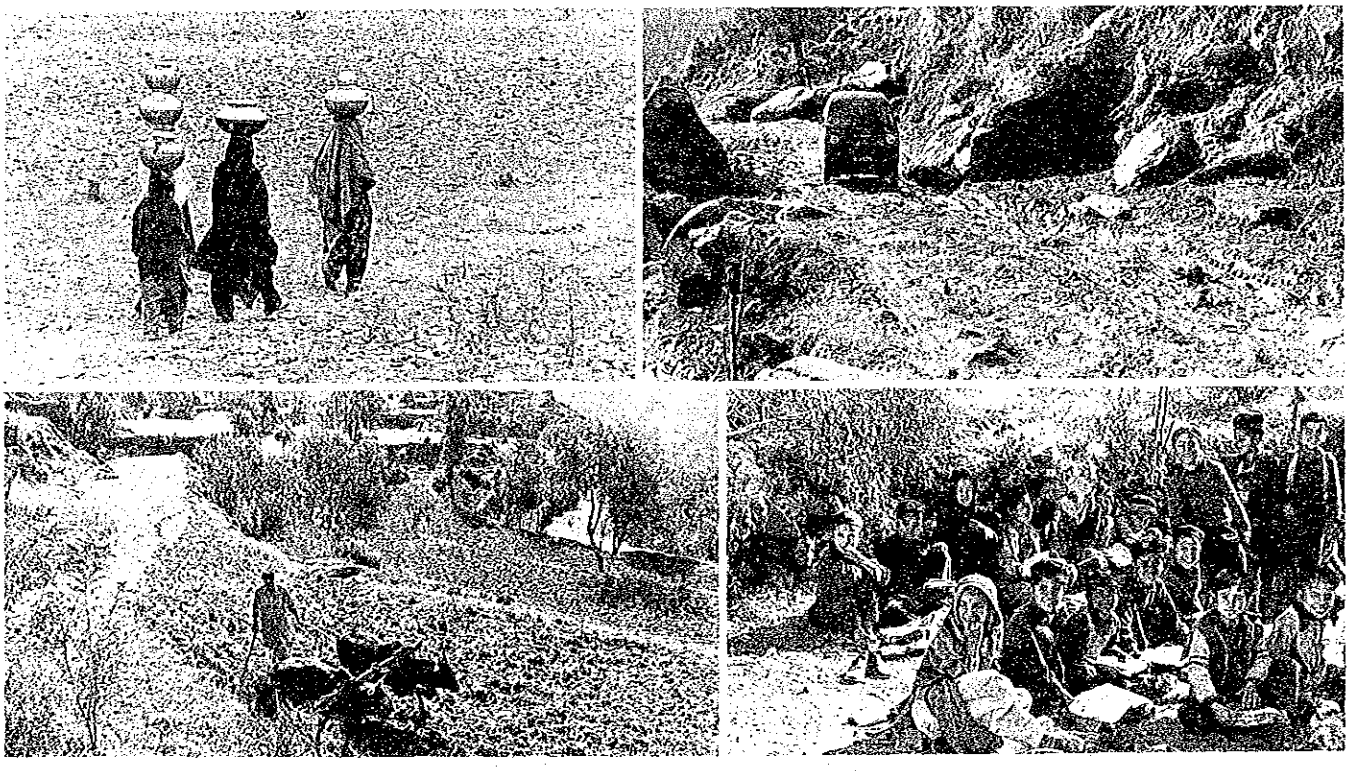
THE ISLAMIC REPUBLIC OF PAKISTAN

MASTER PLAN STUDY
ON
SWAT DISTRICT
INTEGRATED RURAL DEVELOPMENT PROJECT

MAIN REPORT



FEBRUARY 1990

JAPAN INTERNATIONAL COOPERATION AGENCY

THE ISLAMIC REPUBLIC OF PAKISTAN

MASTER PLAN STUDY
ON
SWAT DISTRICT
INTEGRATED RURAL DEVELOPMENT
PROJECT

MAIN REPORT

FEBRUARY 1990

JAPAN INTERNATIONAL COOPERATION AGENCY

PREFACE

In response to a request from the Government of the Islamic Republic of Pakistan, the Government of Japan decided to conduct a Master Plan Study on SWAT District Integrated Rural Development Project and entrusted the study of the Japan International Cooperation Agency (JICA).

JICA sent to the Islamic Republic of Pakistan a study team headed by Mr. Seiji Takeuchi, Sanyu Consultants Inc. three times from October, 1988 to November, 1989.

The team held discussions with the officials concerned of the Government of the Islamic Republic of Pakistan and conducted field surveys in SWAT District. After the team returned to Japan, further studies were made and the present report was prepared.

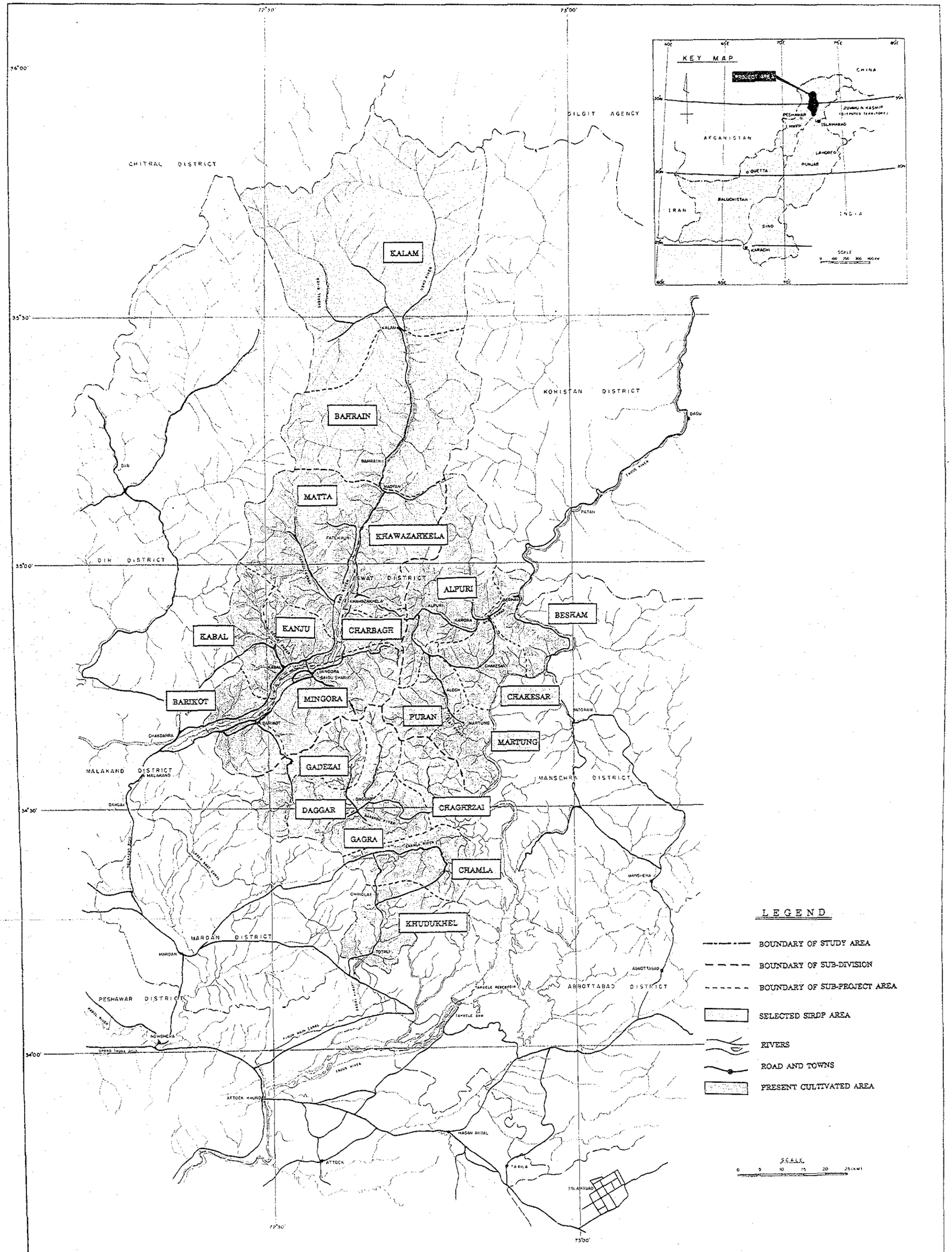
I hope that this report will contribute to the development of the Project and to the promotion of friendly relations between our two countries.

I wish to express my sincerest appreciation to the officials concerned of the Government of the Islamic Republic of Pakistan for their close cooperation extended to the team.

February, 1990

Kensuke Yanagiya

Kensuke Yanagiya
President
Japan International Cooperation Agency



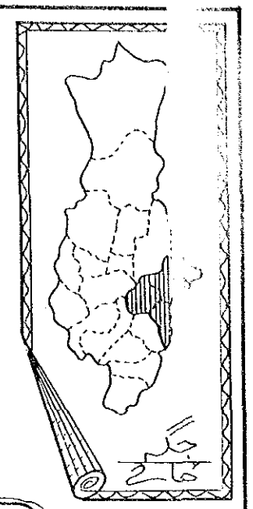
LEGEND

- BOUNDARY OF STUDY AREA
- BOUNDARY OF SUB-DIVISION
- BOUNDARY OF SUB-PROJECT AREA
- SELECTED SIRDP AREA
- RIVERS
- ROAD AND TOWNS
- PRESENT CULTIVATED AREA

SCALE
0 5 10 15 20 25 (KM)

LOCATION MAP FOR SWAT INTEGRATED RURAL DEVELOPMENT PROJECT

MAP FOR SHANGLA PAR INTEGRATED RURAL DEVELOPMENT PROJECT



HARNOI KHWAR
SWAT RIVER
SWAT DISTRICT
KHAWAZAKHELA
ALPURI
BESHAM
KARORA
KHAN KHWAR
ATTD BRANCH FARM
DEOLAI KHWAR
KABAL
MINGORA
SAIDU SHARIF
ATT
AGRI. TECHNOLOGY TRANSFER AND DEMONSTRATION FARM (ATTD)
CHAKESAR
CHAKESAR SUB-PROJECT AREA
ALOCH
BARIKOT
PURAN SUB-PROJECT AREA
LAI KHWAR
MARTUNG
MARTUNG SUB-PROJECT AREA
DAGGAR
BARANDU RIVER
34° 30'
72° 30'

NOTE:
DEVELOPMENT SCHEMES ONLY IN THE "SHORT-TERM" ARE SHOWN IN THIS MAP.

LEGEND OF PROPOSED FACILITIES

AGRICULTURAL INFRASTRUCTURE
: IRRIGATION, : SSIS
: SPRING TANK,

AGRICULTURAL SUPPORTING SERVICE
(E): EXTENSION, : MARKET. CENTER
(S): SMALL INDUST., (L): LIVESTOCK

ROAD AND OTHERS
: IMPROVEMENT : RHC
: SMALL HYDEL POWER PLANT

CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS AND GLOSSARY

1) Agencies

ADA	Agricultural Development Authority
ADBP	Agricultural Development Bank of Pakistan
BARD	Barani Agricultural Research and Development Project
CB	Cooperative Bank
CWD	Department of Communication & Works, NWFP
EAD	Economic Affairs Division
EC	European Community
ED	Department of Education, NWFP
FAC	Department of Food, Agriculture Livestock & Cooperative, NWFP
FAO	Food and Agriculture Organization of the United Nations
FATA	Federary Administration Tribal Area
FBS	Federal Bureau of Statistics
FDC	Forest Development Corporation
FWF	Department of Forestry, Wildlife and Fishery, NWFP
HD	Health Department, NWFP
ID	Irrigation Department, NWFP
In. D	Industry Department, NWFP
JICA	Japan International Cooperation Agency
LG & RD	Local Government and Rural Development, NWFP
NARC	National Agricultural Research Center
NWFP	North West Frontier Province
PARD	Pakistan Academy for Rural Development, Peshawar
PATA	Provincial Administration Tribal Area
PDD	Planning and Development Department, NWFP

PHED	Public Health Engineering Department, NWFP
PIA	Pakistan International Airline
PTDC	Pakistan Tourism Development Cooperation
RMC	Regional Meteorological Center
SHYDO	Small Hydel Development Organization
SWD	Social Welfare Department, NWFP
UC	Union Council
USDA	United Sates, Department of Agriculture
WAPDA	Water and Power Development Authority, Peshawar
WMD	Water Management Department

2) Others

Barani	Rainfed farming area
BHU	Basic Health Unit
CCA	Cultivable Commanded Area
DCP	Digestible Crude Protein
GNP	Gross National Product
IRDP	Integrated Rural Development Programme
Katcha	Unmetaled or unpaved canal
Kharif	Summer season
Khwar	Small rivers and tributaries
Mogha	Large size check and turn-out in irrigation canal
Mater Plan	Master Plan for Swat District Integrated Rural Development Project
Nacca	Small size check and turn-out in distributary and minor canals
Pacca	Paved canal by stone masonry
Project Area	Geographical area of Swat District, 8,788 sq.km
Study Team	JICA Study Team assigned to the Master Plan Study
TDN	Total Digestible Nutrients

