	6.7	10.4	6.8
	Electricity and Gas Distribution	7.8	17.4	4.3	15.5	5.5	2.4
II.	Service Sector	7.9	7.9	8.9	6.3	6.4	5.9
	Wholesale and Retail Trade	6.3	3.7	10.4	7.2	6.3	6.1
	Transport, Storage and Communication	7.8	10.7	6.9	7.6	7.5	6.1
	All Others	8.9	9.9	8.6	5.4	6.1	5.8
III.	GDP (at factor cost)	6.7	5.1	9.2	7.0	5.7	5.8
IV.	GNP (at factor cost)	8.4	4.2	8.1	7.0	4.7	4.9

E: Estimated
R: Revised

Source: Economic Survey 1987 - 88

(3) Balance of Payments

Trade Balance

Major exports of Pakistan are agricultural products such as raw cotton, cotton yarn, and cotton fabrics which amount to more than 40% of total export value. Major imports are crude oil, petroleum products, machinery, chemicals, iron, edible oils and tea.

Trade Balance

(Million Rs.)

	1984 - 85		1985 - 86		1986 - 87	
	Value	%	Value	%	Value	%
1. Exports						
Raw Cotton	4,368	11.5	8,291	16.7	7,676	12.1
Cotton Yarn/Thread	4,046	10.7	4,572	9.2	8,766	13.9
Cotton Cloth	4,638	12.2	5,083	10.2	5,931	9.4
Rice	3,340	8.8	5,527	11.1	5,053	8.0
Leather	2,325	6.1	2,900	5.8	4,079	6.4
Carpets & Rugs	2,031	5.3	2,693	5.4	3,439	5.4
Others	17,231	45.4	20,526	41.4	28,324	44.8
Total	37,979	100.0	49,592	100.0	63,268	100.0
2. Imports						
Grains, Pulses & Others	2,910	3.2	5,067	5.6	1,754	1.9
Tea	3,507	3.9	2,175	2.4	2,648	2.9
Machinery	13,437	15.0	14,956	16.4	15,635	16.9
Iron, Steel	3,938	4.4	4,355	4.8	4,666	5.0
Petroleum & Products	21,763	24.2	16,775	18.4	13,977	15.1
Edible Oils	6,954	7.7	6,128	6.7	4,062	4.4
Chemicals	5,604	6.2	6,602	7.3	5,906	6.4
Others	31,665	35.3	34,888	38.4	43,783	47.4
Total	89,778	100.0	90,946	100.0	92,431	100.0
3. Balance	-51,799		-41,394		-29,163	

Source: Economic Survey 1987-88

The current account deficit in the balance of payments has been reduced substantially from US$1,685 million in 1984-85 and US$1,234 million in 1985-86 to US$719 million in 1986-87 and to US$985 million in 1987-88. To finance the deficit of US$985 million, disbursement of long-term capital (net) of US$903 million and short-term borrowings of US$209 million are estimated for an overall balance of payments surplus of US$127 million.

From this surplus, taking into account US$318 million for the net use of fund credit and US$90 million for repayment deposits, the draw-down of foreign exchange reserves is estimated at US$281 million in 1987-88.

Foreign Economic Assistance

The current account deficit in the balance of payments is financed largely from external resource inflow which comes through loans and grants. As of June 30, 1988 total medium- and long-term loans and grants contracted by Pakistan are estimated to be US$33.4 billion, of which US$24.7 billion would be disbursed. After deducting repayments of US$6.2 billion, grants amounting to US$6.6 billion, loans repayable in rupees of US$0.7 billion and adjusting for exchange rate changes, the net debt disbursed and outstanding on June 30, 1988 is estimated to be US$12.8 billion or about US$120 per capita.

According to the 1987 World Bank Report, Pakistan occupied 22nd place (in descending order) among 25 LDCs with the largest external debt. Its position is also 22nd in terms of Debt/GNP.

On the other hand, gross disbursements in 1987 - 88 is estimated at US$1,572 million, of which US$1,034 million is estimated to have been utilized for project financing, US$171 million for the import of commodities, US$177 million for the import of food items and US$190 million for Afghan refugees.

Balance of Payments (US$ Million)

	1985 - 88	1986 - 87	1987 - 88
Trade Balance	-3,042	-2,294	-2,218
Exports (F.O.B.)	(2,942)	(3,498)	(4,329)
Imports (F.O.B.)	(-5,984)	(-5,792)	(-6,547)
Invisible Balance	1,808	1,575	1,233
Invisible Receipts	(983)	(1,031)	(1,110)
Invisible Payments	(-2,003)	(-2,028)	(-2,206)
Private Transfers	(2,828)	(2,572)	(2,329)
Current Account Balance	-1,234	-719	-985
Long-term Capital (Net)	1,062	736	903
Gross Disbursement	(1,550)	(1,422)	(1,572)
Amortization	(-679)	(-748)	(-754)
Others	(191)	(62)	(85)
Outstanding Export Bills	-82	-226	-
Medium & Short-term Capital (Net) & Others	167	139	200
Debt Relief	25	10	9
Overall Balance	-62	-60	-127
Net Foreign Assets	246	-34	-408
Net Change in Reserves	+184	-94	-281

Source: Economic Survey 1987-88

(4) Price Index

The consumer price index (CPI) during July - March 1987 - 88 recorded an increase of 5.8% compared to the same period in the previous year. Among the major commodity groups covered in the CPI, the highest increase of 7.4% occurred in the prices of the food group, since this is by far the largest single group with a nearly 50% weight of the total. The comparatively

higher rate of increase in the food group has been the result of a combination of factors as stated below. ,

- Excessive rains in April/May 1987 adversely affected highly perishable tuber crops like onions and potatoes as well as fruits/vegetables. The rains also caused post-harvest losses of wheat output.

- Persistent drought conditions during July - September 1987 reduced production of crops, particularly affecting the supply of pulses, grams and some vegetables.

- Increase in the prices of edible oils and milk powder in the international market.

The wholesale price index (WPI) covering various raw materials, manufactures and building materials recorded an increase of 10.3% during the first 9 months of the 1987 - 88 fiscal year. Within the items of WPI, raw materials registered high increases of 22% and construction materials of 16.6%.

(5) Labour Force

According to the Labour Force Survey (LFS) in 1986 - 87, the estimated labour force is 29.6 million, of which 22.3 million are rural workers and 7.3 million are urban; unemployment amounts to 0.89 million. The rate of unemployment reported in the LFS is 3.05%. In fact, there is quite a significant number of employed persons who work for less than 35 hours per week. If this population is also taken into account, the total unemployment rate will actually be 13%.

Based on the 1986 - 87 LFS, 63.3% of the total employed workers are illiterate while among the literate employed, only 12.5% are educated up to matric and above. Agriculture absorbs the major share of the illiterate workers in the country. Among those employed in agriculture, 79.4% are illiterate. Among literate workers, only 15.0% are matric and above while 85.0% are below matric. The low literacy level is one of the causes of

poverty in the rural areas. The sectoral distribution of the labour force is as follows, in which the employment share in agriculture is high at 49.2%.

Distribution of Employed Persons of 10 Years Age and above by Major Industries Division

(Percentage)

	Agriculture	Mining & Manufac-turing	Construc-tion	Electricity & Gas Distribution	Transport	Trade	Others
1980 - 81	52.7	14.1	4.9	0.9	4.7	11.5	11.3
1981 - 82	52.7	13.8	4.8	1.0	4.6	11.7	11.3
1982 - 83	52.7	13.5	4.8	1.1	4.6	11.9	11.3
1983 - 84	51.6	13.7	5.2	0.9	4.9	11.7	12.0
1984 - 85	50.6	13.8	5.6	0.7	5.2	11.5	12.6
1985 - 86	54.0	13.4	5.2	0.5	4.4	11.4	11.0
1986 - 87	49.2	14.2	6.0	0.7	5.3	12.1	12.5
1987 - 88	49.2	14.2	6.0	0.7	5.3	12.1	12.5

Source: Economic Survey 1987 - 88

2.2 Agriculture

2.2.1 Agricultural Production

In agriculture, the theme of the Sixth Five-Year Plan (1982 - 87) was to move from self-sufficiency to exporting. The Sixth Plan growth strategy was based on a major breakthrough in agricultural production through vertical improvement, particularly on the small and medium size farms. With this strategy, the Sixth Plan aimed to expand the export markets for wheat and rice, to expand domestic oilseeds and to freeze the size of the edible oil deficit.

The growth rate in major crops during the Sixth Plan averaged 2.3% (target 3.6%) compared to 3.6% (target 7.0%) in minor crops. Consequently, instead of 4.9% growth targeted for the agricultural sector, the achievement in the sector was 3.8%, which is lower than the achievement during the Fifth Plan period. Increased use of inputs and the development of appropriate technology including

new varieties have resulted in the improvement in the unit yield of cotton and wheat. However, adverse effects of weather conditions in 1986 - 87 have resulted in low growth in the production of major crops other than cotton.

Agricultural Production

	Cropped Area (mill.ha)	Production (thousand ton)					
		Wheat	Rice	Other Food Grains	Cotton	Gram	Sugar-cane
1980 - 81	19.3	11,475	3,123	1,590	715	337	32,359
1981 - 82	19.8	11,304	3,430	1,585	748	294	36,580
1982 - 83	20.1	12,414	3,445	1,632	824	491	32,534
1983 - 84	20.0	10,882	3,340	1,632	495	522	34,287
1984 - 85	19.9	11,703	3,315	1,674	1,008	524	32,140
1985 - 86	20.1	13,923	2,919	1,620	1,208	586	27,856
1986 - 87	20.1	12,016	3,486	1,714	1,309	583	29,926
1987 - 88	-	12,926	3,271	1,576	1,513	367	31,239

Source: Economic Survey 1987 - 88

2.2.2 Farm Area and Number of Farms

According to the Agricultural Census 1980, the total number of farms is about 4 million and farm areas average 4.7 ha/farm, 4.5 ha/farm for owner, 6.4 ha/farm for owner-cum tenant and 3.9 ha/farm for tenant farms.

Tenure Classification of Farms and Farm Area by Provinces (1980)

	Number of Farms (thousand)				Farm Area (thousand ha)			
	Owner	Owner-cum Tenant	Tenant	Total	Owner	Owner-cum Tenant	Tenant	Total
NWFP	361	72	95	528	967	447	246	1,660
Punjab	1,385	618	542	2,545	6,026	3,779	2,300	11,700
Sind	323	85	387	795	1,761	619	1,347	3,727
Baluchistan	158	14	30	202	1,179	174	222	1,575
Pakistan	2,227	789	1,054	4,070	9,932	5,019	4,115	19,066

2.2.3 Rural Development

In the Sixth Plan, the aim was rapid and equitable development of the country, to help the poor emerge from their poverty and to enable them to earn or obtain the necessities of life through a decisive breakthrough in the provision of physical infrastructure and social services to the rural areas. A significant boost was given to social sector programmes of the Sixth Plan, especially those designed for the rural areas, by the inauguration of the Prime Minister's Five-Point Programme (1986 - 90), soon after the formation of an elected government on January 1, 1986. The major emphasis of the Five-Point Programme was on economic uplift and development of rural areas and rural communities.

Reflecting increased financial allocations, rural road construction exceeded Sixth Plan targets by 49%. Progress in other areas, however, fell much behind the targets. Village electrification, rural health centers and rural water supply did not achieve the targets. There was little progress in improving literacy in rural areas.

2.2.4 Existing Problems and Strategy for Development

Agriculture, having about half of the total labour force, is the largest single sector in GDP. Its development will have a substantial effect on the nation's economic and social development. Large investments on irrigation projects, such as the Tarbela and Mangla reservoirs, have attained significant growth in major crop production in the country, especially in Punjab Province. The country has achieved self-sufficiency in major grains, however, there exist problems which hinder further development of this important sector. They are:

1. Low and unstable productivity
2. Production was increased due to the past horizontal development, mainly of irrigation projects, however, the benefits of such development have not been extended to the rural areas. People in the rural areas were left behind in the country's development and are suffering from poverty.