3) Units of Measurement

mm	millimeter
cm	centimeter
m	meter
km	kilometer
sq.cm	square centimeter
sq.m	square meter
sq.km	square kilometer
l, lit.	liter
cu.m	cubic meter
MCM	million cubic meter
gal	gallon
a.f	acre feet
lit/sec	liter per second
m/sec	meter per second
cusec	cubic feet per second
ppm	part per million
pH	Potential of hydrogen
EC	electric conductivity
g	gram
kg	kilogram
ton, t	metric ton
EL	elevation above mean sea level
sec	second
min.	minute
hr.	hour
min.	minimum
max.	maximum
%	percent
No.	number
°C	degree centigrade
Cl	chlorine
HP	horse power
ET	evapotranspiration
pH	potential of hydrogen
N	nitrogen

P	phosphate
K	potassium
O & M	operation and maintenance
KWh	Kilowatt hour
MW	mega watt
EIRR	economic internal rate of return
B/C	benefit cost ratio
FY	fiscal year
Rs	Rupees (currency of Pakistan)
US$	US Dollar

4) Conversion Factors

Unit	Comparison	English Equivalent
Unit of Length:		
Millimeter (mm)	0.001 meter	0.0394 inch
Centimeter (cm)	0.01 meter	0.3937 inch
Meter (m)		3.2800 foot
Kilometer (km)	1,000 meter	0.6213 mile
Unit of Area:		
Square centimeter (sq.cm)	0.0001 sq.m	0.155 square inch
Square meter (sq.m)		10.764 square feet
Hectare (ha)	10,000 sq.m	2.471 acres
Square kilometer (sq.km)	1,000,000 sq.m	0.386 square mile
Unit of Volume:		
Cubic centimeter (cu.cm)		0.061 cubic inch
Liter (lit)	0.001 cu.m	1.0567 quarts (liquid)
Cubic meter (cu.m)	1,000 liters	35.3145 cubic feet
		0.811×10^{-3} acre foot
Unit of Weight:		
Gram (g)		0.0353 ounce
Kilogram (kg)	1,000 grams	2.2046 pounds
Metric Ton (t)	1,000 kg	2,204.6 pound
Unit of Flow:		
Liter per second (lit/sec)		0.0353 cusecs
Cubic meter per second (cu.m/sec)		35.310 cusecs

SUMMARY AND RECOMMENDATION

1. Background of the Project

1.1. Economic Situation in Pakistan

Agriculture is the economic base of Pakistan, which has farming population (over 10 year of age) by about 49 percent of the national total of 103,820 thousand (as of 1988), and occupies about 26 percent in the top of the Gross National Production (GNP).

In a period for the Sixth Five-Year Plan (1983-1988), GNP grew by 6.3 percent per year (6.5 percent of target), but that of the agricultural sector remained at low level of 3.9 percent compared with the target of 4.9 percent, because of the stagnation of major agricultural production sustaining national economy of the Pakistan.

1.2. Rural Development Policy in Pakistan

The Government of Pakistan has formulated the Five-Year National Development Plan for promoting its social and economic development. As a result of serious reconsideration, however, that the development as far made was prone to concentrate to the urban and comparatively wealthy areas, the rural development is actively promoted in recognizing the rural development as an important regional development. Fundamentally, the rural development aims not only at raising the farm productivity by agricultural development, but also at the living standards as well as the employment opportunities in the rural area through stabilizing rural society and economy.

Under such circumstances, the Government of Pakistan has made a plan to promote the rural development projects in the four Provinces of Punjab, Sind, North West Frontier and Baluchistan, and other areas under the direct administration of the Central Government. Swat District was selected as a development area (Project Area) in North West Frontier Provinces (NWFP).

1.3. Request for Swat District Integrated Rural Development Project

The Government of Pakistan requested the Government of Japan in March 1987 to extend the technical cooperation for the study on the Swat District Integrated Rural Development Project. In reply to the request, the Government of Japan dispatched the Preliminary Study Team to Pakistan in April 1988 through the Japan International Cooperation Agency (JICA), and

the Scope of Work (S/W) for the study was signed among Economic Affairs Division (EAD) of the Federal Government of Pakistan, the Government of NWFP and JICA.

2. Physical Conditions of the Project Area

2.1. Location and Geography of the Project Area

1) Swat District, the Project Area, is located in Lat. 34°09'N through 35°56'N and Long 72°07'E through 73°00'E. The District is bounded by Guilgit and Chitral Districts to the north, Kohistan and Mansehra District to the east, Mardan District to south, and the Malakand Agency and Dir District to West. The area of Swat District is about 8,788 sq.km where can be administratively divided into three Sub-Divisions; Swat, Shangla Par, and Buner.

2) Geography of these three Sub-Divisions shows the peculiar feature respectively. The altitude in Swat Sub-Division much varies from about 700 to 6,200 m. The wide and fertile cultivated land and the mountainous area are located along both the banks of the Swat river. The altitude in Shangla Par Sub-Division varies from about 500 to 4,500 m. The entire area forms a part of catchment of the Indus River. The major rivers are the Khan Khwar and the Itai Khwar.

The altitude in Buner Sub-Division varies from about 400 to 3,000 m. The entire area also forms a part of catchment area of the Indus river, and the Barandu river is the main stream in this Sub-Division. Buner Sub-Division can be divided into three basins by the mountain ridges. The rainfed farming called as "Barani" is widely put into practice.

2.2. Geology, Soil and Land Use

1) The Project Area consists of a complicated geological structure caused by the orogenic disturbances and depositional cycles. As the result, an extremely varied nature of land is formed comprising mountains, dissected loess plain, outwash aprons and alluvial plain.

2) Soils in Swat District are formed with materials derived from local weathered bedrock; they are residuum and colluvium from Diorites, Granites,

various Schists and Marbles, etc. The mountain soils are generally shallow to moderately deep and have loamy and gravelly texture.

3) The present land use in the Project Area is shown as follows:

Present Land Use (1977-1988)

(unit: 1,000 ha)

Sub-Division	Grand Total	Cultivated Land		Uncultivated Land			
		Sub-Total	Irrigated	Sub-Total	Cultivable Waste	Pasture & Grazing Land	Forest Land
Swat	545.2	99.1	39.3	446.1	5.4	120.7	140.3
Shangla Par	148.0	41.5	3.3	106.5	4.1	45.9	39.8
Buner	185.6	55.2	6.2	130.4	5.8	70.8	31.8
Total	878.8	195.8	48.8	683.0	15.3	237.4	211.9
	(100%)	(22)	(5)	(78)	(2)	(27)	(24)

2.3. Meteorology, Hydrology and Water Resources

1) The climate of the area can be characterized by that of sub-tropical and semi-arid climatic zone mixtured with temperate zone in high altitude areas, resembling of the Himarayas in the global view. The climate is marked by two distinctive seasons, the Rabi winter rainy season from November to April and the Kharif summer monsoon rainy season from July to October. The temperature starts rising steadily from January till June, and falls in the beginning of the monsoon rainfall and continues till January. The hottest months are June and July recording 28 to 30°C by daily mean temperature, and the coldest December and January recording 1 to 8°C. Annual precipitation in the mountainous areas such as northern Swat and Shangla Par Sub-Divisions is more than 1,000 mm and the central, southern Swat and Buner region less than 1,000 mm.

2) The Swat river flows through the central part of the Swat Sub-Division collecting the water from seven major tributaries. The water is used for irrigation and domestic use in the area. The yearly utilization of Swat river water is roughly estimated as mentioned below;

- The average annual discharge at Chakdarra ; 5,300 MCM
- Intake of irrigation water in Swat Sub-Division; 1,200 MCM
- Return flow of above irrigation water ; 200 MCM
- Water right in downstream area ; 1,000 MCM

- Annual water flowing down without use estimated conservatively ; 3,300 MCM

It is not easy to use this water unless a reservoir is provided with large storage capacity in order to moderate the seasonal fluctuation of discharge.

3) Shangla Par Sub-Division is composed of two watersheds of Khan Khwar and Itai Khwar basins. The Khan Khwar river water is used as much as possible by traditional intake and conveyance method under traditional life style and land use in the mountain villages. Buner Sub-Division is dived into three water basins of Barandu (northern part), Chamla (central part), and Badri (southern part). The Budar Khwar flowing north to south through the Chagarzai area has a comparatively large discharge even in the dry season.

4) There are many natural springs coming out perennially in the mountain foot or valleys in the Project Area. Many of them are traditionally used for private small scale irrigation, drinking, and other domestic uses. There are many alluvial fans and terraces developed in the Project Area. The groundwater table can be found relatively shallow. The tube wells are found in many places recently in addition to the traditional dug-wells.

3. Socio-Economic Conditions

3.1. Administrative Division and Related Agencies to the Study

1) The general administration in Swat District is executed through such organs as Sub-Division, Tehsil, Sub-Tehsil and village. And there are three Sub-Divisions, five Tehsils, 14 Sub-Tehsils and 1,695 villages in the area. The responsible persons as administrative heads in Swat District, three Sub-Divisions and Tehsils are the Deputy Commissioner, Assistant Commissioners and Tehsildars, respectively.

2) The Government Authorities and other agencies concerned with the Master Plan Study for Swat District Integrated Rural Development Project are as follows;

- Federal Government of Pakistan - Economic Affairs Division
- Government of NWFP - LG & RD Department and other seven authorities

- Local Government of Swat District - LG & RD Department and other 13 authorities
- University Institute and Other Authorities in Peshawar - Peshawar Institute of Development Studies, Agricultural University, and other three authorities.

3) The responsible authorities for the Master Plan Study is Local Government & Rural Development Department of Swat District. This Rural Development Department controls 69 Union Councils (UC) which are the self-governing organizations based on the grass-root level rural people. The 539 wards as group of villages are set up in the administrative category between UC and terminal villages for UC to easily control the villages located over a wide area.

3.2. Population, Employment and Farm Economy

1) The total Project Area for the Integrated Rural Development Project is 878,840 ha, of which farmland occupies about 22 percent, cultivable waste about 2 percent, pasture land and grazing land about 27 percent, forest about 24 percent, and non-cultivable area (not available for cultivation) 25 percent respectively.

2) According to the 1981 Population Census, the population in Swat District was 1,233 thousand with population density of 140 persons per square kilometer. The density is larger than 106 persons in Pakistan and 83 person in Marakand Division. The annual rate of population increase in a decade from 1972 to 1981 is 3.1 percent in the whole Pakistan, 3.3 percent in NWFP, and 3.7 percent in Swat District. The number of households in Swat District is about 184 thousand and the number of the unit family is 6.7 persons on an average.

3) The employment population in Swat District was about 324 thousand by (more than ten years of age), of which the rural area workers were 305 thousand, the urban area workers 19 thousand. As regards the industrial structure in the rural area, the distribution rate of the employed population in the primary industry is 82.1 percent, and about 10 percent higher than that in NWFP or Pakistan as a whole. The secondary and tertiary industry sector occupy 3.9 percent and 12.4 percent, respectively. These rates are 3 to 6 percent and 6 to 11 percent lower than those in NWFP and the total nation, respectively. The job seekers were about 15 thousand by more than ten years of

age. This is 4.4 percent of the total workable population of about 339,000 persons. The percentage of the total job seekers registered in Swat District is only 5.4 percent due to the narrow labor market.

4) JICA Study Team conducted the Farm Economy Survey on 60 farmers sampled in Swat District. The average size of land acreage is 1.78 ha (4.37 acre). About 21 percent of population of over ten years of age is under seeking jobs and 15 farmers sold or purchased the land for the last one year. The average gross income of farm household per annum is estimated at 22,886 Rupees, of which agricultural income is 8,236 Rupees (36 percent) and non-agricultural income is 14,650 Rupees (64 percent).

3.3. Agricultural Infrastructure

1) The total cultivated areas of 195.8 thousand hectare are distributed in Sub-Divisions by 99.1 thousand hectare in Swat, 41.5 thousand hectare in Shangla Par, and 55.2 thousand hectare in Buner. The irrigated areas are totalized by 48.8 thousand hectare or 25 percent of the total cultivated areas. Those in Sub-Divisions are 39.3 thousand hectare for Swat, 3.3 thousand hectare for Shangla Par and 6.2 thousand hectare for Buner.

The irrigated areas depend on various sources, including 3.5 thousand hectare by governmental control canal system, 37.5 thousand hectare by private and civil canal system, 0.1 thousand hectare by deep well system, 4.7 thousand hectare by dug-well system, and 3.0 thousand hectare by pump system. The area in Shangla Par is only 3.0 thousand hectare which are irrigated by private or non-governmental canal systems and 0.3 thousand hectare by pumps systems due to the unfavorable topographical and water resources conditions. The irrigation is practised by Irrigation Department and Water Management Department.