The unit yield of rice in Punjab Province is still low, at an average of 1.1 t/ha. Cotton yields increased to an average of 528 kg/ha in 1986, which exceeds the yield of 222 kg/ha in India but is lower than the yield of 911 kg/ha in Egypt and

about 1/3 of 1,413 kg/ha in Australia. The untimely heavy rains in 1987 damaged wheat production and 0.9 million tons of wheat were lost after harvest due to insufficient facilities for post-harvest treatment including transportation and storehouses. Unfavourable weather conditions in 1986 - 87 created pressure on the supply of wheat during 1988 - 89. It has therefore been decided to make tentative arrangements for the import of wheat from abroad.

After completion of the Tarbela Reservoir, no large-scale irrigation development projects were implemented and total cropped area was not increased from 20 million hectares. Considering the large amount of external debt, however, it is no longer feasible to increase crop production through expansion of the irrigation area by means of launching new large-scale irrigation projects. As it is formulated in the Perspective Plan and Seventh Five-Year Plan (1988 - 93), the strategy for development of agriculture should be based on a major breakthrough in agricultural production through vertical and integrated improvement, particularly on the small and medium size farms, which will lead to the total bottom-up development of rural areas and poverty alleviation.

To realize the targets, it is important to execute integrated strategies for all aspects of agriculture. Strategy should not be concentrated to a single sector, for example only irrigation, but a total combination of development strategies should be adopted.

The needs and opinions of farmers and people in rural areas should be taken into account in the development plan. During the Sixth Plan period, the introduction of small tractors could not be achieved on small and medium farms, which preferred instead to hire large sized tractors.

This Project (MIRAD) also adopts the same approach as the above stated strategy for the development of rural areas through agricultural development and poverty alleviation. MIRAD aims to carry out this strategy as a model case for further development.

2.3 Related Plans and Programmes

2.3.1 National Development Plan

(1) Perspective Plan (1988 - 2003)

Over the course of the last four decades of development, the economic foundation of Pakistan has been firmly established, and it is time to expand to a larger social vision and to attune social and economic policies to this vision. The Perspective Plan has been formulated recognizing that the majority of the people has not shared equitably in the benefits of economic growth and that economic planning has not addressed existing social and political realities. The main national objectives in the Plan are as follows:

- to move towards full employment, and to ensure continued growth with stability;
- to promote national integration through a fundamental restructuring of education and information policy, which should be based on a well-defined concept of national culture;
- to implement a concrete programme of rural uplift and poverty alleviation, with balanced regional development, and with special focus on the advancement of women and youth;
- to prepare uplift programmes for the advancement of all sections of society, particularly women and youth;
- to formulate specific, monitorable targets for increasing national self-reliance, supported by legislative safeguards, as necessary, especially in the areas of government finance, food, defence, export-oriented manufacturers, high technology products and energy; and
- to formulate and implement a cogent policy on technological change.

With these objectives in mind, the major development targets of the Perspective Plan are:

- to reduce the rate of population growth from 3.1 percent in 1987 - 88 to 2.6 percent by the year 2003;

- to eradicate illiteracy among youth by the end of the Eighth Plan;

- to provide the entire population with access to clean water;

- to provide all the urban areas and 60 percent of the rural areas with access to sewage facilities;

- to provide telephones to about 50 percent of the population;

- to increase tertiary roads from about 80,000 km at present to about 140,000 km by the year 2003, against an estimated total requirement of 200,000 km;

- to provide a Rural Health Center (RHC) for each Union Council;

- to gradually expand the level of health care facilities such as ambulances with a radio or radio links;

- to increase the installed capacity for power generation to fully meet growing demand; and

- to provide town development schemes in order to accommodate the rapidly growing urban population.

Quality of Life Indicators

	1987 - 88	1992 - 93 (Target)
Population (million)	101.7	119.4
Population Growth Rate (%)	3.2	3.1
Literacy (%)	30.0	40.0
Primary Enrollment (%)	63.5	80.0
Life Expectancy (years)	61.0	63.0
Infant Mortality (thousand)	11.3	9.6
Access to Clean Water (%)		
Total population	53.0	82.0
Rural population	40.0	75.0
Urban population	80.0	95.0
Access to Sewage Facilities (%)		
Total population	23.0	44.0
Rural population	10.0	30.0
Urban population	52.0	70.0
Rural Electricity (%)	33.7	54.8
Rural Road (km)	60.957	69.457

2.3.2 Rural Development Plan (Sectoral Development Plan)

Rural development, for the benefit of the majority of the people who live in rural areas, was the main concern of the Sixth Five-Year Plan, for which many programmes were tried in the past.

- Village Agricultural and Industrial Development Programme(Village AID) which was a version of the internationally known "Community Development Programme" (1953 - 1961);

- Basic Democracies--a system of mainly rural (but also urban) development through local government institutions (1959 - 70);

- Rural Works Programme (1963 - 71), a programme for the provision of physical infrastructure, renamed as "Peoples' Works Programme" in 1971; and

- Integrated Rural Development Programme (IRDP) (1972 - 80), based on joint action by the farmers, line departments and local organizations to make the *markaz*, or a community complex, a functional unit of local development of a multi-sectoral nature.

The evaluations of these programmes suggest that although they made progress to some extent, a great deal was left undone. The investment inputs were far too limited to produce any dramatic results. During the Sixth Plan, the rural development programmes were boosted, especially after the inauguration of the Prime Minister's Five-Point Programme since 1986. The Sixth Plan earmarked 32% of public sector expenditure (about Rs. 90 billion). Physical achievements of the Sixth Plan for rural development, with the exception of agricultural developments, are summarized as follows:

Physical Achievements (Sixth Plan)

Item	Target	Achievement	Expenditure (Rs. 100 mill.) (Budget)	Remarks
Rural roads	10,000 km	14,957 km	53.2 (41.0)	
Village electrification	20,000 villages	16,525 villages	126.7 (83.0)	During first three years of the Plan, a sum of only Rs. 2.6 billion was utilized.
Rural health center	355	194	39.3 (49.5)	Same as above, especially at NWFP
Basic health unit	2,600	1,803		
Water supply	18 mill. people	12.7 mill. people	41.1 (28.0)	Plan exceeds the ability and availability of engineers.
Rural sewerage	4.5 mill. people	3.1 mill. people		
Rural education	-	-	55.7 (73.0)	

(1) Seventh Five-Year Plan (1988 - 93)

The major emphasis is placed on rural development in the Seventh Five-Year Plan to promote further achievements during the Sixth Plan. A total budget of Rs.112.2 billion is allocated. The Plan aims not only at physical

achievements related to infrastructure but also at developing local communities to strengthen leadership, the participation of rural people, etc. The physical targets for rural development are summarized below.

- Rural roads	:	8,500 km	(Rs. 3,910 million)
- Village electrification	:	55% of total census villages, considering their increasing number	(Rs.10,090 million)
- Rural literacy	:	to be increased from 21.5% in 1987 - 77 to 32.0% by 1992 - 93	(Rs. 300 million)
- Rural health center	:	133	} (Rs. 5,660 million)
- Basic health unit	:	1913	
- Rural water supply	:	75% of population	} (Rs. 6,500 million)
- Rural sewerage	:	30% of population	
- 7-Marla plots	:	2.2 million plots	(Rs. 2,000 million)
- Rural education	:		
Primary schools	:	22,613	} (Rs. 7,270 million)
Mosque schools	:	20,000	
- Model villages	:	-	(Rs. 310 million)
- Agricultural development		:	(Rs. 15.58 billion)
- Irrigation water development		:	(Rs. 15.84 billion)

Under the rural roads programme, it was originally envisaged that every Union Council headquarters would be connected by road with main provincial/national highways. Later it was decided that the programme should not be confined to connecting UC headquarters only, and other

objectives such as the need for more and better farm-to-market roads, village roads and canal bank roads should also form part of the programme.

It is not listed above, but the rural industrialization programme, which was initiated by Punjab Province, is also expanded in order to increase job opportunities in rural areas.

2.4 Outline of the Request

2.4.1 Background of the Request

Pakistan has achieved self-sufficiency in food supply and it aims to expand to larger economic development. Social and economic progress in rural areas, however, has been left far behind in the the nation's development, and it is realized that this is one of the largest obstacles to further development of the country.

The Seventh Five-Year Plan places emphasis on rural development as a major strategy to improve conditions in rural communities.

Based on this background, the government of Pakistan has made a request to the Japanese government for technical cooperation in the formulation of the Master Plan for development of the Islamabad rural area. In response to this request, JICA conducted the Master Plan Study in 1985 - 1986 and the report was finalized in March 1986.

Among the proposed development schemes of the Master Plan Study, the most urgent and high priority schemes were identified and formulated as MIRAD (Model Integrated Rural Area Development) with an implementation period of two years. Selection of high priority schemes was based on the development policy of the Pakistani government, a questionnaire survey of village people and technical evaluation.

The plan consists of such components as irrigation, water supply, rural roads, farm ponds and rural development services to contribute to the improvement of living conditions and the increase of production.

Based on this Master Plan Study, the Pakistani government made a request to the Japanese government for grant aid for implementation of Mirad. The Japan International Cooperation Agency (JICA) dispatched a preliminary study team to Pakistan in January 1988 to confirm the contents of the request, to investigate and to evaluate whether or not the plan is suitable for the Japanese grant aid programme.

The preliminary study team appraised the plan to be appropriate for the Japanese grant aid programme after study and investigations on the existing conditions of the project area.

During the course of the study, the northern part of the project area was identified as overlapping with the benefit area of the Upper Krang River Irrigation Development Project (F/S 1988). It was therefore agreed with the Pakistani side that this overlapping area be deleted from the MIRAD project area.

2.4.2 Contents of the Request

The contents of the project consist of the following five components which were requested by the Pakistani government, assessed by the preliminary study team and mutually agreed.

(1) Irrigation Development

I. Irrigation development by small dams ..... 2 dams

Facilities : Dam and related structures, intake structure and pump stations, farm ponds, pipeline and main, secondary canals

II. Irrigation development by well 3

Facilities : New shallow well 3
Pump stations, pipeline, farm ponds and main, secondary canals

(2) Multi-purpose Groundwater Development

I. Water supply system by new deep wells 4

Facilities : Deep wells, pump stations, pipelines, water tanks, distribution pipelines and public water taps

II. Water supply system by improvement of existing wells 12

Facilities : Improvement of wells, pump stations, pipelines, water tanks, distribution pipelines and public water taps

III. Rehabilitation of existing wells 20

Facilities : Installation of hand pump, cover of well and tank

(3) Rehabilitation of Multi-purpose Farm Ponds 17

Facilities : Deep excavation, embankment with brick lining and diesel pump

(4) Rural Road Construction and Improvement ..... 2 roads

New construction : 18.5 km

(5) Rural Development Stations 4

Facilities : Buildings (UC office, garage, cooperative market, storeroom, nursery for baby, workshop, hall), playground and washing place

2.4.3 Appraisal by Preliminary Study Team

Through the investigation on existing conditions, site survey on project area and discussions with Pakistani officials, the preliminary study team appraised the project to be appropriate for the Japanese grant aid programme. During the course of study, the northern area of the project area was identified to be overlapped with the benefit area of "Upper Krang River Irrigation Development Project" (F/S 1988). It was therefore agreed with the Pakistani side that this overlapped area was deleted from the MIRAD project area.

Consequently, the project components were revised upon agreement between the team and the Pakistani side as follows and these components are the scopes to be studied by the Basic Design Study Team.

(1) Irrigation Development
   - I. Irrigation development with dam ..... 2 nos.
   - II. Irrigation development with well ..... 3 nos.

(2) Multi-purpose Groundwater Development
   - I. Water supply system by new deep well ..... 5 nos.
   - II. Water supply system by improvement of existing well..... 12 nos.
   - III. Rehabilitation of existing well ..... 20 nos.

(3) Rehabilitation of Multi-purpose Farm Pond ..... 17 nos.

(4) Rural Road Construction ..... 18.5 km

(5) Rural Development Station ..... 4 nos.