2) The areas along the Swat river, Barandu river, and watersheds have been given severe flood damages every year to farmlands, irrigation facilities, residential areas and public facilities such as roads, etc. The flood control and protection works of the farmland and irrigation facilities along with the rivers fall into the jurisdiction of the Irrigation Department. Except for the locally executed small works, however, most of the works have been carried out only along the Swat river.

3) There are many rainfed dry farming (Barani) fields developed up to the top of the hills in Shangla Par and Buner Sub-Divisions. The fields are exposed

to the severe rainfall in the Rabi (winter) and Kharif (monsoon season) to be eroded and collapsed. The land consolidation works with the unification and leveling of the existing small plots of land have not yet been carried out both in the irrigated farmland and Barani field.

3.4. Roads and Communication

1) Roads in Swat District are 1,021.km in total length, of which highway type is 593.7 km and low type class is 427.4 km with road density of 0.125 km/sq.km. The road density is equivalent to only one fifth of minimum at 0.64 km/sq.km of the area, which is the target of rural development in Pakistan (Sixth Five-Year Plan 1983-1988).

2) There are daily flights of PIA between Saidu Sharif, Capital of Swat District, and Islamabad and between Saidu Sharif and Peshawar. The transportation in Swat District, however, depends mainly upon motor vehicles, and the number of which registered in Swat District amounted to be about 10,000 in 1985.

3.5. Rural Electrification

1) WAPDA controls two transmission stations of Amanko (Swat Sub-Division) and Karapa (Buner Sub-Division) with 132 KV power lines. The coverage of electrification is estimated at only 24 percent, which is lower than that of the Sixth Five-Year Plan's target of 38.3 percent in 1987. Irrigation Department (Power Wing) is in charge of operation and maintenance of existing three power schemes. They are Damorai station with 100 KW established in 1982, Karora with 200 KW in 1984 and Kalam with 200 KW in 1984.

In order to study small-hydel power development, SHYDO has been established recently, but has not completed any plants yet.

Non-electrified villages, especially those in Shangla Par Sub-Division are constrained in such various fields of daily life as health care, education and village water supply, etc.

3.6. Village Water Supply

1) The water supply schemes in Swat District are controlled by Public Health Engineering (PHE) Department in Mingora. The Department is handling water supply schemes covering 300 to 500 households on an average and responsible for planning, designing, implementation, and maintenance of completed facilities. Also, the Department collects the water charge from consumers.

The water supply schemes in Swat District are 143 in completion, 33.4 percent of population coverage, and 77.1 million Rupees are required as expenditure. The coverage of water supply schemes in Shangla Par Sub-Division shows the lowest figures by 28.5 percent of population, and 3.9 million Rupees of investment, which is equivalent to only one tenth of that for Swat and Buner Sub-Division.

3.7. Rural Infrastructure

1) According to the Population Census in 1981, the illiteracy rate of Swat District is 15.1 percent for men and 1.7 percent for women which are lower than 25.9 percent and 6.5 percent in NWFP respectively. The schooling rate for children at primary school in Swat District are 41 percent for boys and 5 percent for girls in 1987, which are extremely lower than 83 percent and 19 percent respectively in NWFP. The schools facilities are short in number in primary schools for both boys and girls as shown in the fact that a school covers 10.0 and 38.3 sq.km/school in Swat, 8.0 and 24.9 sq.km/school in NWFP for boys and girls respectively. The facilities of schools are generally insufficient to meet the education population.

2) The population per health institution in Swat District was estimated at 13,900 on an average. In considering the inadequate functions of the existing dispensaries, the above figures are far from the basic health care by one health institution for 9,820 persons as large in the Sixth Five-Year Plan. The population per one doctor in the District is larger than that in NWFP and was estimated at 14,500 and 10,800 in Swat District and NWFP, respectively.

The present health care activities are unsatisfied by people due to shortage of RHC, BHU and doctors in number.

3) The Government of NWFP has been trying to establish the rural sanitation systems. According to the target of the Six Five-Year Plan, the

sanitation facilities have been provided in NWFP with the population coverage of 1.5 and 28.3 percent for the rural and urban areas, respectively, by 1988. The budget allocated for three on-going sanitation schemes in 1987/1988 was only seven percent of the total budget for the Public Health Engineering Department in Swat District.

4) The number of post offices in the District is estimated at 106, of which one is the head post office in Saidu Sharif, 21 are the sub-post offices and 84 are the branch post offices. Each post office, on average, serves an area of 74.2 sq.km and the population of about 14,000.

Only two telegram offices are available, one in Saidu Sharif and the other in Mingora. There are, however, no telegram offices in the rural areas. Three automatic relaying telephone offices are located at Saidu Sharif, Mingola and Daggar. And there are 36 of other relaying offices in the area. The telephone available is 2,982 units. The population served by each telephone can be calculated at about 540 persons.

3.8. Forestry and Tourism

1) The total forest areas in Swat District in 1988 were 2,160 sq.km, consisting of Swat Forest Division of 1,720 sq.km and Alpuri Forest Division of 440 sq.km. The ownership of the forests in Pakistan is generally classified into three types of reserved forest, protected forest, and private forests. Annual harvesting volume of timber amounts to 36.9 thousand cubic-meter. The revenue of forest is shared by 60 to 80 percent for the public concession and by 40 to 20 percent for the Government.

2) Swat District is blessed with the tourism resources. There are reasonable and comfortable hotels and motels. The tourist attraction will greatly contribute to increase revenue and the local employment opportunities in the area. The present problems pointed out by the Tourism Information Center of PTDC are that caravan parks, youth hostels, good and decent restaurant, single decent toilets, etc. are required.

4. Outline of Present Agriculture

4.1. Barani Agricultural Area

1) Such larger share of the total labor force as 82 percent in the primary industries of agriculture, forest and fishery in Swat District means that the regional economy remains dependent on an agriculture. Most of the farmers, however, are small farmers cultivating Barani land with very limited irrigated area as follows;

Distinctive Features of Agriculture in the Project Area

1. Population			
- Total Population	1,233	thousand	(100%)
- Total Population in Farm Households	1,145	thousand	(92.9%)
2. Farm Households (1980 Census of Agriculture)			
- Agricultural Households	140.0	thousand	(100%)
- Agricultural Households with Farm	110.0	thousand	(77.5%)
Owner Household	79.5	thousand	(56.0%)
Owner -cum-Tenant Household	9.4	thousand	(6.6%)
Tenant Household	21.1	thousand	(14.9%)
- Agricultural Households without Farm(Livestock Holders)	32.0	thousand	(22.5%)
3. Farm Size (1980 Census of Agriculture)			
- Cultivated Land per Farm	1.2	ha	
- Irrigated Land per Farm	0.4		
- Unirrigated Land per Farm	0.9		
4. Livestock			
- Total Head of Cows	561.7	thousand	
- No. of Head per Farm Household	4.0	(all ages)	

2) Since the average annual rainfall exceeds 1,000 mm in the mountainous area, it could be said that the Project Area is comparatively blessed with rainfall. The distribution of rainfall, however, varies by months and years to a great extent. As a result, it becomes impossible to plant crops at suitable time. The cropping intensity in the Barani area is estimated at 147 percent, while the intensity in the irrigated areas is high as 185 percent.

4.2. Irrigated Agricultural Area

1) About 84 percent of the total irrigated areas is irrigated in the use of river discharges which are commonly unstable by seasons. The national irrigation systems, which usually can supply irrigation water all year round, are located in the limited areas, mostly in Swat Sub-Division. Many rainfed areas are located in Shangla Par Sub-Division with irrigated land found in the very limited area.

2) Most of the river flow irrigation systems are small by traditional method, covering about 5 to 30 ha, and will need improvement for more stable and efficient water supply. Presently, these systems have been maintained in the traditional way without any improvement.

4.3. Crop Production and Agricultural Farming

1) The total production of both maize and wheat has tripled in these ten years, although their yields have been kept low in the level. It means that the increase of the crop production is derived from the expansion of cropping areas. The expansion of the cropping areas might result from the reclamation of the marginal lands in the mountainous areas due to lack of suitable cultivation land. The development of the marginal land has accelerated the perished forest land to cause severe flood by increasing runoff, land sliding, and soil erosion, especially in the areas.

2) In the overall cropping intensity, wheat covers about 54 percent in the Rabi season, while maize and rice cover 50 percent and 10 percent respectively in Kharif season. High cropping intensity of wheat and maize comes from their large cropping area in Barani. The cropping of rice and such cash crops as fruits, vegetables, onion, Kharif potato, etc. is limited to the non-seasonal irrigation areas which cover very small areas. The average yields of wheat, maize, and rice are 1.1 ton/ha, 1.3 ton/ha, and 1.6 ton/ha respectively. Although the yield level is almost equal to the national averages, there is a large yield gap of these crops between that by research stations and farmers' fields.

3) About 20 kg of nitrogen (nutrient element) per hectare are applied in the Project Area. Although the improved varieties of wheat and rice have been introduced by most farmers, only a few farmers use quality seeds because organizations for scientific seed production system have not been established in the Project Area. Only very limited amount of seeds samplings of maize, potato,

and fruits, and vegetables are supplied due to the same situation as that of wheat and rice.

4.4. Animal Husbandry and Fisheries

1) About 82 percent of total farmers holds 4.0 head of cattle with 2.8 head of adult and 66 percent of farmers 2.9 heads of water buffaloes with 1.9 head of adult on an average. Most of the cattle is used as draft animals, while water buffaloes are raised as major supplier of milk. On the other hand, most sheep and goats are raised in transhumant herds. In addition to shortage of animal feeds, insufficiency in services on animal health case genetic improvement and improvement of raising technology is major constraint for development of the animal husbandry in the area.

2) Although a trout hatchery has been constructed with the production capacity of 20 million fingerlings in a year, the fishculture of trout has not been developed yet successfully except for a few small scale fishponds.

4.5. Agricultural Research and Extension

1) Two research organizations under NWFP Agriculture University cover the Project Area, and these are the Pir Sabac Agricultural Research Station and the Mingora Agricultural Research Station. The former conducts experiment on maize and millets, while the latter on other crops to promote the agricultural development in high altitude area. The Mingora station, however, is in lack of experimental farms and staff. Moreover, sub-station should be provided to conduct the experiment of the temperature zone crops in the higher altitude areas like Kalam area. Except Buner Sub-Division where the extension activities have been strengthened by training and visit programme, the extension staffs have to cover more than 5,000 farm households on an average. In addition to the fact, the lack of transportation facilities like motorcycles and other extension equipment/materials also causes the inadequate extension services in the area.

There are 288 of multipurpose cooperative societies established in Swat District and the total members of the societies are about ten percent of the total farm households. Their activities, however, are generally not as powerful, especially in the works in mountainous areas.

2) A wide range of agricultural environment in the Project Area requires the various adapting researches and the systematization of agricultural extension technology based on the researches for different areas, especially for mountainous areas of Shangla Par Sub-Division. There is no organization, however, to take in charge of these works.

5. Development Problems and Strategy

5.1. Problems and Constraints for Development

1) From the view point of the land resources, problems and restricting factors for development are pointed out as limitation in flat land for crop cultivation in the mountainous areas with steep slope. An over-development of farm land at the steep slope area has caused reduction in forest areas to results in serious social problems of soil erosion as well as decrease in the water holding capacity of the land.

2) There exist perennial and intermittent rivers in the Project Area, and the seasonal fluctuation of their discharges is extremely large, and this has brought about many problems and restrictions in the development and utilization of the water resources. Since the seasonal fluctuation is small, the groundwater is one of the easiest water sources to be utilized if the cost problem can be conquered.

3) The rainfed (Barani) field acreage amounts to about 75 percent of total cultivated area. From view point of the farm economy of Barani farmer, about 35 percent of their living costs is payable by annual agricultural income. Hence, main labors of the family have drained to work to Peshawar, Rawalpindi, Karachi and far to the Middle East. This has brought about problems and restrictions in promotion of self-supporting activities of farm management and village community movement.

4) Various crops adaptable to a wide range of agricultural environment would be much expected to be introduced. Such problems, however, as inadequate agricultural experiment, insufficient agricultural extension, shortage of veterinary and extension facilities and insufficient seeds multiplication facilities are pointed out. The development of agriculture in the Project Area are constrained by limited water and other resources, limited financial capacity, human resources, and agricultural supporting services.

5) The forest is fundamental for living conditions of the local people. The increasing pressure of grazing, lopping of fuel twigs, and illegal timber cutting is the customary social problems. Consequently, the development strategy for the use and management of the forest resources should be formulated in considering increasing needs of local people, and the forests should be used as a base to provide the infrastructure as well as the wood-industry in creating employment opportunities in the forest areas.

6) Social infrastructures such as road networks, electricity supply, water supply, education, health care, sanitation, and communication have not been sufficiently developed yet. The teachers and doctors are short in number as well. The present improper rural infrastructure of roads, electricity, and other limits the social and economic activities. And in particular, the shortage of staff in health care and education is very serious.