CHAPTER 3 OUTLINE OF PROJECT AREA

3.1 General

3.1.1 Location

The Islamabad rural area is located in the highland area of northern part of Pakistan and it is near by Rawalpindi city which has population of about 800,000. The Islamabad rural area extends in between the latitude of 33°29'N and 33°49'N and the longitude of 72°50'E and 72°24'E. The area is surrounded by the Murree hills at north, the Margalla hills at north to northwest and the Siwalik hills at east and it is bordered by the Grand Trunk Road and Rawalpindi city at west to south.

The Project area is specified as the "rural area" by the municipal boundary based on the Capital Territory Local Government Ordinance 1979. The area is scaled from the topographical map of 1/50,000, as follows;

Rural area	59,500 ha
Urban area	31,100 ha
Islamabad Capital	90,600 ha

3.1.2 Status of Land Use

The development of Islamabad City under the Land Use Project, which emphasized urban functions, such as development of administrative areas, commercial areas, industrial areas, public establishment areas, residential areas and sports/recreation/greenery areas, etc., has been continuing since 1960, and about half of the development has been completed.

Even though the Agricultural Development Project was implemented on a national scale to wipe out the existing disparity between city and rural areas, there were circumstances where the agricultural regions had been excluded from this development; but in 1975, with the establishment of the Integrated Rural Development Center (Markaz) at Tarlai Village as the first step, Markaz were

established in Sihala and Bharakao Villages. Agricultural development was also strengthened, and the supply of consumable goods and the assurance of verdant lands began to be keenly anticipated.

However, in spite of all this, the organizational development for basic agricultural services of the agricultural districts hardly occurred, the dependence on rainfall remained as of old, and the use of cultivated land, etc., remains less than 40%, as shown in the table below.

Present Land Use in the Investigated Area

Land Use Category	Area (ha)	Percentage
Cultivated land	28,120	38.9
Cultivable wasteland	3,630	6.1
Uncultivable wasteland	17,090	28.7
Uncultivable plains wasteland	(9,080)	(15.3)
Mountainous area/slopes at foot of mountains	(8,010)	(13.5)
Protected forest land	10,360	17.4
Unclassified	5,300	8.9
Total	59,500	100.0

The land use status of the 25 villages to receive direct benefits under this Project is as given below.

Cultivable area	11,912 ha
Already cultivated area	5,936 ha
Unclassified	2,587 ha
Total	19,885 ha

3.1.3 Administrative Organization and Population

The area of Islamabad Capital Territory is about 90,600 ha, out of which the agricultural district occupies 59,500 ha (66%). According to the 1961 census, the rural population is about 41% (138,000) out of the Capital Territory population of 340,000.

The administration of the agricultural regions of the Capital Territory is carried out by 12 Union Councils of the Islamabad Capital Territory Administration (ICTA). The population for each Union Council, of which there were 11 at the time of the 1981 census, and of which there are 12 at present, is as shown in the following table.

Population of Each Agricultural Region Union Council
(1981 Census)

	UC Name	Men	Women	Total
1.	Rawat	6,005	5,450	11,455
2.	Sihala	8,825	7,682	16,457
3.	Koral	6,511	6,327	12,838
4.	Kirpa	5,527	5,237	10,764
5.	Charah	6,667	6,197	12,864
6.	Tamair	4,758	3,971	8,729
7.	Shah Allah Ditta	4,032	3,044	7,576
	Sub-total	42,325	38,358	80,683
8.	Tarlai	6,699	5,590	12,289
9.	Sohan	5,733	5,151	10,884
10.	Phulgran	6,118	5,704	11,822
11.	Kuri	6,054	5,532	11,586
12.	Bharakao	5,552	5,038	10,590
	Sub-total	30,156	27,015	57,171
	Total	72,481	65,373	137,854

Within these, the UCs which are included in the present investigation are UCs 1 - 7 in the above table.

Further, within these 7 UCs, the number of villages which fall under the implementation of the present Project are 26, and the population to receive direct benefits are 64,906.

3.1.4 Labour Population and Population Employed in Different Occupations

The labour population of Islamabad Capital Territory is about 93,000 as shown in the table below. The population within the city area is 57,500 (61.8%) and in the rural areas is 35,500 (38.25%).

The overall literacy rate is seen to be 58% but the 44.8% rate at the rural areas when compared to the city area percentage of 88.1% indicates a very low figure.

Labour Population (1981 Census)

	Overall	City Area	Rural District
Population	340,280	204,364	135,922
Persons above 10 years of age	243,800	148,200	95,800
Labour population	93,000	57,500	35,500
(Illiterate)	(39,100)	(19,500)	(19,600)
(Literate)	(53,900)	(38,000)	(15,900)

Among the population of people employed in different occupations in the rural areas, the population percentage of 38.8% in agriculture, forestry and fisheries is extremely high, followed by social and personal services of 19.9%, and the manufacturing industry with 9.1%.

Out of the total labour population in the rural areas of 35,500, the employed population is 30,697 and the unemployed population is 4,803, which indicates an unemployment rate of 13.5%. If this is compared to the overall unemployment rate of 3.1% for the whole of Pakistan, the unemployment rate for the rural district of Islamabad may be said to be remarkably high.

Population of Persons Employed in Different Occupations
in The Rural District of Islamabad

	Field of Activity	Employed Persons	Ratio (%)
1.	Agriculture, forestry & fisheries	11,191	38.8
2.	Industries	27	0.1
3.	Manufacturing	2,790	9.1
4.	Electricity, gas, waterworks	807	2.6
5.	Construction industry	2,665	8.7
6.	Wholesale and retail	1,816	5.9
7.	Transport & communications	1,811	5.9
8.	Metal, insurance, real estate business	246	0.8
9.	Social and personal services	6,105	19.9
10.	Unclassified	2,519	8.2
	Total	30,697	100.0

3.1.5 Income Levels

According to the Socio-Economic Survey in 1984 on the rural areas of Islamabad, farmers with a monthly income of less than Rs.1,000 amounted to 75.9% and the average monthly income per household was Rs.810.

The average cultivated area of a farm is about 1.6 ha, and the earnings per ha in the Barani area is about Rs.1,375 (Cereals Administration). If the average annual agricultural income is estimated, it amounts to Rs.2,200. From this, it is seen that the major portion of the farming households depend on their income from cultivation work.

If the average monthly income per zone is observed for each UC, the monthly incomes of Sohan, Sihala, Kirpa, etc., which are Union Councils near the city, are high, and conversely for Tamair, and Charah, which are far from the city, the incomes are low.

From this, it is inferred that the closer area to a big city, the better are the chances for its agricultural communities.

Income for Each Zone in the Rural Districts of Islamabad (1984)
Average Monthly Income per Zone

UC Name	Less than Rs. 500	Rs.500 to Rs.1,000	More than Rs.1,000	Average Monthly Income
1. Koral	26.7%	54.3%	19.0%	854
2. Rawat	30.5	52.2	17.3	814
3. Sihala	36.6	35.8	27.6	912
4. Bharakao	34.5	42.7	22.8	863
5. Phulgran	41.6	39.9	18.5	773
6. Shah Allah Ditta	41.8	43.1	15.1	730
7. Tarlai	40.7	40.6	18.7	780
8. Sohan	19.4	46.1	34.5	1,084
9. Kirpa	34.6	39.8	25.6	897
10. Tamair	49.2	37.4	13.4	672
11. Charah	50.9	32.5	16.6	703
Ratio/Average	39.3%	32.5%	20.5%	Rs 810

Source: UNICEF/LGRD, 1985

3.1.6 Roads

The city area of Islamabad Capital Territory, designated in 1960 in the City Project, is presently progressing in construction, and about 1/3 of the total road work has been completed. Most of the roads in the city area are being constructed as wide, metalled roads.

The roads in the rural districts connect the interconnected villages to the trunk roads of the Capital Territory and are farm roads called "farm-to-market roads".

The road network within the regions under the present investigation are 12 km of national roads , 71 km of state roads, 113 km of capital territory roads, and 193 km of district roads. The major portion of the district roads are mud roads (Katcha Road), and are being used as farm roads.

The length of the different roads in the rural areas extends to about 890 km, and compared to the average road density of 0.16 km for the whole of Pakistan, the figure of 0.64 km per square kilometer for the road density in the rural areas is quite high. However, 65% of the connected farm roads, which play an important part in the daily activities of the village, and the district roads are unpaved roads and most of them are roads on which the tractors can only barely pass through.

Length of Roads in Rural Areas of Islamabad

(Unit: km)

Road Category	Metalled Road	Shingle Road	Katcha Road	Total
National Road	12.0	-	-	12.0
State Road	70.7	-	-	70.7
Capital Territory Road	86.5	2.0	24.0	112.5
District Road	60.2	8.1	124.5	192.8
Total	229.4	10.1	148.5	388.0

1) Table indicates the length of road on which vehicles can pass.
2) These are measured values at the time of the on-site survey, and the roads which are difficult to judge such as shingle roads have been taken as katcha roads.

The number of registered vehicles within the investigated area was, 10,907 in the whole of Islamabad after 1981, and of this number, 337 vehicles were in the rural area. The vehicle categories within the rural area are motorcycles (34%), automobiles (43%), and tractors (12%).

The rise in the number of registered vehicles in the whole of Islamabad is 2,500 vehicles every year on an average, or 6.7 vehicles per 1,000 persons, when this is compared to the average of 1.7 per year for Pakistan, a sudden increase in motorization can be said to be in progress.

Further, the daily movement of people from the farms to the city area is estimated to be about 10% of the rural population.

3.1.7 Water for Daily Use

A part of the water for daily use in these regions is supplied by spring water or the water from Simly Dam (about 1 hour water supply per day), but the real situation is that most of the people depend on the community wells for their water supply.

The quantity of water drawn from the wells also depends on the manpower and conveyance method and is about 20 lit. per person (11 lit. - 23 lit.). In the dry season when the wells dry up, fetching water from far away places is unavoidable.

The results of the survey implemented by the Local Government and Rural Development Department in 1985 are as shown in the table below. The fewest wells are in Shah Allah Ditta with 10, and the maximum number of wells are in Sohan with 174.

Consequently, the number of persons served per well is exactly the opposite; Shah Allah Ditta with 758 persons per well, and Tamair with 310 persons per well.

Again, the percentage of the wells which have adequate water and can be used in the dry season range from 100% for Shah Allah Ditta to 1% for Rawat, with great differences existing depending on the location, the average being 56%.

Well Conditions for Each Union Council

UC Name	Dry Season Conditions				Persons per Well
	No Water	Scarce	Enough	Total	
Koral	1	12	(78) 46	59	77
Rawat	27	42	(1) 1	70	164
Sihala	12	14	(75) 79	109	153
Bharakao	24	11	(55) 42	61	184
Shah Allah Ditta	-	-	(100) 10	10	758
Kirpa	29	40	(49) 66	135	144
Tarlai Kalan	9	29	(62) 61	99	124
Sohan	2	24	(85) 148	174	76
Tamair	15	20	(20) 9	44	310
Charah	38	39	(40) 52	129	138
Total	177	245	(56) 541	963	143

(Note) 1. The figure in brackets is the number of wells with adequate water in % out of the total number of wells.

Source: Village Basic Fact Survey, LGRD, 1985

3.1.8 Electrification of Farming Villages

In the rural areas, the power generating stations supplying electricity are the Mangla Dam Power Station (maximum output 800 MW) and Tarbela Dam Power Station (maximum output 1,575 MW).

Within and around these areas, there are transformer substations at 6 places which receive power delivered from both the power stations and Mangla and Tarbela dams, and deliver the power from these substations to the areas under investigation. The power from these all falls under the jurisdiction of WAPDA.

At the time of the investigation of electrification of villages in 1986, there were 42 unelectrified villages which was 35% of the whole; but at the time of the present

investigation, excluding a few villages, in general all the villages have been electrified.

3.1.9 Economic Activity

Of the major economic activities in the rural areas of Islamabad, there are those in the agricultural sector and non-agricultural sector activities such as retail business, short distance conveyance business, building work, and others; but here, only the industrial and manufacturing industry conditions are mentioned.

In the Islamabad Capital Territory, to create substantial capital reserves as a base for the Industrial Promotion Region, the 3 zones mentioned below have been formed.

(1) Commercial Zone (city area)

This zone is located to the north of Khyaban-e-Suhrawardy Road, and due to its proximity to the neighboring residential area, is suited for the production of general consumer goods and service industries. For example, there are bread, milk or butter production industries, flour mills, cleaning services, a special weaving industry, rubber and plastic manufacturing industry, grinding mill, automobile servicing factory, household appliance repair services, printing industry, technical and fine arts services, etc.

(2) Zone of Manufacturing Industry (city area)

This zone receives the influences of Rawalpindi City and is built along the Khyaban-e-Sir Syed Road. It is in the so called "I-Sector" industrial belt, and large; medium-and small-scale manufacturing industries of various types have developed operations here. Conveyance and transport services, which are indispensable to manufacturing industries, are good, and railways and roads are well provided. Electricity, water, gas, and telephone services have also been provided. Already plots have been allotted for 280 industries, and more than half of these are active, with a part of it under construction.

(3) Second Industrial Zone (UC Sihala)

This zone is in the belt sandwiched between the Soan River and G.T. Road, and within the zone the Kahuta Road runs from east to west. It is located away from the residential area, and the volume of water required for industrial purposes is comparatively large. This zone has been constructed for industries which cannot be set up in the manufacturing industry zone due to trash, noise and offensive odors.

3.2 Agricultural Status

3.2.1 Outline of Regional Agriculture

The important indicators of agricultural construction in the rural areas of Islamabad are observed in the following table. Farm households occupy 68% (14,170 households); the farm household population is 85% (129,000 persons), and though they may be said to be closed to both the capital and Rawalpindi, from the past to the present, the areas have retained a strong character as farming communities.

However, the nature of the farming has been changing considerably from the self sustaining economic agriculture until now, in a part of the region, the following changes are appearing:

i) There is an increase in the percentage of income dependence on occupations other than agriculture.

ii) Farming households with side businesses are increasing.

iii) Due to the increase in occupations other than agriculture, agricultural labour is becoming insufficient.

iv) Useful draft cattle are showing a decrease in numbers and there is an increase in the usage of machinery such as tractors.

v) Vegetables and poultry farming, and the rearing of milk cows, etc., are increasing to meet the requirements of cities.

In order that these changes may be spread throughout the whole region, it is felt that it is important to progressively strengthen the basic ground facilities like irrigation facilities, and provide farm roads, etc.

Important Indicators of Agricultural Construction in Agricultural Areas of Islamabad

	Islamabad Agricultural Areas		7 UCs Receiving Direct Benefits (25 Villages)	
1. Population				
Total population	152,184	(100%)	64,906	(100%)
Farming population	129,200	(85%)	43,844	(68%)
2. Farming households				
Total households	20,800	(100%)	9,899	(77%)
Farming households	14,170	(68%)	7,593	(77%)
3. Land				
Total land area (ha)	59,500	(100%)	19,835	(100%)
Arable land (ha)	23,120	(39%)	11,312	(57%)
Arable land per farming household (ha/household)	1.6		1.5	
4. Livestock				
Total livestock (conversion to adult cows)	48,590 heads		-	
Number of livestock/number of farming households	3.8 head/house		-	

3.2.2 Status of Land Holdings

The land holdings in the rural areas of Islamabad Capital Territory are as indicated in the table below. It can be seen that 65% of the land owners own less than

0.4 ha, and the percentage of land owners having more than 20 ha does not exceed 0.2%.

Individual Land Holdings in Islamabad Rural Areas (1984)

Scale of Land Owned (ha)	Number of Owners (persons)	(%)	Area Owned (ha)	(%)	Average Owned Scale/Owners (ha)
Less than 0.4	37,823	(65)	7,780	(14)	0.2
0.4 - 2.0	15,674	(27)	20,380	(86)	1.3
2.0 - 4.8	2,933	(5)	10,100	(18)	3.4
4.8 - 10	1,058	(2)	7,900	(14)	7.5
10 - 20	344	(0.6)	4,360	(8)	12.7
Above 20	135	(0.2)	5,600	(10)	41.5
Total	57,462	(100)	56,120	(100)	1.0

1. Total farming regions within ICT considered. Again, protected forest land, common land, are excluded.

Source: Assistant Commissioner's Office, IA.

If this is viewed with respect to the 25 villages to receive benefits under this Project (7 UCs), it becomes as follows:

Scale of Land Holdings (ha)	Number of Owners (persons)	(%)
0 - 2	8,727	(75)
2 - 4	1,884	(16)
4 - 6	618	(5)
8 - 10	292	(3)
Above 10 ha	84	(1)
Total	11,605	(100)

3.2.3 Agricultural Income

The results of the survey on the present conditions of the average agricultural income per household for the 25 villages (7 UCs) to receive direct benefits under this Project are as follows:

	Rupee/Year	
Income from crops	5,516	
Income from stockbreeding	4,244	
Total	9,760	(Rs.813/month)
Production costs for crops	3,398	
Production costs for stockbreeding	2,009	
Total	5,402	(Rs.450/month)
Net earnings on crops	2,123	
Net earnings on stockbreeding	2,235	
Total earnings	4,857	(Rs.363/month)

3.2.4 Crop Production

(1) Planting Pattern

The crop production in the region under investigation is dependent mostly on rainwater, and is divided into two seasons--the winter planting season (Rabi: October/November - April) and summer planting season (Kharif: July - October). The most important crop in the region is wheat, planted in the Rabi season. The planting area of wheat in the Rabi season occupies 90% of the total cropping area and approximately half of the annual cropping area. Most of the wheat planting area is mix-planted with rapeseeds with the aim of obtaining green crop fodder. Fodder crops, pulses, etc., are introduced as other Rabi crops but the planting area is limited.

The main Kharif crops are maize, pulses, cereals (sorghum and millet); green fodder is also planted. The main season is considered to be the Rabi season when wheat, which is the staple food, is planted. A little bit of irrigated land is used mostly for vegetable growing and vegetable planting is done through

both the seasons. Fruit raising is being considered and tried out everywhere in recent years but the actual planting of fruit trees has almost never been done. The most important planting pattern in the region is the dry farming system in the Barani area, with wheat as the basic crop, and a 2-year 2-crop rotation system (wheat/summer crop - fallow/fallow) is carried out. As shown in the table below, 1 crop a year dry farming system or 2 crops a year intensive method are also general planting patterns. However, the planting patterns vary depending on the rainfall conditions every year, and are not definitely fixed. In the dry farming system introduced in this region, weeding and conservation of the water in the soil depending on the multi-purpose uses of the soil surface are carried out as the main aims, and during the rainy season, when no planting is done soil tilling operations are carried out several times.

Planting Patterns of Area under Investigation

First Year	Second Year	Remarks
Wheat/summer crops	Fallow/Fallow	dofasli/dosala
Wheat/Fallow	Wheat/Fallow	
Fallow/summer crops	Fallow/summer crops	
Wheat/summer crops	Wheat/summer crops	Limited to fertile land around the farm villages

(2) Cropping Intensity, Planting System, Planting Area

According to the documents of the Land Revenue Department regarding the land use for every village and planting conditions, as well as the documents offered by CDA, the cropping intensity, planting areas and planting systems (planting area percentage for each crop) for the past 3 years covering almost the whole of the region under investigation, are as given in the table on the next page. The cropping intensity for a year (about 105%), planting area, and planting systems show little change in each individual field. Although a change in the planting method can be acknowledged, considering the region as a whole, it can be understood that a fixed planting pattern is being carried out.

Cropping Intensity, Planting System, Planting Area

	Winter Crops					Summer Crops					
	Wheat	Oil Crops	Others	Total (ha)	Intensity (%)	Maize	Pulses	Corghum Millet	Others (ha)	Total (ha)	Intensity (%)
1981 - 1982	10,980	420	660	12,060	56	4,820	4,150	860	920	10,750	50
1982 - 1983	10,940	440	810	12,190	56	4,400	4,220	890	850	10,360	48
1983 - 1984	10,550	440	770	11,760	54	4,600	4,940	860	780	11,180	52
Average	10,820	480	750	12,050	55	4,670	4,440	800	850	10,760	50
Planting (%)	50	2	4	56		22	21	4	4	50	

Documents: Based on data supplied by Land Revenue Department, IA and CDA.

Note 1: The cropping intensity corresponds to cultivated land of 21,670 ha, and other is fallow land.

(3) Unit Yield, Production Quantity

The unit yield in the study area varies greatly with rainfall, and considerable differences are found according to the rearing management and soil conditions. Consequently, due to discrepancies in the year and the sources of information, differences in unit yield can be observed. The average yield for all the crops is at a low level but the yield of wheat, which is the most important crop in the region has, increased considerably after 1979/80. This increase in yield is considered to be the result of the introduction of improved seed varieties, followed by increased usage of chemical fertilizers. The unit yields of the other crops remain at a low level. If the average yield quantity is compared with the estimated yield from the cultivation tests of NARC, it is extremely low, and it is felt that productivity can be increased considerably by improvement with different cultivation methods such as the introduction of improved seed varieties, improved irrigation methods, fertilizers, cultivation management, etc.

The production quantities under the present conditions for the most important crops based on the average yield and estimated planted areas between the years 1978/79 to 1982/83 are as shown in the table below.

Production Quantity with the Present Conditions in the Study Area

	Wheat	Oil Crops[2/]	Maize	Pulses[3/]	Fodder[4/]
Planting area (ha)	11,400	500	5,000	4,800	900
Average yield (kg/ha)	1,020	490	700	450	490
Production quantity (t)	11,628	245	3,500	2,160	441

1/ Agricultural Statistics Pakistan, from 1979 - 1983

2/ Rape and mustard

3/ Mung and mash. Average yield is average of the unit yield of both crops.

4/ Sorghum and millet. Average unit yield is average of sorghum.

(4) Cultivation Methods

Most of the farming households in the study area found difficult to support themselves by rainfed small scale farming only, so obtaining income in the city areas through some business other than agriculture has become necessary. Due to this reason, excluding the case of growing vegetables in the cultivated land, crop production is being carried out by ignoring the principles of growth management and with careless cultivation methods, and this has become the biggest reason for low productivity. The outline of the cultivation methods used in the area are as given below.

1) Plowing and Soil Preparation

Plowing and soil preparation operations are divided into the plowing and harrowing operations before sowing and plowing operation during the fallow period. These operations are normally carried out by using tractors, but in the cultivated land where tractors cannot be introduced or in case of households where the leasing services for tractors cannot be received, draft cattle are being used. The plowing depth is shallow at about 10 - 15 cm, and the bed beneath the planting soil is a problem.

The plowing before sowing depends on the cultivator, but in general plowing is done twice and harrowing is done once. The plowing during the fallow period is done after rainfall, with the aim of conserving the moisture in the soil, and is usually done several times from July to the time when the wheat is sowed. For this reason, tractor leasing services are in demand at the time of sowing the Kharif crops and the peak period is in July; the demand is especially high in the few days immediately after the rainfall.

2) Sowing

The sowing of wheat is carried out by human labour (dispersed sowing) and also by using draft cattle or tractors, and the percentages of area for the different methods are roughly estimated as 50%, 30% and 20% respectively. The sowing of other crops is almost completely dependent on human labour.

The planting of an improved variety of seeds for wheat (Lyallpur 73, Pak 81, etc.) is widespread in the whole study area, and occupies 95% of the total wheat planting area. However, the planting of an improved variety of maize (Neelum, etc.) does not exceed 10%. In the case of other crops, in almost all cases, the planting of seeds used in the past is being continued.

3) Fertilizing and Culture Management

Fertilizing is normally being done in the case of wheat, and it is estimated that 70 - 80% of the farming households are using fertilizers. The increased usage of fertilizers in the case of maize is low, compared to wheat. The fertilizers being used in this area are mostly phosphate and urea, and the normal fertilizing quantity per hectare for wheat is about 125 kg. Usage of agricultural machines is not the general case, and is restricted to a part of the cultivated lands around the farming community. Weeding operations are seldom carried out and cropdusting is restricted to vegetables and fruit trees.