7) The steep mountainous topography restricts the development of road, electricity, and others due to comparatively high construction cost compared with that in flat area.

5.2. Inquiry Survey on the Grass-Root People's Needs

In order to identify farmers' economic conditions and local peoples' demands, farm economic survey was conducted in the study, and their results are shown below;

1) Farm Economic Survey (10 UCs, 10 Villages, 60 samples)

Suggestion for the Solution of the Problems by Farmers

- Upgrading of School Facilities : 50
- Upgrading of Irrigation Facilities : 40
- Loan for Agricultural Inputs : 34
- Electrification : 32
- Road Improvement : 30
- Water Tank Construction : 30
- Dispensary Construction : 30
- Drainage Improvement : 13

Major Community Problem observed by Respondents

- Health & Sanitation : 51
- Rural Electrification : 36
- Education : 30
- Communication : 25

2) Inquiry Survey for Union Council Level (66 UCs responded out of 69 UCs)

(Unit: Number of UC responded)

Priority Needs	Swat				Shangla Par				Buner			
	I	N	M	U	I	N	M	U	I	N	M	U
Irrigation	5	13	10	0	2	5	0	0	13	2	0	0
Road (Katcha)	2	13	8	1	1	12	2	0	1	4	0	0
Electrification	5	12	10	0	2	6	1	0	2	7	3	0
Water Supply	7	11	4	0	1	8	1	0	1	6	1	1
Health Centre	3	21	6	1	0	11	0	0	2	9	0	1
Primary, Middle High School	6	12	10	2	1	7	4	1	1	5	3	2

Note) UC responded: Swat 35, Shangla Par 15, Buner 16
I: Improvement, N: New Development
M: More increase, U: Upgrading

5.3. Development Strategies

1) The Seventh Five-Year Plan (1988-1993) emphasizes the development of the rural area in stating about an implementation of a concrete programme of poverty alleviation and an attainment of full employment. In the project plan, the following two development strategies are proposed to expect that poverty can be driven away from these frontier rural areas;

i) Increase in family income and expansion of employment opportunity, and

ii) Acceleration of rural development for improvement of the social infrastructure.

2) Major Study Subjects for Attainments of Strategies

- The development of natural resources available in the Project Area and the way of better utilization of them and increase of agricultural production,
- The measures to balance the income disparity between the rural and urban people in the area,
- The measures for creation of employment opportunities for the local people, especially, low income people, women and youths, and
- The measure to keep harmony of living environment with local natural condition, and creation of the amenity of rural society.

3) Development Time Target

The following three fundamental and overall targets are provided;

First Stage	: Short-term development	(1990 - 1995)
Second Stage:	Middle-term development	(1995 - 2000)
Third Stage	: Long-term development	(2000 - 2005)

4) Growth Target of Economic Factors

Items	Unit	1988	2005	Annual Growth Ratio
Population, Swat	1,000 persons	1,537	2,626	3.2%
Household, Swat	1,000 houses	229	343	
Employment, Swat	1,000 persons	404	690	
Gross Regional Production Value per Capita		5,870 (1987)	9,023 (2003)	6.0%

5) Criteria for Selection of Basic Development Plan

Based on the development strategy mentioned above, criteria for selection of basic development plan are considered as follows.

a) Consistency in Government Policy

The aspects given high priority for developing the rural area by the Seventh Five-Year Plan are likewise given high priority in the formulation of Master Plan.

b) Satisfaction of Local People's Demands

The study is made to meet the local people's demand as much as to realize the Master Plan as early as possible.

c) Income Increase and Employment Generating Effects

The priority in selection of the development plans is given to those plans which will raise the income level and increase employment opportunities of the rural people in order to correct the regional imbalance in socio-economic conditions.

d) Satisfaction of Needs in Minimum

The recently accepted philosophy underlying in rural development emphasizes to satisfy the local people in minimum living conditions. The plans related to these fields are given high priority and should be included in the Master Plan.

e) Investment Scale

In considering the scale of investment and finance in huge amount, plans with lower priority will not be included in the Master Plan. The said criterion in view of the investment scale will be decided based on the coordination of the on-going development plans, effect through the plans and urgency in project implementation.

5.4. Basic Concept of Development Plan

The socio-economic development in Swat District shall be entrusted with the Seventh Five-Year Plan (1988-1993) and the Second Project Plan (1988-2003). Several Foreign Aids Projects have been implemented through the integrated development method.

However, the implementation period of these Foreign Aids Projects are within the term stipulated in the Seventh Five-Year Plan. And the annual budgets required for the local government programmes have not been enough to meet the local needs. Under the circumstances, in order to attain the national

economic growth target projected in the Second Project Plan, an integration of the development budgets to be allocated to each line-Department and an implementation of the proposed plans according to the Master Plan will be along with rational strategy.

5.5. Approach to Integrated Rural Area Development (IRAD)

- A definition of an integrated rural area development study is to determine the appropriate location of social and economic activities/functional facilities.
- The Master Plan Study so far made was initiated with the development need surveyed in participation of all Union Councils.
- The on-going IRAD projects and future plans to be executed by all line-Departments concerned were confirmed and projected in the Master Plan.
- Water resources development studies were conducted on the preliminary level..
- Decentralization of planning was considered; Namely at the first step, administrative structures as spatial hierarchy was identified. At the second step, Sub-Division was classified into nine Zones based on the topographical, agro-climatological and socio-economical environment. At the third step, one Sub-Tehsil area was defined to be one Sub-Project Area. As a result, the Project Area is divided into 20 Sub-Project Areas.

6. Development Project Proposed in Master Plan

6.1. Sectoral Development Plan for Formulation of Master Plan

1) The study on sectoral development plans mentioned below have been made on the basis of the prevailing problems and constraints, in order to formulate the Basic Project Plan (Master Plan) for the Swat District Integrated Rural Development Project.

i) Land Resources Development Plan
   - Land use plan
   - Soil conservation measures plan

ii) Water Resources Development Plan
- Surface water resources development plan
- Groundwater resources development plan

iii) Agricultural Development Plan
- Crop production plan
- Farm mechanization plan
- Animal husbandry Plan
- Farmers' organization and agricultural institutional development plan
- Rural industry development plan
- Marketing and agricultural credit plan

iv) Agricultural Infrastructure Plan
- Irrigation plan
- Farmland improvement plan
- Flood control and river protection plan

v) Rural and Social Infrastructure Plan
- Road and communication plan
- Small-hydel power and rural electrification plan
- Village water supply plan
- Rural infrastructure plan

vi) Social Forestry and Tourism Development Plan
- Social and farmland forest development plan
- Tourism development plan

6.2. Development Plan in Master Plan

1) All of the development plans for each sector, aiming at betterment of rural life in the Project Area, are carefully reviewed alone with the criteria mentioned previously on the development potential, and natural and physical conditions. As a result, the following major development plans are selected in the Master Plan:

- Agricultural infrastructure plan
- Agricultural supporting services plan
- Road and communication network plan
- Rural electrification plan
- Village water supply plan

- Rural infrastructure plan
- Village community plan

The social and farmland forest development plan and tourism development plan are not included in the main development plan in taking into account the following fact; the former development plan has been implemented successively with the on-going forestry development plans. Regarding to the latter plan, the integrated rural development plan should be formulated through the integration of sectoral development plans in close coordination with rural community in the area. From this point of view, the tourism development plan would not meet the local peoples' demand in the aspects of such criteria as the immediate effect through the plan and urgency of project implementation.

6.3. Project Facilities and Implementation Plan

1) The Project Area is divided into 20 Sub-Projects by Tehsil, and the Tehsil-wise 20 Sub-Projects involving major project facilities are tabulated in Table-1. And, the development schemes in the Master Plan having three implementation stages of short, middle and long-terms development are shown in Table-2.

Total development cost required for Master Plan is estimated at 15,653 million Rupees as shown below:

Development Cost for Master Plan

(Unit: Million Rs.)

Development Plan	Short-Term	Middle-Term	Long-Term	Total	
1. Agricultural Infrastructure	636	670	636	1,942	(18%)
2. Agr. Supporting Service	255	123	76	454	(5%)
3. Road & Communication	950	322	193	1,465	(14%)
4. Rural Electrification	309	558	907	1,774	(17%)
5. Village Water Supply	376	452	464	1,292	(12%)
6. Rural Infrastructure	856	933	1,548	3,337	(32%)
7. Village Community	76	92	91	259	(2%)
Sub-total	3,458	3,150	3,915	10,523	(100%)
8. Price Escalation	449	1,392	3,289	5,130	
Total	3,907	4,542	7,204	15,653	
	(25%)	(29%)	(46%)	(100%)	

2) The main implementation agency for the project is local Government and Rural Development (LG & RD) Department. It is important and prerequisites that active cooperation among Government Agencies for each sectoral development should be established under the project so as to ensure smooth project implementation. The project will have three levels of organization and management structures to meet the above-mentioned requirements (See Figure-1); the Project Steering Committee (PSC) responsible for policy making, District Project Coordination Committee (DPCC) to manage overall project coordination, and Project Management Unit to execute project implementation with the participation of line-Departments concerned in Swat District.

The implementation period of the Master Plan Project is planned to be 15 years and is divided into three phases of short-term (1990-1995), middle-term (1995-2000), and long-term (2000-2005). The implementation schedule for the Master Plan Project is shown in Figure-2. For the project implementation, financial and technical assistance by the foreign governments would be required because of its large amount of the investment cost.

7. Priority Development Project

7.1. Selection of Priority Development Area (SIRDP Area)

1) The Master Plan for the Swat District Integrated Rural Development Project was formulated on the basis of Sub-Project Areas including 20 areas on the Tehsil boundary from the viewpoint of areal project planning. Out of these 20 Sub-Project Areas, three Sub-Project Areas in Shangla Par Sub-Division (Chakesar, Puran and Martung Sub-Tehsils) was finally selected as the priority development areas through the second step of selection. These selected areas are named as the Shangla Par Integrated Rural Development Project (SIRDP) Area, and Pre-Feasibility study on the area has been made in this study.

7.2. Present Situation of SIRDP Area

1) Present situation of the selected SIRDP Area is summarized below:

Present Situations of SIRDP Area

1. Administrative Boundary	:	Chakesar, Puran and Martung Sub-Tehsils
2. Area		
- Cultivation Area	:	19,770 ha (Irrigated Area; 1,940 ha)
- Uncultivated Area	:	47,930 ha
Total	:	67,700 ha
3. Population (1988)	:	138,600 (Population Density: 205 persons/sq.km)
4. Household	:	21,330 households (6.5 person/house)
5. Agricultural Production		
- Main Crop	:	Kharif -- Maize, Rice Rabi -- Wheat
- Crop Yield	:	Maize ; 1.8 - 1.1 ton/ha, Rice; 1.6 ton/ha, Wheat 1.6 - 0.8 ton/ha
6. Rural Infrastructure		
- Road	:	Unfavourable condition with unpaved roads by low density
- Education	:	Literacy rate -- men 28% and women 2%
- Rural Electrification	:	Electrified house ; 195 houses (0.9%)
- Village Water Supply	:	Population coverage ; less than 30%
- Health Services	:	Hospital 2 places, BHU 6 places

7.3. Project Facilities and Implementation Plan for SIRDP Area

1) Pre-Feasibility study on Shangla Par Integrated Rural Development Project (SIRDP) was made including various alternative plans. As a results, the proposed facilities in the SIRDP area are shown in Table-3. And the project cost and implementation schedule are given in Table-4 and Figure-3.

2) As the project facilities related to the priority development project, Agricultural Technology Transfer and Demonstration (ATTD) Farm aiming at the farmers' training in Swat District, especially Chakesar, Puran and Martung areas has been planned at Mingora. The functions of the ATTD Farm are as follows;

- Development of agricultural production by upgrading farmers' farming technology as well as increasing yield and quality of such crops as staple crops, fruits and vegetables through research and experimentation,
- Promotion of agricultural extension services by upleveling the extension workers' capability, and
- Positive transfer of agricultural technology and demonstration of irrigated and Barani farming to the local farmers.

In addition to the above ATTD farm as the main station, four branch farms will be provided in Chakesar, Derai, Choga and Martung in SIRDP Area.

8. Expected Project Impact

Socio-economic situation in the rural area in Swat District would be innovated by the beginning of 21st century through the smoothly implementation of Swat District Integrated Rural Development Project. The living condition would be considerably improved and become stable. The diversified farm management would be developed through socio-economic modernization in the rural area. The anticipated effectiveness of the Master Plan would be materialized from the integrated interaction of implementation of seven major development schemes proposed in Master Plan, by on-going Government development programmes and the foreign aid projects in Swat District. When each scheme in 20 Sub-Tehsils is under the well-balanced investment, the project benefits will be equally distributed throughout the rural area.

Expected benefits can be studied in relation to the following four subjects:

1) Agricultural Production Effects

Construction of irrigation facilities including improvement and extension of canals, flood protection works, and Barani land conservation works will contribute to increase in irrigable area and diversified cropping area. Especially, irrigable area is expected to increase by 19,800 ha of farmland, and hence, to extend from 25 to 35 percent of total cultivated area. Implementation of agricultural development schemes will be effective to increase cropping

intensity, land and labour productivity for cropping and animal productivity and quality.

Establishment of ATTD Farm will particularly contribute to upgrading of farmer's technology, encouraging farmers to introduce the diversification crops, increasing crop yield, and promoting agricultural extension services, etc.

2) Effects on Employment and Income Increase

Effect on employment is expected in a wide area of increase in production of cropping intensity, acreage for diversification of crops. And raising of animal labour is the main reason for farmers to provide much more labour. Expansion of demand for labour market will be generated through physical activities such as increase in production of marketable crops and livestock, construction of marketing facilities and road networks.

Women and unemployed labour will be increased through establishment of fruits processing factory and women handicraft centre. Young family labour once drained for working out of Swat District will be encouraged to return to their villages for their farming.

Furthermore, a great number of skilled and unskilled labour will be employed by construction works during the 15-year implementation for the Master Plan. Farm income, off-farm income and wage earned by small farmers will be available through the rise of agricultural productivity and expansion of working opportunity. Motorization resulting from the road development will make prosperous such industries as commerce, manufacturing and tourism to contribute to increase the regional income.

3) Improvement of Living Standard

Many hardships in physical labour and time losses will be saved by release of women from the hard works for fetching drinking water through implementation of the village water supply schemes, reduction of physical toil of farming through agricultural mechanization and upgrading of the convenience by construction of road and communication facilities. These saved labour and time will be used for daily works such as education for children, study for farmers themselves, improvement of nutrition, childcare, etc..

4) Effect on Rural Infrastructure

The education development schemes will bring about an incalculable positive effect for subsequent generation to be useful for the rural development. Attending rate of students for primary school is expected to rise by 90 percent of boys and 70 percent of girls by the year of 2005.

The health care and related facility development will make the present medical level in Swat District grade up to the national standard by 2005. This will contribute to upgrading of health condition and stability of welfare by quick access to medical care of the local people.

Sanitation facility development will disseminate latrines at coverage of 20 percent of population by 2005. This scheme should be encouraged by the Government as part of the village community development plan for the promotion of the rural volunteer movement.

9. Recommendations

1) Promotion of Staged Development for Master Plan Project

The development plan for Master Plan Project is worked out by three staged developments in short, middle and long-term. The short-term development is formulated in taking into account the implementation priority, quick yielding, etc. In this study, Pre-Feasibility study has been made on the priority plans in the short-term plan. It is necessary, however, further works of survey, investigation and design on the other short-term plans proposed in the Master Plan for materializing the project implementation. And also, necessary surveys and studies for the middle and long-term plans should be started as early as possible to expect the project implementation.

2) Promotion and Effects of Priority Development Project

The study on Master Plan Project has revealed that the development priority of the projects in the District is given to Shangla Par Sub-Division, Buner Sub-Division and Swat Sub-Division in order. As the first step, the Shangla Par Integrated Rural Development Project (SIRDP) involving three Sub-Tehsils of Chakesar, Puran and Martung should be implemented in priority. By the implementation of SIRDP, it is anticipated that the SIRDP will not only give an appropriate guideline for rural development in Swat District,

but also serve as a model of the development for the neighboring Districts adjacent to Swat District.

3) Arrangement and Organization for Master Plan Project and SIRDP Implementation Programme

The Government of Pakistan should take necessary measures for preparation for early implementation of SIRDP. Especially those measures for the first priority development schemes selected as the project to be implemented in the early stage out of the SIRDP should be taken immediately. Regarding to the implementation organization, the related Government Agencies concerned should cooperate actively each other for successful project implementation.

4) Swat River Basin Irrigated Agricultural Development Project

The SIRDP was proposed as priority development Project in the short-term development through the study of Master Plan. Swat River Basin Irrigated Agricultural Development Project was proposed as the middle and long-term development in the Master Plan.

It is strongly recommended that the fundamental investigation and study for the project should be commenced in the early stage in considering the following facts, that is, the local people and Government Agencies concerned desire abundant water resources development in the Swat river and furthermore long period will be needed to carry out the investigations such as land and water resources and geological surveys.

TABLE 1 20 DEVELOPMENT SUB-PROJECTS AND THEIR MAIN PROJECT FACILITIES

No. of Zone	Name of Sub-Project Scheme	No. of UC	Population in 1988 ('000)	Culti. Area ('000 ha)	Head works	Dams	Multi-Purpose Dams	Pumps	Small Scale Irrigation System	Small Tank	Small Hydel-Power	Road On-Going	Road Proposed	Village Water Supply	Public Welfare	School	Post Office	Tele-phone	Agri. Marketing Facility	Agri. Promotion Facility	Vete-rinary	Artifical Insemination Office
I	Kalam	2	31	2.2			○				○		○	○						○		
	Bahrain	4	85	6.5							○	○		○	○		○			○		
II	Matta	8	211	26.6		○						○		○	○	○	○	○	○	○		
	Khawazakhela	4	100	18.7 1/						○		○		○	○	○				○		
	Charbagh	3	54						○						○	○	○	○		○		
III	Kanju	3	50	11.7 2/	○									○	○	○	○	○				
	Kabal	3	136	21.0	○									○	○	○	○	○		○		
	Barikot	3	64	12.4					○				○		○	○	○	○		○		
	Mingora	5	96						○	○		○		○	○	○	○	○		○		
IV	Alpuri	7	121	16.5		○	○			○		○		○	○	○	○	○	○	○	○	○
V	Chakesar	2	51	6.7			○				○		○	○	○	○				○	○	○
	Puran	2	51	8.7			○	○	○		○	○			○	○	○	○	○	○	○	○
	Martung	2	31	4.5			○					○		○	○	○	○	○		○	○	○
VI	Besham	2	47	5.3				○			○				○				○	○	○	
VII	Daggar	4	65	10.2					○	○		○		○	○	○			○	○		○
	Gadezai	3	65	10.5					○	○		○			○	○	○	○	○	○		○
	Gagra	3	52	6.3	○							○		○	○							
	Chaghrzai	4	47	8.9	○	○					○	○	○	○	○	○	○	○				
VIII	Chamala/Amazai	3	61	9.4				○			○	○	○	○	○	○				○		○
IX	Khudukhel	2	47	9.9				○					○		○	○						
	Total	69	1,465	195.8																		

Note: 1/; Include Charbagh population
2/; Include Mingora Population

TABLE 2 PROPOSED DEVELOPMENT WORKS FOR MASTER PLAN (1/2)

Project Facilities	Short-Term		Middle-Term		Long-Term	
	Works	Qty	Works	Qty	Works	Qty
1. Agri. Infrastructure Development						
-New Irrigation Schemes	.Ushoraw Irrg. Scheme	120 HA	.Choga Irrig. & Hydel	170 HA	. Kabalgram Irri. Scheme	320 HA
	. Bodar Irrg. Scheme	1,520 HA	. Chakesar Irrig. & Hydel	110 HA		
	. Kar Schalizara Scheme	42 HA				
	. Ghur Ghushot Lift Irrig.	49 HA				
	. Kotkai SSIP	150 HA				
	.SSIS	40	. SSIS	40	. SSIS	40
	. Spring Water Tank Irri.	75	. Spring Water Tank Irri.	75		
	. Ground Water Tank Irri.	15	. Ground Water Develop.	15		
	. Improvement in Mingora	500 HA	. Improvement in Mingora	500 HA	Improvement in Mingora	500 HA
- Improvement / Extension of Irrigation Facilities	. Nipki Khel Canal Exten.	1,315 HA	. Nipki Khel Canal Exten.	1,315 HA		
	. Impro. / Flood Project		. Imp / Flood Protect		. Imp / Flood Protect	
	Barwai Khwar	170 HA	Barwai Khwar	180 HA	Barwai Khwar	180 HA
	Harnoi Khwar	500 HA	Harnoi Khwar	500 HA	Harnoi Khwar	500 HA
	Deolai Khwar	500 HA	Deolai Khwar	500 HA	Deolai Khwar	500 HA
	Kana Khwar	110 HA	Kana Khwar	120 HA	Kana Khwar	120 HA
- Barani Field Consolidation			. Swat Sub-Div.	2,100 HA	. Swat Sub-Div.	2,100 HA
			. Buner Sub-div.	3,300 HA	. Buner Sub-div.	3,300 HA
- Flood Control & Land Protection	. Swat River Area	7.8 KM	. Swat River Area	10.0 KM	. Swat River Area	10.0 KM
2. Agricultural Supporting Service Development						
- Soil Research	. Soil Survey	215,000 HA	. Soil Survey	215,000 HA	. Soil Survey	200,000 HA
	. Sub-Station / Upgrading	2				
- Extension & Seed Multiplication	.ATTI) Farm(Mingora)	1				
	. Agr. Training Centers	5	. Agr. Training Centers	5	. Agr. Training Centers	5
	. Extension Facilities	17	. Extension Facilities	17	. Extension Facilities	18
	. Transportation for Exten.	21	. Transportation for Exten.	20	. Transportation for Exten.	22
	. Seed Farms	4				
	. Fruit. & Vegetable Training Offices	6	. Fruit. & Vegetable	2	. Fruit & Vegetable	2
	. Fruit Nursery Station	1	. Fruit Nursery Station	1	. Fruit Nursery Station	1
	. Bee Keeping Center	1	. Bee Keeping Center	1	. Bee Keeping Center	1
- Livestock & Poultry	. Veterinary Hospital	4	. Veterinary Hospital	1	. Veterinary Hospital	1
	. Natural Breeding Center	3	. Natural Breeding Center	3	. Natural Breeding Center	3
	. Animal Insemination Center / Sub-Center	3	. Animal Insemination Sub-Center	1	. Animal Insemination Sub-Center	1
	. Animal Nutrition Improvement Center	2	. Animal Nutrition Improvement Center	1		
	. Poultry Hatchery	1	. Poultry Hatchery	1		
	. Animal Distribution	LS	. Animal Distribution	LS	. Animal Distribution	LS

Note : Figures without specified unit show the proposed places

TABLE 2 PROPOSED DEVELOPMENT WORKS FOR MASTER PLAN (2/2)

Project Facilities	Short-Term		Middle-Term		Long-Term	
	Works	Qty	Works	Qty	Works	Qty
- Agri. Engineering & soil Conservation	.Soil Conservation	LS	.Soil Conservation	LS	.Soil Conservation	LS
	.Tractor Station	3				
- Cooperative & Input Supply	.Inspecter Office	1	.Inspecter Office	1		
	.Cooperative Bank	1				
	.Agr. Inputs Warehouse	1				
- Small Industry	.Woman Handicraft Center	1	.Wood Craft Training	1		
	.Gabion Factory	1	.Fruit Processing	1		
- Marketing Facilities	.Main Station(Mingora)	1				
	.Center & Sub-Center	3	.Center & Sub-Center	5	.Center & Sub-Center	3
3. Road and Communication Development						
- Road Improvement/Const.	.Road Improvement	387.5 KM	.Road Improvement	123 KM	.Road Improvement	23 KM
	.Road Construction	77 KM	.Road Construction	88 KM	.Road Construction	157 KM
- Telecommunication Development	.Wireless Telephone System	LS				
4. Rural Electrification Development						
- Rural Electrification	.Extension of WAPDA Transmission Line	29,000 H	.Extension of WAPDA Transmission Line	68,700 H	.Extension of WAPDA Transmission Line	116,200 H
	.Micro-Hydel Power		.Micro-Hydel Power			
	Kalam	400 KW	Kalam	200 KW		
	Martung	200 KW				
5. Village Water Supply Development						
- Water Supply System	.New Water Supply System	58,800 H	.New Water Supply System	70,600 H	.New Water Supply	72,600 H
6. Rural Infrastructure Development						
- Education Facilities	.Improve./Upgrading Schools	815	.Improve./Upgrading Schools	406		
	.Const. of Schools	286	.Const. of Schools	646	.Const. of Schools	1,613
- Health Facilities	.Improv./Upgrading Facilities	78	.Improv./Upgranding Facilities	65		
	.Construction of BHUs	24	.Construction of BHUs	34	.Construction of BHUs	52
	.Residence for Doctor	51	.Upgranding to RHCs	7	.Upgranding to RHCs	19
	.Ambulances	12	.Residence for Doctor	133	.Residence for Doctor	221
- Sanitation Facilities	.Office Establishment	LS				
	.Self-Const. of Latrin	13,400 H	.Self-Const. of Latrin	18,200 H	.Self-Const. of Latrin	42,800 H
7. Village Communitiy Development	.Minor Works Programme	LS	.Minor Works Programme	LS	.Minor Works Programme	LS