4) Harvesting Operations and Conveyance

Recently, the introduction of the wheat cutter is being tried out, but most of the harvesting of the crops is dependent on human labour. The threshing of wheat in most cases is done using threshing machines (IRRI improved type), but threshing by draft cattle is also being carried out in part. The threshing of other crops is dependent on human labour or draft cattle. The carrying and conveyance of harvested items is normally dependent on draft cattle.

5) Agricultural Mechanization

In the study area, there is widespread mechanization of the operations of plowing, soil preparation and threshing of wheat.

Due to the individual leasing services or leasing services of Markaz, the widespread use of tractors by each farmer has been observed. After the rainfall in July, when the period of demand for machinery for

cultivation operations is at the peak, the number of tractors is still inadequate. In the study area, plowing is done by tractors or draft cattle with short plows, but plowing with people using plows or hoes is almost never done. Individual owners of tractors above 40 - 50 HP are extremely limited; only a small number of landowners own them.

Markaz maintains 15 tractors capable of 48 - 90 HP operation in its leasing services, and the leasing charges per hour for cultivation operations, depending on the horsepower required, are about 30 rupees to 55 rupees.

3.3 Natural Conditions

3.3.1 Topography

The area surrounding Islamabad is located on the northern edge of a wide plateau called the Potwar Plateau. In the northern part is the Margalla Hills, and it is bounded on the east by the Murree Hills. Thus the study area may be broadly divided into two parts--the hilly regions from the northern part to the eastern part, and the plateau region running from the central part to the southern part.

The Margalla Hills in the northern part extends in the north-northeast to south-southwest direction, and displays a topography of rugged mountains. The mountainous regions are 1,000 to 1,200 m above sea level and the relative height from the flat ground level is about 400 - 600 m.

Potwar Plateau is a level plateau, but within it is a stretch of hills. The hills and the flat portions keep alternating and offer an undulating topography, which is the characteristic of this plateau. The height of the flat surface is 400 - 500 m above sea level, and overall the height decreases in a northeast to southwesterly direction. Again, the height of the hills is about 100 m. Places with a topography of poor soil due to the continuing erosion by rivers are numerous.

The important water systems are the Soan River, Kurang River and Lei River, and these flows unite in the southern part of the region. The tributaries of the Kurang River, namely the Gumreh and Malal, are big, and the Ring, the tributary of the Soan River, is also big.

3.3.2 Geology

The study area is located on one face of the elevated belt which has existed from the middle Jurassic age to the present age, and consists of sea or land-made limestone, sandstone, conglomerate, shale and unconsolidated deposits, etc.

In the present case, the most important geological features are the Tertiary period bedrock strata formed by sandstone and shale, and the Quarternary period strata formed by unconsolidated deposits.

Constructionwise, large and small fold construction is the main characteristic, in general the trend of the axis of the folds runs in an east-northeast to west-southwest direction.

In the central portion of the study area, along the Soan River, a large scale included fold called the Soan syncline exists. In the mountainous regions, anticlinal axis construction is generally found, and here the sandstone and shale of the Tertiary period are exposed.

Places with cultivated fields, in the case of Tertiary period strata, consist of shale strata on which Quarternary period strata, and Quarternary age strata within synclinal folds are deposited; from the topographical point of view also the distinctions are very clear.

3.3.3 Meteorology and Hydrology

The study area belongs to the semiarid weather belt category and the average yearly rainfall is about 1,100 mm. The annual precipitation of rainfall is large, the concentration of rainfall is in the monsoon season between July and September, and a little rainfall is also observed in winter between January and March.

As for the temperature, the hottest month is June, and the average temperature in a month is 31.6°C. The coldest month is January, and the average temperature in the month is 10°C.

The river flow data for a short period for the Soan River and Kurang River are available. According to this data, the runoff rate is small, about 25 - 34%. Since the rainfall in a year is concentrated between the months of June to September, the flow volume of the rivers at this time is large. From April to May, this decreases remarkably.

3.3.4 Underground Water

The underground water in the study area can be broadly divided into the water within the sandstone-conglomerate strata of the Quarternary period and that within the sandstone strata of the Tertiary period which is below. In the bare rock belt at the foot of the mountains, places with bubbling spring water also exist. The alluvial lowlands and diluvial plateau along the Kurang, Gumreh and Soan rivers and the thick sand-conglomerate layers, have good water permeability, and this region becomes a powerful belt for the usage of underground water within the region, but in the rest of the region, the viscous quality of the coated layers is high. Since the depth of the wells which can be dug by hand is limited, in general, the quantity of the water in shallow wells is not great.

The number of shallow wells within the study area is about 1,000, and deep wells 36. Among these, more than half of the deep wells have been dug in Sohan UC along the Kurang River. The present state of the shallow wells shows an average depth of about 10 m, a diameter of more than 2 m, and an underground water depth of about 5 - 7 m. Among these wells, more than 40% dry up at the time of drought or the water becomes insufficient. Most of the wells which do not dry up reach to the sandstone strata of the Tertiary period. The results of the investigations done by way of on-site inspections of the spring water conditions, topography, etc., on the ground surface indicate that the underground water sources in this region are not only unpressurized underground waters of the Quarternary period strata, but the underground waters within the sandstone strata

of the Tertiary period are also important sources and will be given due consideration in the present design.

With respect to water quality, the pH is between 8.0 - 8.5, and the overall hardness is in most cases around 500 ppm.

CHAPTER 4 EVALUATION OF THE PROJECT

4.1 Objectives

Agriculture in the Project area still remains in the barani (rainfed) farming stage because of lack of the agricultural infrastructures. Living conditions have been also left behind in the development of the urban capital area because of no implementation of infrastructures such as road, water supply, etc.

It is also true, however, that development has been started in the area adjacent to the urban area through agricultural development such as vegetable farming by well irrigation, and chicken and milk supply to the urban area. Located nearby a large market, the project area has great possibilities for development through the supply of rural products to the urban area.

The Project aims to develop the Islamabad rural area and to assist small farmers, who live in inferior living conditions but work hard in a severe natural environment, through agricultural development as a food basket area to the urban area by means of the integrated implementations of infrastructures for the improvement of living conditions and the increase of income level.

4.2 Study and Evaluation of the Request

4.2.1 Necessity and Suitability

(1) Necessity of Rural Development

Agricultural development in Asian developing countries from the 1960s to the 1970s aimed at increasing crop production through the implementation of irrigation and drainage facilities to meet with the population increase after World War II. It was called the "green revolution" represented by the IRRI high-yield variety of rice.

These large-scale irrigation projects contributed greatly to stabilize the nation's economy by increased major crop production. However, the

benefits of this economic growth have not been shared equally by those people who live in rural areas such as small farmers, tenant farmers and people in the Barani Area, but have gone instead to the people in urban areas such as land owners, those in trading companies, etc. Poverty and economic prosperity have co-existed. Annual per capita income was about US$50 in Pakistani rural areas until the end of the 1960s, and the rural areas have still been left behind in the economic growth and continue to suffer from poverty and unemployment. New technology has contributed to the nation's economy but have not helped the rural areas.

Based on the above understanding, there exists the necessity for integrated rural development. As the final goal of every project is development of an area and uplifting of the people's lives, the project should not strengthen only agricultural productivity but should also include social infrastructure and indirect components other than agriculture. The benefits and services obtained through a project should be shared equitably by the people in rural areas.

In other words, projects for rural development should not be formulated simply for economic viability but also for social welfare. It requires an integrated strategy to cover the wide and complicated components and problems in the rural area.

The strategy to first develop direct benefits and to expect indirect or secondary benefits to spread to the people afterwards will not work successfully in rural areas where property distribution is not even, as the indirect benefits will be absorbed by the direct beneficiaries usually rich people. Small farmers or the poor majority are always left behind. The rural development strategy sets the target of bringing these people on to the stage as social beneficiaries.

A rural area is a place where agricultural production is harmonized with community life. People's lives and social activities in a rural area are always tied together with agriculture which creates rural culture and history. Therefore, it is difficult to deal with agriculture separately from the people's social and cultural lives in the rural area.

Implementation of any single component for rural development is ineffective and often its expected benefits will be submerged in the other existing problems coordinated indirectly to the component.

It is, therefore, important to take the following points into account for the formulation of a strategy for rural development projects.

- Low income farmers should be included.
- Major objectives of the plan should be the improvement of living conditions and the increase of income for all people of the community.
- Economic viability is not the only factor for evaluation but the contribution to social welfare should also be counted.
- Participation of beneficiaries is necessary from the planning to the implementation stages.

Evaluating the requested contents of the Project from the points of above considerations, the Project is deemed appropriate and necessary base on the following reasons.

1) The implementation of the agricultural and social infrastructures has not been progressed in the rural area of the Project. The living conditions are poor and the income level is low.

2) The Project area is located near the both cities of Islamabad and Rawalpindi. The Project area has advantages for the agricultural development as the nearest supply base of the agricultural productions to the urban area.

3) The landholdings in the rural area are small. The land owners of less than 0.4 ha are 65% of the total and the owners of more than 2.0 ha are only 0.2%. Therefore, the Project will not benefit any particular landowners nor the large land owners.

4) The components of the Project are considered the integrated schemes as they are the five components selected among the 13 schemes identified by the Master Plan Study.

5) The rural development scheme is one of the important strategies of the National Perspective Plan and the Seventh Five Year Plan. The Project aims the same objectives with these national Plans.

4.2.2 Project Implementation and Operation

The executing agency responsible for project implementation is LG & RD of ICTA. ICTA has started preparation of the organization required for operation and maintenance of the Project based on the following basic understandings.

- Operation and maintenance of the Project will be undertaken by RACC under the supervision of LG & RD through Markaz.

- Expenditures for additional staff and engineers for operation and maintenance and a part of the operation costs will be included in the ICTA annual budget.

- A water users association (WUA) for irrigation facilities will be set up under the supervision of LG & RD. WUA will conduct operation and maintenance of irrigation facilities and farm ditch construction under the cooperation of the UC.

- Electricity charges for water supply and irrigation schemes will be managed by the UC.

- Water charges on to the user will be studied by RACC.

- Tolls for vehicles outside of the village will be studied by RACC.

LG & RD will supervise the Project technically and administratively and assist RACC and the UC for the collection of O & M charges and for the set up of WUA. It is considered necessary to strengthen the engineering abilities and activities of the existing LG & RD organization for the supervision of the Project.

The estimated expenditure for the required staff of the O & M organization and operation charges such as the electricity charge and the operation cost of heavy equipment for maintenance will be about Rs.1.5 million per annum. Expenditure for staff salary and a part of the operation cost will be included in the ICTA annual budget and other charges like electricity charges will be borne by beneficiaries. This O & M cost in the total is less than 0.9% of total budget of ICTA in 1989. It is evaluated that the expenditures and costs for O & M will not impose difficulties on the budget management of ICTA. As for water charges levied on the beneficiaries of the water supply scheme, they will be minimized to separate the beneficiary and the non-beneficiary.

4.2.3 Related Aid Project

This Project consists of 5 schemes selected among the 13 schemes proposed by the Master Plan report in March 1986. The northern part of this project area is overlaped with the benefit area of the Upper Krang River Irrigation Development Project which Feasibility Study was conducted in 1988 through Japanese technical cooperation.

The preliminary study team in January 1988 decided to delete this overlapping area from the Project area. The area overlaps, but project components are not overlapped between the two projects such as the water supply scheme, multi-purpose farm ponds and rural development stations. It is recommended to take into careful consideration the progress of project preparation of the Upper Krang River Irrigation Development and the evaluation of the implementation of the Project area.

4.2.4 Evaluation of Project Components

In general, depressed living conditions due to a low income level exist in the project area. Development of this area and improvement of living conditions are important policies in line with the purpose of the Seventh Five-Year Plan of Pakistan. The strategy for development of rural areas, as stated in 4.2.1, should be an integrated programme of social development, not only stressing economic viabilities.

Thirteen development schemes were proposed by the Master Plan Study. However, it is not possible for the Japanese grant aid programme to include all the schemes due to project scale. Schemes with a high priority are selected based on the people's needs and formulated to be a model project in order to demonstrate a rural development project.

The study team evaluated the project components to see whether or not they are proper and effective for rural development and of a suitable project scale for the Japanese grant aid programme. The evaluation is summarized below. A technical evaluation of each component will be given in 4.2.5.

1. Needs for the people are a water supply, village electrification, irrigation and roads. Electrification in the Project area has progressed almost to the level of 90%. Other needs are included in this Project.

2. Each component is technically sound.

3. Participation of the people is confirmed through the setting up of a water users organization and their sharing operation charges in the water supply scheme.

4. ICTA, the executing agency of the Project, recognizes the concept of rural development and has already started implementation of a part of the project components, such as the UC office and rural roads. It is expected this Project will support ICTA and accelerate rural development.

5. Relations and major benefits of each component are summarized as follows:

Benefit	Irrigation	Water Supply	Road	Farm Pond	Rural Development Station
Stable water resource	O	O		O	O
Planned farming	O		O	O	O
Income increase	O		O		
Employment opportunities	O		O		
Clean environment		O		O	
Release from heavy labour		O		O	
Improvement of living conditions	O	O	O	O	O
Communications	O		O		O

4.2.5 Technical Evaluation of Components

The basic design study team has made its technical investigation and study paying attention to the following items appraised by the preliminary study team.

- To confirm the stability and availability of groundwater for wells.
- To investigate the geological structure of M-2 dam foundation to avoid any large fluctuation in the project cost.
- To study the alternative of the provision of machinery instead of the rehabilitation of small-scale farm ponds.
- To study a clear concept for the operation and management of rural development stations.

The team confirmed the project components as follows:

(1) Irrigation Development

I. Dam ..... 2 sites (2 sites requested)

- After detailed investigation and study on M-2 dam, the team identified a new dam site located about 1 km from the previous dam site at the time of the preliminary study.

  It was confirmed that the new dam site has better topography for a dam, and a geological foundation of good durability and permeability. The dam height is 11 m with a reservoir capacity 165,000 m^3. The project cost will not be increased due to site conditions.

II. Irrigation well ..... 3 sites (3 sites requested)

- Among the requested 3 sites, the I-7 well nearby M-1 dam in Tamair UC was evaluated as not suitable due to its small yield of water. The location, therefore, is changed to Gehr hardo Village in Sihala UC.

- Wells for irrigation should be deep wells.

(2) Multi-purpose Groundwater Development

I. Water supply system by new deep well ..... 4 systems (4 systems requested)

No.	Location	Benefit UC	Pipeline
L-27	Soan River right bank	Sihara UC	3.5 km
L-28	Soan River right bank	Sihala UC	3.9 km
L-30	Soan River left bank	Rewat UC	6.5 km
L-31	Soan River left bank	Rewat UC	2.9 km

Note: L-30 is the supplemental plan to the existing facilities.

II. Water supply system by existing shallow well ..... 13 systems
(12 systems requested)

The team investigated 54 wells through a water quality test,electric sounding and pump-up test and decided on the following 13 wells for this water supply systems.

Cherah UC	6
Tamair UC	1
Kirpa UC	2
Sihala UC	1
Koral UC	1
Shah Allah Ditta UC	2
Total	13 wells

The water supply system in Shah Allah Ditta Village is the supplemental system to the existing system (i.e., deep drilling, pump facilities and pipeline to the existing water tank.) The water supply system in Gokina Village in Shah Allah Ditta UC was additionally included in this Project.

Gokina Village water supply system

The need for a water supply system in this village was recognized at the time of the Master Plan Study; however, it was excluded from the scheme due to the following considerations.

1. The road connecting Islamabad and Gokina through steep hills of 1,100 m in elevation is not paved and not suitable for the transportation of construction materials and machinery.

2. No electricity is available.

3. No bridge exists to cross the river in the village.

4. Construction costs and operation costs would be too high. It was concluded that electrification and roads have a higher priority.

Electrification and road pavement have been completed by the time of the basic design study although some 1 km of road was left unpaved and there are no facilities provided for safety such as guardrails, etc. It was found that there are no problems for construction work in Gokina Village.

In addition to this, it was found that the village people have been suffering from disease which is suspected to be caused by drinking water from specific wells. Wells with good quality water are located far from the village center.

Evaluating these facts, the team decided after all to provide a water supply system to Gokina Village.

III. Hand pump installations ..... 20 sites
(20 sites requested)

Selection was made for those wells excluded from the water supply system, and the following 20 sites were included as the components. The number of hand pumps per well will depend on the size of the well and the number of beneficiaries.

Tamair UC	5
Kirpa UC	10
Cherah UC	5
Total	20 wells

(3) Multi-purpose Farm Ponds 13 ponds (17 ponds requested)

The team made an investigation and study of 21 farm ponds and evaluated 13 as worth rehabilitation due to the great benefits expected. Standards for selection were as follows:

1. Farm pond capacity should exceed 1,500 m^3 after rehabilitation.

2. Spillway can be installed to release excess rainwater inflow to the pond.

3. Rehabilitation costs should be appropriately small.

Koral UC	2
Kirpa UC	5
Cherah UC	1
Rewat UC	2
Sihala UC	1
Kuri UC	1
Shah Allah Ditta UC	1
Total	13 ponds

The provision of diesel pumps, as suggested by the preliminary study team, was not included in the Project component. Because it will require additional rehabilitations on new constructions of shallow wells near the farm ponds. The Project cost will be too high compared with the expected benefits.

(4) Roads

ICTA has already started the construction of roads according to the Master Plan. The team has decided to include the following road alignments and lengths into the Project, excluding the portion for which construction has been completed.

Darwala - Cherah	New construction	5.7 km (9.6 km requested)
	Rehabilitation	3.0 km
Gagri - Ladhiot	New construction	7.4 km (8.9 km requested)
	Rehabilitation	2.0

(5) Rural Development Station

The rural development station was placed in the Master Plan Study as a key station for the rural development scheme. Through several intensive discussions with ICTA, the study team confirmed and understood the plan of ICTA for the organization and management of the rural development station to be as follows:

- The rural development station is administratively organized under Markaz in order to strengthen the activities of the existing Markaz.

- Markaz is responsible for the operation and maintenance of the project facilities under the supervision of LG & RD. Key O & M staff will be placed in LG & RD and in Markaz.

- Existing UC offices can be utilized as extension offices of Markaz for operation and maintenance of the Project at sites.

- Markaz has three major functions;

  (1) Coordination, (2) Services to people and (3) Development of the area, among which the functions of (2) and (3) are proposed by ICTA to be strengthened through this Project.

- Hearing of the success of suburban-type agriculture and farm management, UCs are activated and the following requests are made of Markaz .

  (1) Development and training on irrigation facilities and equipment for agriculture

  (2) Provision and training of agro-industries such as carpet factories, saw mills, etc.

  (3) Increase the number of tractors to lend and strengthening of repair shop functions.

Based on these existing needs and the present limited functions of Markaz, ICTA has requested the following to the team instead of the original request regarding rural development stations.

- Provision of tractors to lend and four-wheel-drive jeeps in order to strengthen the functions of Markaz.

- Construction of garage and repair shop for tractors and construction of workshop with sawing & knitting machines for agro-industry development on the place adjacent to the existing UC offices which will function as a rural development station.

Based on the studies and investigations in the field, the team evaluated the request regarding rural development stations as follows:

- Existing UC office has sufficient capacities for office and meeting room, etc., to function as a rural development station and as an office for operation and maintenance of this Project. Therefore, the construction of a rural development station will be excluded at Cherah UC and Shah Allah Ditta Village where UC offices already exist.

  In the case of Gokina village in Shah Allah Ditta UC, evaluating from the compact village size, a small office space will be added to the pump house of the water supply scheme in order to function as a rural development station.

  The rural development stations to be constructed under this Project are at Kirpa UC and at Gokina Village.

- A shortage of tractors and increasing needs from farmers do exist, and so improvement of Markaz is required. Provision of an appropriate number of tractors is included in the Project. It is necessary that ICTA shall construct a garage and repair shop adjacent to the UC office and rural development stations.

- Four-wheel-drive jeeps will be provided in order to improve communications between Markaz and rural development stations and to strengthen the operation and maintenance functions of the Project.

- As for the provision of agro-industry facilities such as green houses, it is one of the important schemes recognized by the Master Plan Study. However, engineering staff, leaders and technicians are in short supply and a development plan is not prepared, etc. The team concluded that this

component, though necessary in the near future, shall be excluded from the scope of this Project.

Existing conditions of UC offices were investigated by the team as follows:

Location	Present Conditions
Cherah UC	Adjacent area to the existing UC office was already arranged for public use. Alternative place is also available near the village center in case the agro-industry development component is to be provided.
Shah Allah Ditta UC (2 sites)	Adjacent area to the existing UC office was made available for public use in Shah Allah Ditta Village. In the case of Gokina Village, a water supply system was proposed in addition to the rural development station.
Tamair UC (Kirpa UC)	Proposed location for rural development station at Tamir UC was found to have no good drainage conditions and be too far from the village area. The team prefer to locate the rural development station at Kirpa where many components--road, water supply system and farm pond--are concentrated. The area near the farm pond (FP-4) is available for construction of the rural development station.
Tractor to lend for agriculture	At the time of the Master Plan Study (1985), twenty-two tractors were located in three Markaz. But now, only 15 of them are in working condition. Others were damaged, deteriorated or utilized as spare parts.

Based on studies and investigations at field, the team evaluates the request regarding rural development stations as follows.

- Existing UC office has sufficient capacities of office, meeting room, etc. to function as rural development station and as office for operation and maintenance of this project. Therefore, the construction of rural development station will be excluded from the scope at those places of Cherah UC and Shah Allahditta village where UC offices already exist.

  In case of Gokina village in Shah Allahditta UC, evaluating from the compact village size, small office space will be added to the pump house of water supply scheme in order to function as rural development station.

  The rural development stations to be constructed by this project are at Kirpa UC and at Gokina village.

- Shortage of tractors and increasing needs from farmers do exist and improvement of MARKAZ is required. Provision of tractors of appropriate number is included in the project, on condition that ICTA shall construct garage and repair-shop adjacent to the UC office and rural development stations.

- Four-wheel-drive jeeps will be provided in order to improve the communication between MARKAZ and rural development station and to strengthen the operation and maintenance functions of the project.

- As for agro-industry facilities and equipped agriculture such as glass house, it is one of the important schemes recognized by M/P study. However, engineering staff, leaders and technicians are short and development plan is not prepared. The team concludes this component, is necessary in near future, but shall be excluded from the scope of this project.

(6) Machinery and Equipment to be Provided

Machinery and equipment necessary for the operation and maintenance of this Project are to be procured by the Project.

- Operation and maintenance of dams

Dams designed in the Project have a comparatively small reservoir capacity with its catchment area, and silting in the reservoir will shorten the effective service life of the dams. During the rainy season, a scouring sluice valve will be fully opened to discharge silt inflow; however, it is inevitable to have siltation developing from upstream of reservoir every year. Excavation of siltation from the reservoir is an important maintenance operation that needs to be done at least once a year.

Required types of machinery are as follows:

Item	Class	No.
Backhoe shovel	0.4 m^3 class	1
Bulldozer	11 t class	1
Dump truck	8 t class	3

These types of machinery will be utilized for the maintenance of farm ponds and roads and for the rehabilitation of small-scale farm ponds excluded from the Project.

- Tank lorry 5,000 lit. capacity, 3 (three numbers with suction pump)

Tank lorries are necessary during construction stage to be used for water supply to the peoples whose existing wells are under rehabilitation. After the Project, the tank lorries will be utilized for emergency water supply during dry season.

- Improvement and strengthening of Markaz functions

Lack of mobility and a shortage of tractors to lend are the major reasons of the stagnation of Markaz activities. The required number of staff for the

operation and maintenance of this Project is estimated at about 40 people who will be stationed at each facility, rural development station, Markaz and LG & RD. Four-wheel-drive jeeps are necessary to communicate with these facilities.

As for tractors, as discussed in 4.2.5 (5), they are to be provided together with spare parts. The construction of a garage and repair shop by ICTA is required. Numbers of vehicles are as follows:

Four-wheel-drive jeep	3
Tractor (75 - 80 ps class)	25
Attachment (Disc harrow)	25
Spare parts & repair tools	25 sets

- Equipment for water quality tests 10 sets

Based on the existing conditions in the field, it is concluded that a large facility for water quality control will not be necessary, but periodical observations of water quality are essential, especially on the items of colon bacillus, total hardness, etc. Equipment for water quality tests on basic items are provided. The quantity will be enough for 2 years of observations as a training period.