Note : Figures without specified unit show the of proposed places

H : Houses

TABLE 3 PROPOSED DEVELOPMENT WORKS FOR SIRDP AREAS

Development Works	Schemes	Qty	Term
1. Agri. Infrastructure Development			
– Irrigation	· Small Scale Irrigation Scheme	18 pla.	1990-2005
	· Spring Water Tank Irrigation	30 pla.	1990-2000
	· Kabalgram Irri. Scheme	320 ha.	2000-2005
	· Sandai-Aloch Irri. & Hydel Power Scheme	352 ha.	1990-1995
	· Choga Irri. & Hydel Scheme	170 ha.	1995-2000
	· Chakesar Irri. & Hydel Scheme	110 ha.	– do –
2. Agri. Supporting Service Development			
– Research	· Soil Survey & Equipment	50,700 ha	1990-1995
– Extension & Seed Multiplication	· ATTD Farm (Mingora)	1 pla.	– do –
	· Agricultural Training Centres	3 pla.	1990-1995
	· Improv./Const. of Extension Facilities	6pla.	– do –
	· Seed Farm	1pla.	– do –
	· Fruit Nursery Station	1pla.	– do –
	· F & V. Training Office	1pla.	– do –
	· Transportation	LS	– do –
	· Bee Keeping Center	1 pla.	– do –
– Livestock & Poultry	· Veterinary Hospital	4 pla.	– do –
	· Natural Breeding Center	4 pla.	– do –
	· Artifical Insemination Sub-Center	1pla.	– do –
	· Animal Nutrition Improvement	1pla.	– do –
	· Poultry Hatchery		
	· Animal Distribution	1pla.	– do –
	· Soil Conservation Project	LS	1990-2005
– Agri Engineering & Soil Conservation	· Tractor Station	LS	1990-1995
	· Inspector Office	3 pla.	– do –
– Cooperative & Input Supply	· Cooperative Bank	1 pla.	– do –
	· Agr. Inputs Warehouse	1 pla.	– do –
	· Women Handicraft Center	1 pla.	1990-1995
– Small Industry	· Main Market. Center (Mingora)	1 pla.	1990-1995
– Marketing Facilities	· Marketing Sub-Center	1 pla.	– do –
		3 pla.	– do –

Development Works	Schemes	Qty	Term
3. Road & Communication Development			
– Road Development	· Road Improvement	103.5 km	1990-1995
	· Road Construction	176.0 km	1990-2005
– Communication Development	· Wireless Telephone System	LS	1990-1995
4. Rural Electrification Development			
– Rural Electrification	· Extension of WAPDA Transmission Line	26,700 houses	1995-2005
	· Micro-Hydel Power Station	200kw	1990-1995
5. Village Water Supply Development			
– Water Supply System	· Construction of New Water Supply System	22,300 houses	1990-2005
6. Rural Infrastructure Development			
– Education	· Improv. and Upgrading of Existing Schools	102 pla.	1990-2000
	· Construction of New Schools	241 pla.	1990-2005
– Health Care Facilities	· Improv. / Upgrading Existing Facilities	10 pla.	1990-2000
	· Construction of BHUs	11pla.	1990-2005
	· Upgrading BHU to RHC	3pla.	2000-2005
	· Residence for Doctor	41 pla.	1990-2005
	· Ambulances	3 unit	– do –
– Sanitation Facilities	· Self-Construction of Latrines	7,100 houses	– do –
7. Village Community Development	· Minor Works Programme	LS	1990-2005

TABLE 4 SUMMARY OF DEVELOPMENT COST FOR SIRDP

(unit: million Rs.)

Description	F/C	L/C	Total
1. Project Works			
– Agricultural Infrastructure			
Irrigation Schemes	70.3	46.9	117.2
– Agricultural Supporting Service			
ATTD Farm	39.1	16.7	55.8
Extension and Others	48.5	20.8	69.3
– Road and Communication	162.9	65.7	228.6
– Rural Electrification			
Micro-Hydel Power	20.2	5.1	25.3
Extension of WAPDA Line	91.6	39.2	130.8
- Village Water Supply	64.0	27.4	91.4
- Rural Infrastructure			
Education Facilities	67.6	67.5	135.1
Health Care Facilities	17.5	7.5	25.0
Sanitation Facilities	23.7	15.8	39.5
- Village Community	0	14.4	14.4
Sub-total (Direct Cost)	605.3	327.1	932.4
2. Land Acquisition and Compensation (5%)	0	46.6	46.6
3. Project Administration (10%)	37.3	55.9	93.2
4. Engineering Service (15%)	97.9	42.0	139.9
Sub-total (Direct & Indirect Cost)	740.5	471.6	1,212.1
5. Contingency (20%)	148.1	94.3	242.4
Sub-total	888.6	565.9	1,454.6
6. Price Escalation (1990-2005)	248.0	385.2	633.1
Grand Total	1,136.6	951.1	2,087.7

FIGURE 1

PROPOSED ORGANIZATION FOR PROJECT IMPLEMENTATION

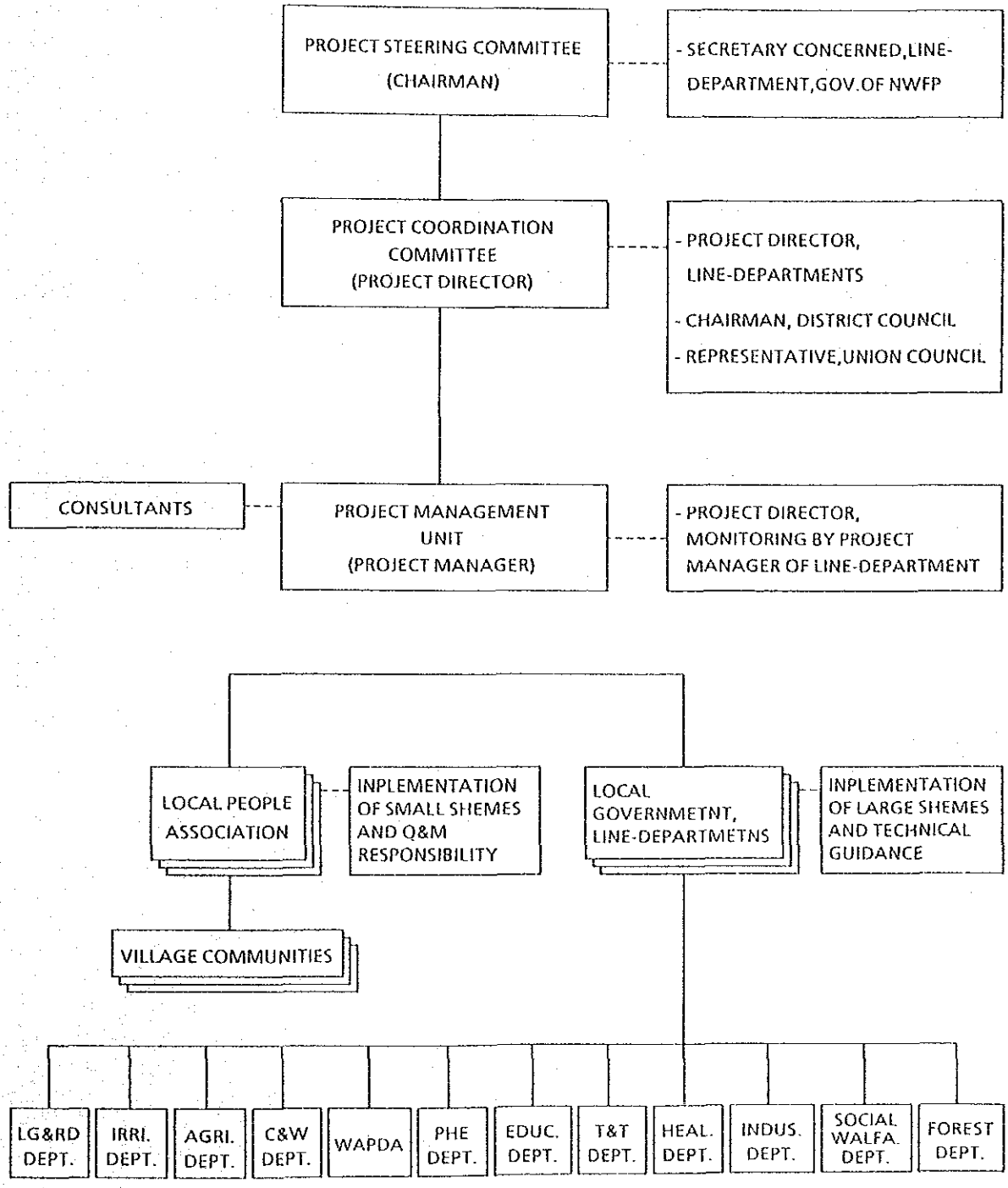


FIGURE 2 IMPLEMENTATION SCHEDULE OF MASTER PLAN PROJECT

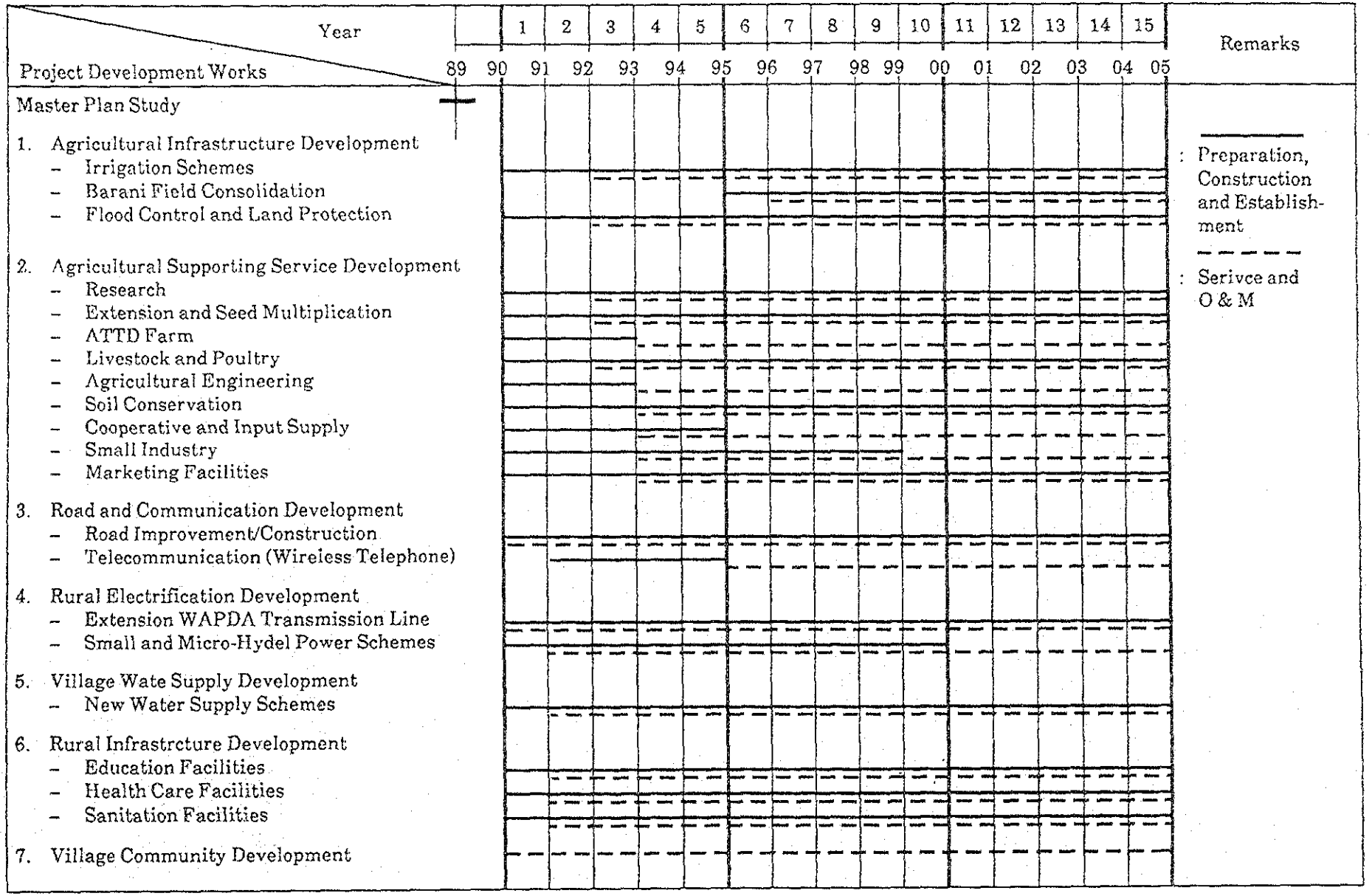
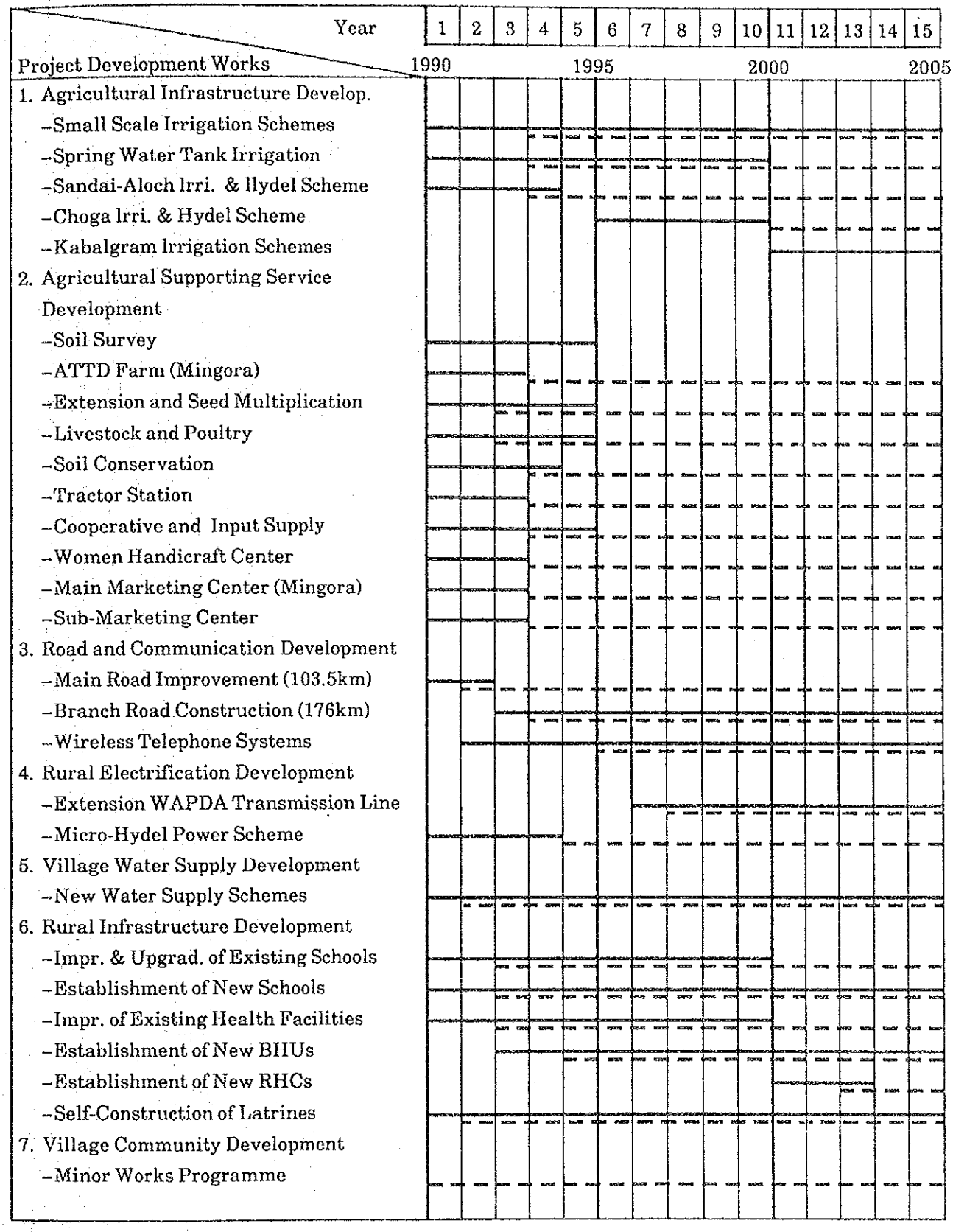