4.2.6 Conclusion of Evaluation

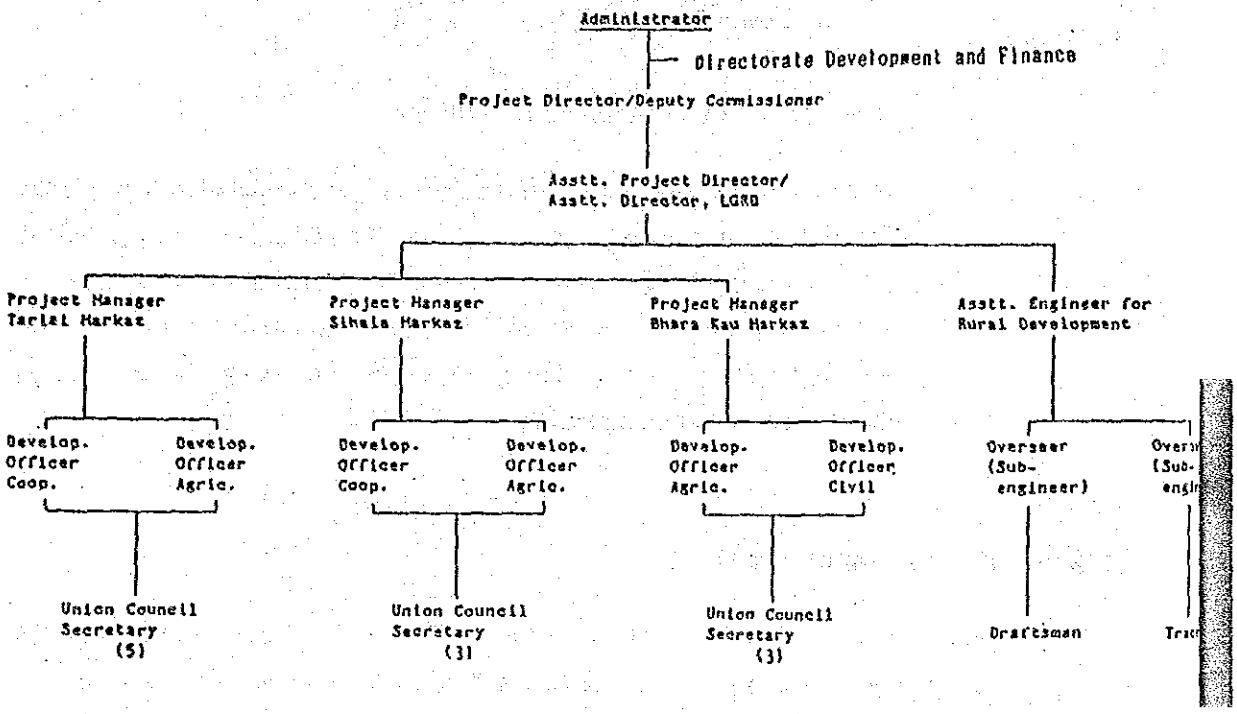
Based on the study and evaluations given in 4.2.1 - 4.2.5, it is concluded that the Project is appropriate to be executed under the Japanese grant aid programme, as the expected results, reality of the Project and executive capability of ICTA are confirmed and the objectives, approach and effects agree with the conditions of the Japanese grant aid system.

4.3 Outline of the Project

4.3.1 Executive Agency and Organization

(1) Executive Agency

The executive agency of the Project is LG & RD in ICTA. ICTA, headed by an administrator, is one of the administrative organizations of the central government and has almost the same authority and functions as the provincial government. ICTA administers through 12 Union Councils and the RACC organized by the chairman of each UC coordinates the UC. The organization chart of LG & RG of ICTA is shown below.



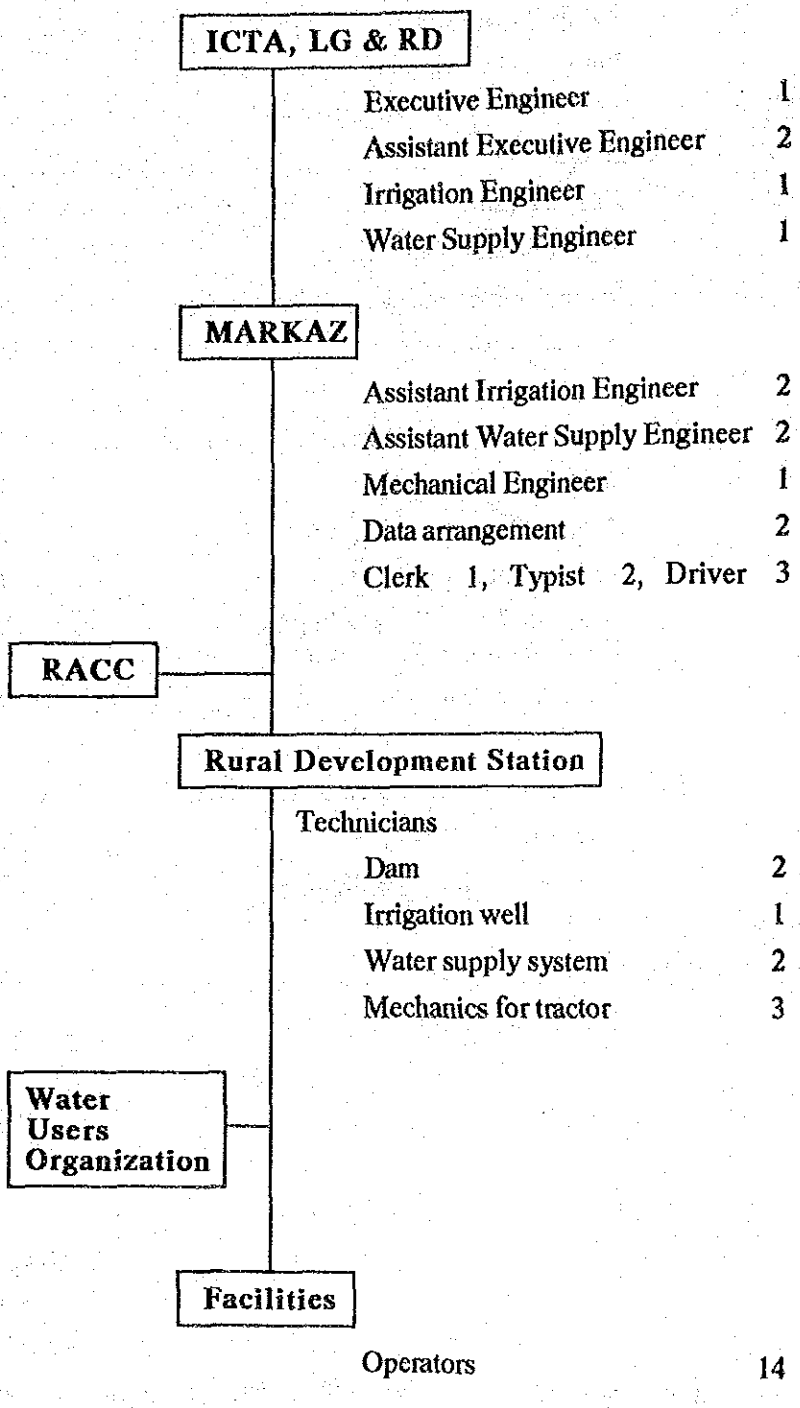
(2) Organization

The following staff are estimated as necessary for operation and maintenance of the project facilities as discussed in 4.2.2 and they are to be organized under ICTA having more than 1,000 employees at present.

- Operators		14
	Pump at dam	2
	Pump at irrigation well	2
	Pump at deep well	4
	Pump at shallow well	6
- Technicians		8
	Dam facilities	2
	Irrigation well facilities	1
	Water supply facilities	2
	Mechanic for tractor	3
- Supervisors		7
	Irrigation Engineer	1
	Assistant Irrigation Engineer	2
	Water Supply Engineer	1
	Assistant Water Supply Engineer (Staff for water quality test)	2
	Mechanical Engineer	1
- Executive Engineer		3
	Executive Engineer	1
	Assistant Executive Engineer	(2)
- Administrative Staff		(5)
	Data arrangement	(2)
	Clerk	(1)
	Typist	(2)
- Driver		3
	Total	40

Numbers of staff in brackets are the existing staff members at Markaz.

Organization Chart



4.3.2 Outline of Project Major Facilities

(1) Irrigation Development

I. Dam

M-1 Dam

The dam is located at the upstream portion of the Maral River, on the first left tributary of the Krang River, about 1.5 km downstream from Tamair Village and about 400 m downstream from the point where the rural road between Cherah and Mohol crosses the Malal River. The Malal River forms a steep valley at the dam site, about 25 m in width, 10 m in depth and 80 m in length. The geological formation of the dam site is alternative layers of sandstone and shale and the loess layer deposit forms the surface layer of the valley. The sandstone has several 10 cm to 1 m blocky joints with an alignment N75°E and a dip 70°N. These rocks of the dam foundation are classified geologically into the C_L - C_H class and no geological problems are expected for the dam foundation.

Geological formations indicate the possibility that a permeable layer or zone may be formed in the direction from upstream to downstream of the dam. By means of curtain grouting of 30° inclined to the left bank together with consolidation grouting, the foundation rock can surely be improved and the permeable layer or zone running under the dam can be stopped at the dam site.

The irrigation area of the dam was selected at a flat hill area located at the right side of the river. The main features of M-1 dam and irrigation are as follows:

M-1 Dam

Catchment area	:	10 km^2
Reservoir capacity	:	93,000 m^3
Dam type	:	Concrete gravity
Design flood	:	50 m^3/s

Dam height	:	12.5 m
Related structures	:	Spillway, Sluice valve, Intake pump facilities
Bridge at upstream	:	30 m span bridge
Road for O&M	:	New construction about 400 m Rehabilitation about 3,000 m
Irrigation facilities	:	
Pipeline	:	500 m
Farm pond	:	1
Benefit area	:	Max. 50 ha with main and secondary canals

M-2 Dam

As a result of the detailed field investigation, a dam site with better topographic and geological conditions was found downstream of the dam site studied through the Master Plan and preliminary study. This dam site is about 35 m wide and about 10 m deep and has hard rocks of sandstone and shale exposed on the surface. It is located about 1.3 km downstream from the point where the rural road between Jhang Sayadoan and Kirpa crosses the Malal River.

The geological formation of the dam site is alternate layers of sandstone and shale. The sandstone layer is about 10 - 15 m thick with about 1 m blocky joints. The shale layer is about 10 m thick and medium to well weathered. The alignments of these the rocks are N55°E with a dip 75°S parallel to the dam axis. The dam body is to be placed on the sandstone layer and the downstream stilling basin is to be placed on the shale layer. The geological classification of the foundation rocks is C_L - C_H having a sufficient bearing capacity and stress allowance. The permeability of the rocks is 5 - 20 Lu for the sandstone and about 1 Lu for the shale. As the alignment of rocks is parallel to the dam axis, seepage through the dam foundation will be stopped by curtain groutings which are required to minimize the uplift force and to improve the geological conditions on both abutments.

The irrigation area is selected on the left bank of dam. Farm ponds (FP-6) included in the farm pond rehabilitation scheme will be utilized as field regulation storage in this irrigation plan. Access to the dam site is easy from the existing submersible bridge to the dam site. The main features of the M-2 dam irrigation plan are as follows:

M-2 Dam

Catchment area	:	57 km^2
Reservoir capacity	:	165,000 m^3
Dam type	:	Concrete gravity
Design flood	:	150 m^3/s
Dam height	:	11.0 m
Related structures	:	Spillway, Sluice valve, Intake pump facilities
Bridge at upstream	:	2 bridges, 70 m span and 40 m span
Maintenance road	:	New construction 350 m Rehabilitation 1,000 m
Irrigation facilities	:	
Pipeline	:	1,000 m
Farm pond	:	1
Benefit area	:	150 ha with main and secondary canals

II. Groundwater

The original plan was to irrigate about 20 ha/well by construction of shallow wells at the following three places.

Tamair UC	:	I-7
Kirpa UC	:	I-11
Shihala UC	:	I-19

It was planned to pump up the groundwater existing in diluvial and alluvial layers of Neocene formation. Based on the results of pump up tests on the existing shallow wells and electric soundings near the proposed wells, it was found that well yields will not be sufficient to

satisfy water requirements for irrigation. It is concluded, as suggested by the preliminary study, that wells for irrigation should be designed as deep wells.

The I-7 well proposed near M-1 dam in Tamair UC is located in the area having a geological anticline formation and the hydro-geological catchment is small. It was judged that sufficient yield could not be expected even by means of a deep well. The basic design study team made additional hydro-geological investigations on the area along the right bank of the Soan River, which was proposed by the Pakistani side as an alternative to I-7. The team selected the alternative deep well at Gehr Hardo Village in Sihala UC. This location of the well is along the road (R-2) to be constructed under the Project and another deep well is planned in an adjacent area for the water supply scheme. As the irrigation area is covered by fertile soil, considerable irrigation benefits can be expected. Two other irrigation wells are planned for the original locations - I-11 at Paratal Village in Kirpa UC and I-19 at Dhok Darhan Village in Shihala UC.

Based on the field investigations and study, design yield and well depth were set as follows and the wells were renumbered. The drilling diameter is to be 500 mm and the casing pipe is to be 350 mm in diameter.

Original	New	UC	Depth	Design Yield
I-11	TWI-1	Kirpa	130 m	5 lit./sec
I-19	TWI-2	Shihala	130 m	14 lit./sec
-	TWI-3	Shihala	130 m	14 lit./sec

III. Farm ditch

Farm ditches from turnouts of the secondary canal were originally planned to be constructed by the beneficiary farmers as one of the tasks undertaken by the Pakistani side. The team studied the possibility of including the construction of farm ditches into the scope of the Project.

A farm ditch is a very small earth canal which extends from a turnout to a farmer's individual farming plot. The hand construction of a farm ditch is easy with a scoop. The routes of farm ditches should be selected by farmers themselves through discussions with neighboring farmers. Farmers should always maintain their farm ditches. The procedure of the implementation of farm ditches is as follows:

1. Model farmyards with an area of 4 - 5 ha will be selected from a groundwater irrigation area.
2. Farm ditch construction for model farmyards will be included in the scope of the Project for an exhibition of model farm ditches to farmers.
3. Farm ditches other than those of model farmyards will be constructed by farmers themselves.

(2) Multi-purpose Groundwater Development

This scheme aims at integrated improvement of living conditions and environments and increased agricultural productivity. Drinking water and other water for domestic use depend on groundwater from shallow wells. Due to there being no water supply system in the project area, drawing of water by hand from public wells and transportation of water to their homes puts a heavy labour burden on women and children in rural areas. In the dry season, yields from wells become small and wells dry up many times. People have to walk a longer distance to obtain water.

Based on the above background, the establishment of firm groundwater resources and a water supply scheme was requested to free people from such heavy labour and allow them to use their time for more productive purposes. ICTA has already started construction of water supply schemes based on the report of the Master Plan although the progress of the construction work is slow due to budget limitations. The team paid careful attention so that the scope of the Project will not overlap with the on-going schemes which are listed below.

1. Rawat water supply scheme
2. Sihala water supply scheme
3. Kirpa water supply scheme
4. Shah Allah Ditta water supply scheme

I Water supply schemes with new deep wells L-27, L-28, L-30 and L-31 locate their wells along the Soan River to obtain groundwater in Quaternary period alluvial and diluvial layers and below these layers sandstone of the Tertiary period to distribute water to the adjacent plateau. According to the detailed electric soundings and geological data, the depth of these wells will be 110 - 130 m with a design yield of 14 lit./sec.

L-27

The well location was selected at the right side of the Soan River. The main pipeline from the well will be aligned with the new road (R-2) and water will be distributed to Gehr Hardo, Jandala and Kangota Saividan villages in Sihala UC.

L-28

The well location was selected along the right side of the Soan River but about 4.5 km downstream of L-27. The water will be distributed to Gagri, Ghagar and Bhandar villages in Sihala UC.

L-30

The well location was selected about 2 km downstream of L-28 but along the left side of the Soan River, just downstream of the bridge of the Islamabad - Lahore Highway. Water will be distributed to Rawat Village in Rawat UC through an approximately 6.5 km long pipeline which is the longest among the schemes. This scheme is overlapped by the on-going water supply scheme of ICTA in which the construction of a deep well, pump house and a part of a water tank had been completed at the time of the field survey.

The team tried to utilize or improve the existing facilities; however, it was judged difficult due to the following considerations.

1. The on-going scheme serves only half of the population of Rawat Village, i.e., the commercial area.
2. Unit consumption of water was designed at 20 lit./capita/day which is half of the Punjab design standard.
   Adopting 40 lit./capita/day and supplying the entire population of the village, the existing 4" diameter pipeline is too small and booster pump capacity is not sufficient.
3. The distance between the pump house and water tank is as much as 6.5 km, but there are no communication lines.
4. Measuring devices such as a water level gauge for well tube and an underground water tank are not designed.

It is not feasible to utilize or improve the existing on-going facilities, otherwise all facilities would be replaced. Consequently, the team has concluded that the scheme of L-30 will cover the other half of the area of Rawat Village with separate water supply facilities.

Time sharing of the main pipeline was also studied but it was not thought economical due to the large scale of booster pump required.

L-31

The well location was selected about 9.5 km downstream of L-30 along the left side of the Soan River and water will be distributed to Gurha Shah Village in Rawat UC through a pipeline of about 3.5 km.

II Water supply scheme with existing shallow wells

This scheme consists of rehabilitation/improvement of existing shallow wells, pump facilities, pump houses, pipelines, water tanks and public taps. The team made field investigations on 54 existing shallow wells through electric sounding tests, pump-up tests and water quality tests. The following 13 wells were selected as being good for this scheme.

Cherah UC	6
Tamair UC	1
Kirpa UC	2
Sihala UC	1
Koral UC	1
Shah Allah Ditta UC	2
Total	13 wells

The average depth of the existing shallow wells, except for those in Sihala UC, is 10.3 m and 20 - 28 m in Sihala UC. Most of the wells take water from Quaternary surface layers, but those wells which do not dry up, even in extremely dry years, reach to the Tertiary weathered sandstone layers. Several springs or seepage spots were found in sandstone layers. As for water quality, no harmful substances were found although a relatively high content of salt and calcium were reported. A high content of colon bacillus was found at wells where people are washing clothes and cattle are drinking water around the well but there is poor drainage with no pavement. Improvement of drainage conditions should be included in the scope of work in this scheme. Major items of the scheme are as follows:

1. Additional drilling
   Drilling depths average about 10 m with a 500 mm diameter and casing pipe installed.

2. Rehabilitation of wells
   Concrete lining of inner wall of well; paving of surrounding area, improvement of drainage; and covering of top of well.

3. Pump facilities
   Pump facilities, pipeline and water tank

4. Distribution facilities
   Distribution pipelines and taps for public use (about one tap per 5 - 10 families). The water supply scheme at Shah Allah Ditta Village is limited to the supplemental facilities for the on-going scheme of ICTA.

These facilities are a pump, pump house and pipeline to the existing water tank.

III Installation of hand pump

This scheme aims to lessen the heavy work of drawing water by means of installation of hand pumps and to improve the environments of existing wells through installing top covers on wells, drainage improvement and pavement around the well. The existing shallow wells to be improved in this scheme are such wells found through field investigations to be of good water quality and to dry up during the dry season.

Tamair UC	5
Kirpa UC	10
Cherah UC	5
Total	20 wells

(3) Multi-purpose Farm Pond Rehabilitation

This scheme aims to supplement the water supply scheme. In the Islamabad rural area, available water resources (especially for drinking water) from existing shallow wells are so limited that the people utilize farm ponds for various purposes such as washing clothes and cattle and for drinking water for domestic animals. Water resources of farm ponds are rainfall, drainage from adjacent areas and seepage or spring water. Large farm ponds are utilized to supplement irrigation but the most of small farm ponds become empty during the dry season and this creates a crisis for all the village people. Field investigations and studies were conducted on 21 of the existing farm ponds (against 17 requested ponds) and the following 13 farm ponds were found viable for rehabilitation according to the conditions given in 5.2.5 (3).

Koral UC	2
Kirpa UC	5
Cherah UC	1
Rewat UC	2
Sihala UC	1
Kuri UC	1
Shah Allah Ditta UC	1
Total	13 farm ponds

(4) Rural Roads

Construction and rehabilitation of rural roads are, like water supply schemes, one of the main components requested by many people in the rural areas. ICTA has started implementation of rural road work in accordance with the JICA Master Plan Study in 1986. According to the survey of village people conducted by the basic design study team, the major reasons of the request are transportation of milk, vegetables and eggs, commuting access, and easy access in case of sudden illness to Islamabad and to Rawalpindi.

Two road lines were surveyed by the team. The length of construction completed by ICTA is about 1 km from the starting point of Gagri - Ladhiot Road and about 3 km from the ending point of the Darwala - Cherah Road. Road alignments were set in field for topographic survey and a portion of the new construction in this Project was concluded, excluding the above completed portion, as follows:

Darwala - Cherah Road (R-1)	5.7 km
Gagri - Ladhiot Road (R-2)	7.4 km

Damages such as washout of road shoulders, damaged pavement, etc., were noticeable for some portions connected to the above proposed roads. Considering overall utility and convenience, the effects of new roads will be lost if damaged road portions form one road line together with new road. It is, therefore, planned to include rehabilitation of existing road to the Project as follows:

Darwala - Cherah (R-1)	3.0 km
Gagri - Ladhiot (R-2)	2.0 km

(5) Rural Development Station

As described in 4.2.5 (5), the rural development stations included in the Project are two sites, one at Gokina Village in Shah Allah Ditta UC and the other at Kirpa UC. The station at Gokina Village is located at the pump house of the water supply scheme. Standard facilities of the rural development stations are set as follows:

1. UC office

Office room	2 rooms
Meeting room	1 room

2. Others

Night watchman's room	1 room
Toilet	1 room
Water supply	1 system

4.3.3 Operation and Maintenance Plan

Small scale but daily operation and maintenance of the project facilities will be undertaken by RACC together with UC and the Water Users Association (WUA). Major Operation and maintenance are to be done by the organization under the administrative and technical supervision of LG & RD through Markaz. Operation and maintenance works to be executed by UC, WUA and beneficiaries are as follows:

- Maintenance of irrigation canals, i.e., cutting grass, excavation of siltings, cleaning of canalss, etc.
- Operation of intake gate at farm pond, cleaning of farm pond and excavation of siltings.
- Cleaning and maintenance of pump houses and water tanks.
- Cutting grass and cleaning of multi-purpose farm ponds.

In addition to the daily operation and maintenance works of facilities, the following works should be undertaken by Markaz under the supervision of LG & RD.

- Excavation and removal of sand deposits in the reservoir using the provided backhoe shovel, dump trucks and bulldozer at least once or twice a year or at any time when required.
- Distribution of water by the provided tank lorry to farm ponds and to the people when ponds and/or shallow wells are dried up during the dry season.
- Maintenance of road and related facilities.
- Maintenance of water supply facilities

Necessary costs for daily maintenance work will be borne by UC, WUA and beneficiary farmers, and costs for major maintenance work to be done by Markaz will be included in the annual development budget of ICTA.

Operational costs of facilities, except for staff salaries, are principally to be paid by beneficiaries and partly supported by ICTA if necessary. Expenditures for the operation and maintenance staff are to be included in the ICTA budget.

Major supervision and planning work to be undertaken by Markaz under LG & RD are as follows:

- Supervision of O & M organization.
- Supervision and preparation of operation and maintenance plan of irrigation facilities according to the irrigation plan.
- Supervision and preparation of the water supply operation plan.
- Supervision and maintenance of heavy equipment provided.
- Operation and maintenance of tractors.