FIGURE 3 IMPLEMENTATION SCHEDULE OF SIRDP

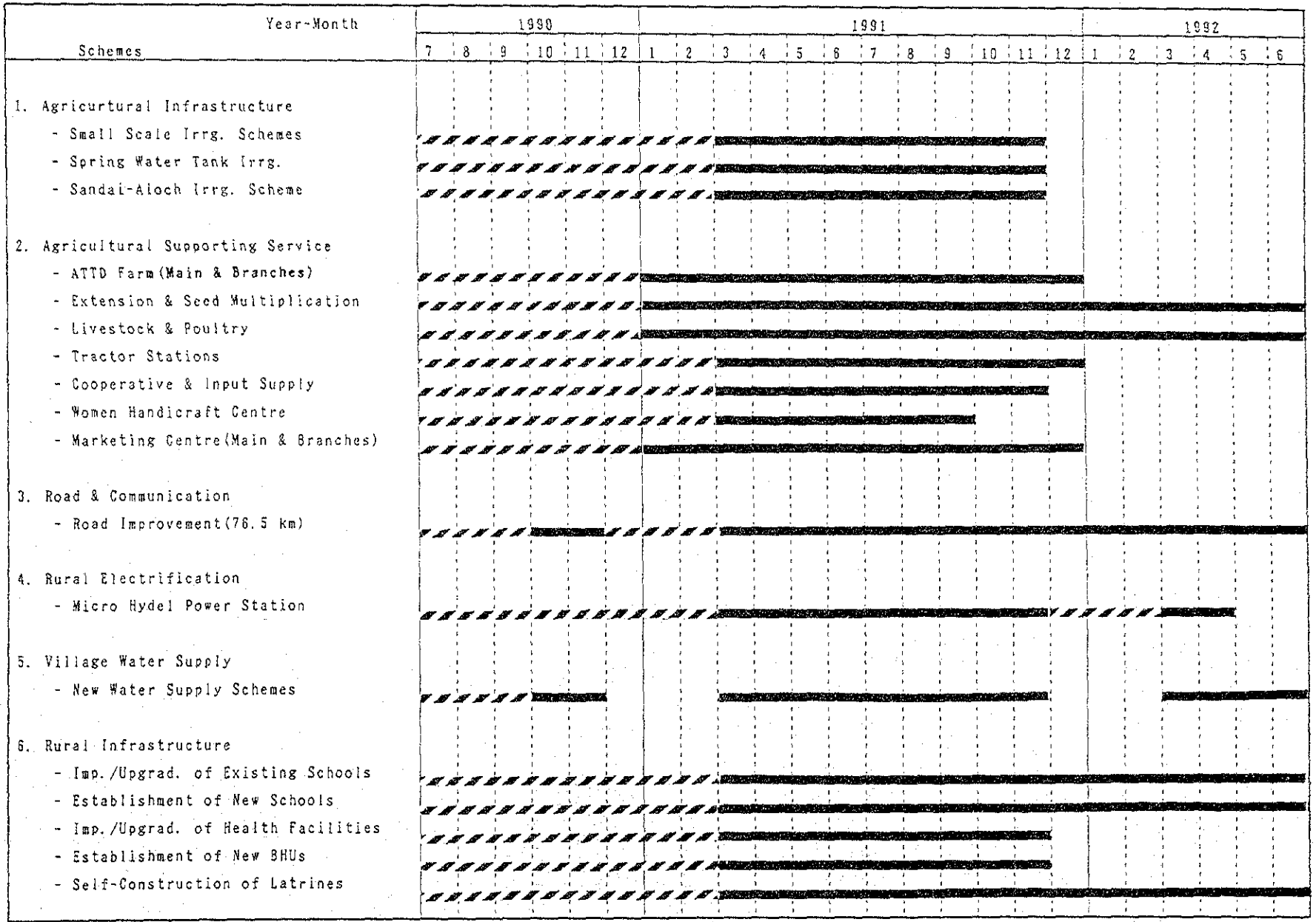


Remarks:

——— : Preparation, Construction and Establishment

- - - - - : Services and O & M

FIGURE 4 TENTATIVE IMPLEMENTATION SCHEDULE OF SIRDP PRIORITY SCHEMES



Note: ▰▰▰▰▰▰▰▰▰▰▰▰▲ : Preparation, Design, ect.

▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬ : Coonstruction & Establishment

CHAPTER I. INTRODUCTION

CHAPTER I. INTRODUCTION

1.1. Background of the Study

The Islamic Republic of Pakistan has formulated the Five-Year National Development Plans for promoting its social and economic development. Currently the Seventh Five-Year Development Plan (1988-1993) is being enforced aiming at realizing the targeted economic growth through positive participation of an increasing number of people in the economic activities as well as at sharing the fruits of development to the lower income classes in the rural areas.

The rural area development, thus, is actively promoted in recognizing that the rural area development as regional development is very important. Fundamentally, the rural development aims to not only raise the farm productivity by agricultural development, but also the living standards and to increase the employment opportunities in the rural areas through the consolidation of society and the stabilization of its economy.

Under such circumstances, the Government of the Islamic Republic of Pakistan has made a plan to promote the rural development projects in these four Provinces of Punjab, Sind, North West Frontier and Baluchistan, and other areas under the direct administration of the Central Government. Swat District was selected as a development area (Project Area) in North West Frontier Province (NWFP).

The Government of the Islamic Republic of Pakistan requested the Government of Japan in March, 1987 to extend the technical cooperation to the study on Swat District Integrated Rural Development Project. In reply to the request, the Government of Japan dispatched the Preliminary Study Team to Pakistan in April, 1988, through the Japan International Cooperation Agency (JICA), and the Scope of Work (S/W) for the Study was signed among Economic Affairs Division (EAD) of the Federal Government of Pakistan, the Government of North West Frontier Province and JICA.

The study aims to investigate the present status of agricultural production, infrastructure for farming and rural society, etc. along with the direction given bellows;

- To formulate the Master Plan of the Integrated Rural Development Project, and

- To carry out the Pre-Feasibility Study on the selected priority projects.

1.2. Implementation of the Study

Phase I Study for the formulation of the Master Plan consists of two stages, Phase I field work and Phase I home office work, and has been started since the end of October 1988.

Phase I Study aims to grasp the prevailing conditions and problems encountered in the Project Area through the necessary data collection and field survey in each field and to make study on the Basic Project Plan, so as to become a conception of the project formulation. The Phase I field work has been carried out in cooperation with the Pakistani Government Officers concerned, and the Field Report (I) was prepared and submitted to the Pakistani Government at the end of December 1988.

After submitting the Field Report (I), Phase I home office work has been done in Japan for the detailed study on the Basic Project Plan till the middle of March 1989, and the results was compiled into Interim Report.

The Phase II Study aiming at the formulation of project plan was commenced from the middle of June 1989 and completed by the end of October 1989. The Phase II field work and home office works were carried out as well for the formulation of project plan. And Progress Report (II) and Draft Final Report were prepared by Study Team at the end of each stage of study work.

Following the elaborate discussion between the Pakistani Government Officials concerned and the Study Team for the Draft Final Report in November 1989, the Final Report of the Project was prepared in February 1990.

The Report covers the results of the studies carried out by the Study Team in collaboration with the Pakistani Government Officials concerned, and also incorporates all the provisions in respect of interim

discussions held between the Pakistani Government Officials and the Study Team.

Member of the Study Team assigned to the project and the related Line-Departments in North West Frontier Province (NWFP) are listed below;

Study Team

1.	Mr. Seiji Takeuchi	Team Leader
2.	Mr. Shoji Yamada	Rural Development
3.	Mr. Mituharu Kurakazu	Agricultural Infrastructure
4.	Mr. Kunio Takagaki	Rural Infrastructure
5.	Dr. Kazuo Abe	Crops and Soil
6.	Mr. Yasunori Hasegawa	Farm Management and Organization
7.	Mr. Tetsuo Dokiya	Agricultural Economy
8.	Mr. Masatoshi Tsuchiya	Rural Electrification
9.	Mr. Kunihiro Okumura	Design and Cost Estimate

Related Line-Departments of NWFP

1. Planning and Development Department
2. Local Government and Rural Development Department
3. Irrigation Department
4. Agriculture, Food, Livestock and Dairy Department
5. Water and Power Development Authority
6. Communication and Works Department
7. Public Health Engineering Department
8. Education Department
9. Telegram and Telephone Department
10. Health Department
11. Industry Department
12. Social Welfare Department
13. Forest Department

CHAPTER II. BACKGROUND OF THE PROJECT

CHAPTER II. BACKGROUND OF THE PROJECT

2.1. Background of National and Provincial Economy

The population density of NWFP was 148 persons/sq.km in 1981, and higher than 106 persons for the whole Pakistan, but lower than 230 persons in Punjab Province. The annual population growth rate in Pakistan and NWFP was the same by about 3.1 percent from 1972 to 1981.

The annual achievement in the national economic growth during the Sixth Five-Year Plan (1983-1988) has been 6.3 percent (target by 6.5 percent) in GDP with growth rates of 3.3 percent in agriculture and 8.0 percent in manufacturing against the target of 4.9 and 9.3 percent, respectively. The growth rate of GDP in NWFP is estimated at seven percent per annum at constant factor cost from 1982-1983 to 1985-1986 (NWFP Development Statistics, 1986).

The income per capita in NWFP is almost the same as that of the whole Pakistan as shown in the following table;

Per Capita Income at Current Factor Cost (GNP)

(unit: Rupees)

Area	1982-83	1983-84	1984-85
Pakistan 1/	4,143	4,498	4,914
NWFP 2/	4,102	4,488	4,889

Source: 1/ Statistical Pocket Book of Pakistan, 1986
2/ NWFP Development Statistics, 1986

The composition of GDP by industries in NWFP such as the agriculture, manufacturing and wholesale and retail was 24.9 percent, 17.4 percent and 17.1 percent in 1985-1986, respectively. The share of agriculture in NWFP in 1982-1983 was higher than that in Pakistan, but declined in 1985-1986, due to the stagnation of major crop and livestock production as shown in the following table.

GDP Composition

(unit: %)

Sector	Pakistan[1/]		NWFP	
	1982-83	1985-86	1982-83	1985-86
Agriculture	27.02	25.77	27.81	24.88
Major Crop	14.79	14.41	15.44	12.66
Minor Crop	4.14	3.24	4.19	3.91
Livestock	7.23	7.75	7.31	7.43
Fishing	0.75	0.25	0.76	0.74
Forestry	0.11	0.12	0.11	0.14
Manufacturing	18.88	19.93	16.92	17.42
Wholesale & Retail	16.26	15.05	16.87	17.12
Others	37.86	39.25	38.40	40.58
GDP	100.00	100.00	100.00	100.00

Source: 1/ 1982-1983: Statistical Pocket Book of Pakistan, 1986
1985-1986: Pakistan Basic Facts, 1985-1986
2/ NWFP Development Statistics, 1986

The national economy of Pakistan has progressed for the last four decades. However, there was a national dilemma which was always represented by co-existence of poverty and economic prosperity. Majority of the population,especially in the rural areas, has not been shared equitably with the benefits of economic growth. The Seventh Five-Year Plan (1988-1993), consequently, has been formulated in the context of the achievements and problems founded during the Six Plan execution period. The improvement of diffusion rate of social infrastructure in the rural area becomes one of the main themes in the Seventh Five-Year Plan since the rate is much lower in the rural area compared with that in the whole Pakistan as shown in Table 2-1.

TABLE 2-1. RURAL SHARE IN DEVELOPMENT BENEFITS IN PAKISTAN

Social Infrastructure		1982-1983	1987-1988
1. Education			
Literacy : Urban	(%)	42.6	49.9
: Rural	(%)	15.0	21.5
(NWFP, Urban & Rural)	(%)		(16.7 in 1981)
2. Health			
Urban Doctors	(Nos.)	18,800	28,000
Rural Doctors	(Nos.)	1,200	8,000
(NWFP, Urban & Rural)	(Nos.)		(1,400 in 1986)
Rural Health Centers	(Nos.)	298	492
(NWFP)		(46 in 1982)	(64 in 1985)
3. Rural Electrification			
No. of Villages with Electricity		N.A	18,617
Percent of Total Villages	(%)	N.A	38.3
Rural Electricity Consumption	(%)	N.A	10.0
(NWFP, No. of Villages with Electricity)			(3, 928 in 1985-1986)
4. Rural Roads			
Total Length	(km)	46,000	60,957
Increase in kilometer of Farm to Market Roads	(km)	5,000	14,957
(NWFP, Urban & Rural)	(km)		(8,297 in 1985-1986)
5. Village Water Supply			
No. of Potable Water in in Rural Area	(million)	13.7	28.6
Percent of Rural Population	(%)	22.0	40.0

Source Pakistan: The Seventh Five-Year Plan, 1988-1993
NWFP : NWFP Development Statistics, 1986

2.2. Background of Divisional and District Economy

The economy of Malakand Division is characterized as rural economy because of the high percentage of rural population and working population (10 years and above) employed in the sectors of agriculture and forestry as shown in the following table.

Rural Population (1981) and Working Population (1986-1987)

(unit: %)

Sector	NWFP	Malakand Division	District			
			Malakand	Swat	Dir	Chitral
Percentage of Rural Population	85	96	100	93	100	100
Working Population						
Agriculture	62.2	75.0	53.3	77.7	75.5	79.7
Mining	0.2	0.3	0.4	0.3	0.4	0.1
Industry	3.0	2.0	3.0	2.0	2.0	0.8
Manufacturing	7.5	5.3	11.3	4.7	4.0	6.5
Community and Social Personal Services	14.0	8.5	15.1	8.5	6.7	7.9
Others	13.1	8.9	16.9	6.8	11.4	5.0

Note : Agriculture sector includes agriculture, forestry, hunting and fishing. Commerce sector consists of whole sale and retail trade, restaurant and hotels.

Rural population was based on 1981 Population Census. Working population is 10 years and above by industry employment status estimated for 1986-1987.

Source : Rural Population NWFP Development Statistics, 1986
Working Population: Important District-Wise Socio-Economic Indicators, NWFP, 1988, Bureau of Statistics, P & D Department Government of NWFP.

The population density of Malakand Division in 1981 was only 83 persons/sq.km that is thinner than 148 persons of NWFP. However density of Swat District shows a high figure of 140 persons.

The annual growth rate of population in Malakand Division was 3.8 percent from 1972 to 1981, while 3.1 percent in NWFP. Such a high

rate is caused by 3.7 percent in Swat District and 4.2 percent in Dir District.

As the economic structure of employment in Swat District has been concentrated to the agricultural sector, the increase in population will be accompanied by vitally important problems of creation of unemployment and low investment of the social infrastructure. The following table shows the labor market in Swat District.

Number of Jobs Seekers Registered and Placed in Employment
by Employment Exchange in NWFP (Accumulation 1970-1986)

(unit: '000 persons)

Item	Peshawar	Kohat	D.I. Khan	Mardan	Swat	Abbottabad
Registered	151.4	81.4	36.6	70.6	49.6	95.9
Placed	23.4	18.6	10.2	8.0	2.7	13.9
Percentage (%)	15.5	22.8	27.9	11.3	5.4	14.5

Source : Directorate of Manpower & Training, NWFP.
NWFP *Development Statistics*, 1986

Investment in the social infrastructures in Swat District is comparatively behind other Districts in Malakand Division as shown below;

Social Infrastructure (1986-1987)

District	Road Density (km/sq.km)	Population per Telephone (Person)	Population per Health Institution (Person)	Population per Doctor (Person)
Malakand	0.27	388	8,080	12,920
Swat	0.12	508	11,710	46,848
Dir	0.13	980	9,460	20,265
Chitral	0.08	557	3,860	50,200

Source: Important District-Wise Socio-Economic Indicators, NWFP, 1988, Bureau of Statistics, Planning & Development Department, Government of NWFP.

CHAPTER III. PRESENT SITUATION OF THE PROJECT AREA

CHAPTER III. PRESENT SITUATION OF THE PROJECT AREA

3.1. Physical Conditions

3.1.1. Location and Geography

1) Location

Swat District, the Project Area, is located in Lat. 34°09'N through 35°56'N and Long. 72°07'E through 73.°00'E. The neighbours of the District are Guilgit and Chitral Districts at the north, Kohistan and Mansehra Districts at the east, Mordan District at the south, and the Malakand Agency and Dir District at the west. The land area of Swat District is about 8,788 sq.km.

The Project Area can be divided into the three administrative areas (Sub-Divisions) as shown in the Location Map, and their geographical features are as described below;

- Swat Sub-Division
- Buner Sub-Division
- Shangla Par Sub-Division

2) Geography

a) Swat Sub-Division

Saidu Sharif is the Capital (headquarters) of the Swat Sub-Division. It is about 76 km north of Dargai, the northern terminus of Pakistan Western Railway. Other important towns are Mingora, Charbagh, Khawazakhela, Madyan, Bahrain, Matta and Barikot. Mingora is the major business center adjacent to Saidu Sharif. All these towns are located along both the banks of the Swat river and linked by motorable roads.

The area is mountainous with fairly broad and almost flat strips which are used for crop cultivation with fertile soils along both the banks of the Swat river at the downstream from Madyan. The main hill range in the east as well as in the west runs in parallel with the river coarse. Numerous cross-spurs run in the direction of east-west and give rise to

subsidiary valleys in varying length. The altitude varies from about 700 m at Landakai to about 6,200 m at Anmowal, the highest peak of the area. There are several other peaks with height ranging from 3,600 m to 4,500 m above sea level.

b) Shangla Par Sub-Division

The entire area of the Shangla Par Sub-Division forms a part of catchment of the Indus river, giving rise to a number of sub-valleys either directly or through small rivers. The main rivers are the Khan Khwar and the Itai Khwar.

The principal towns of the area are Alpuri (the Sub-Divisional headquarters), Karora, Lilonai, Besham, Aloch, Chakesar, and Martung.

The main ridge of the mountains forming the watershed for the Swat and the Indus rivers runs from north-east to south-west. A number of spurs jutting out of this main ridge run mostly from west to east, ending at the Indus river. The altitude varies from about 500 m near Akhun Baaba Ziarat in the south-east of Martung to about 4,500 m near Kota-Kando in the northern part of the Kana.

Moderate land slope less than 30 percent is rare, and the precipitous cliffs develops at many places. The surface configuration is generally rugged and uneven. Relatively large scale agricultural lands are observed around the village of Aloch.

c) Buner Sub-Division

The entire area of the Buner Sub-Division also forms a part of catchment of the Indus river, and the Barandu river is the major stream in this Sub-Division. The important town of the area is Pacha Killi, where a large number of pilgrims turn up every year, usually in spring to pay homage to the shrine of Syed Ali Tirmizi, Alias Pir Baba, a well-known Saint of the former NWFP. Another principal town is Daggar as the Sub-Divisional headquarters and the business center for the Buner Sub-Division.

Buner Sub-Division can be divided into three basins by the mountain ridges; they are Barandu Basin at the northern part of Sub-Division, Chamla Basin at central part, and Badri Basin in the southern

part. The altitude varies from about 400 m near Totali in the south to about 3,000 m at the place around Gokand in the north. There tends the broad flat land and the rainfed farming called "Barani" is widely practised.

3.1.2. Geology

The Project Area has a complicated geological structure caused by the orogenic disturbances and erosional and depositional cycles. As a result, the land with extremely intricated features is formed comprising mountains, dissected loess plain, outwash aprons and alluvial plain. The geological features are described as below;

Mountain (Residual and Colluvial Slopes)

The major part of the area is covered with high and steep mountains. The exposed rocks are mostly plutonic. Sedimentary, volcanic and metamorphic rocks are found in comparatively small extent.

Loess Plain

The sediments in the loess plain are aeolian, mainly containing silty materials deposited during the Pleistocene period. The present landform represents the subrecent erosional remnants of the old surface. In the subrecent epoch, disturbance of the environmental equilibrium started an era of erosion resulting in truncation of most of the soil profile. The landform generally occurs on the valley flanks where the mountain spurs have protected it from total erosion.

Water-reworked Loess Plains

The water-reworked loess plains comprise loess which was eroded by water during the subrecent epoch and redeposited in the adjoining depressional area with some admixture of non-loessial materials.

Outwash Aprons

The outwash aprons are constituted of a foreign mixture of fine earth and rock fragments washed out of the mountains to be deposited at their foot. These materials have usually gravelly and coarse textures.

Alluvial Plains

This landform consists of materials transported by the Swat river and other perennial streams to be deposited along their courses. The soils consist of the materials originating from volcanic and metamorphic rocks, etc.

3.1.3. Soils and Land Use

1) Soils

The major part of Swat District is covered with high and steep mountains. The soils of the mountain area are formed of materials derived from locally weathered bedrock (residuum and colluvium from Diorites, Granites, various Schists and Marbles, etc.)

The mountain soils are generally shallow to moderately deep, and have loamy with gravelly texture. Because of their occurrence on the sloping land, they are susceptible to water erosion. The pH value ranges five to eight. The soil characteristics mainly depend on the physiographic position and parent materials.

According to "Soil Map of the World" prepared by FAO/UNESCO in 1974, the soils of Swat District are mapped as Eutric Cambisols and Rankers.

The soils of the alluvial plains are of moderately thick for gravel or stone bed and well drainable. Their textures are slightly gravelly or sandy loam to silt loam. The topography of alluvial plains ranges from nearly level to gently slope. The soils on this landform are good for crop production.

Loess has been formed by deposition of aeolian materials during the pleistocene and severely eroded in the past. Soils are generally very deep, calcareous silt loam and without contamination of gravels. Water-reworked loess comprise loessic outwash materials admixed with other materials. The soils are deep, well drained and have silt loam texture. Loess and water-reworked loess are both good soils for crop production, but they cover only minor extent.

2) Soil Classification and Mapping Units

The basic soil classification unit adopted in Soil Survey of Pakistan is soil series. In the Reconnaissance Soil Survey, soil complex and soil association have been used as mapping units of the soil maps (1/250,000 in scale) which are a combination of two or more soil series and rockland in such an intricate pattern that they cannot be mapped separately on the map (See Figure 3-1).

In the soil map of the study, the soil complex and soil association are also used as mapping units. The characteristics of the principal soil series in some mapping units are shown in Table 3-1.

3) Present Land Use

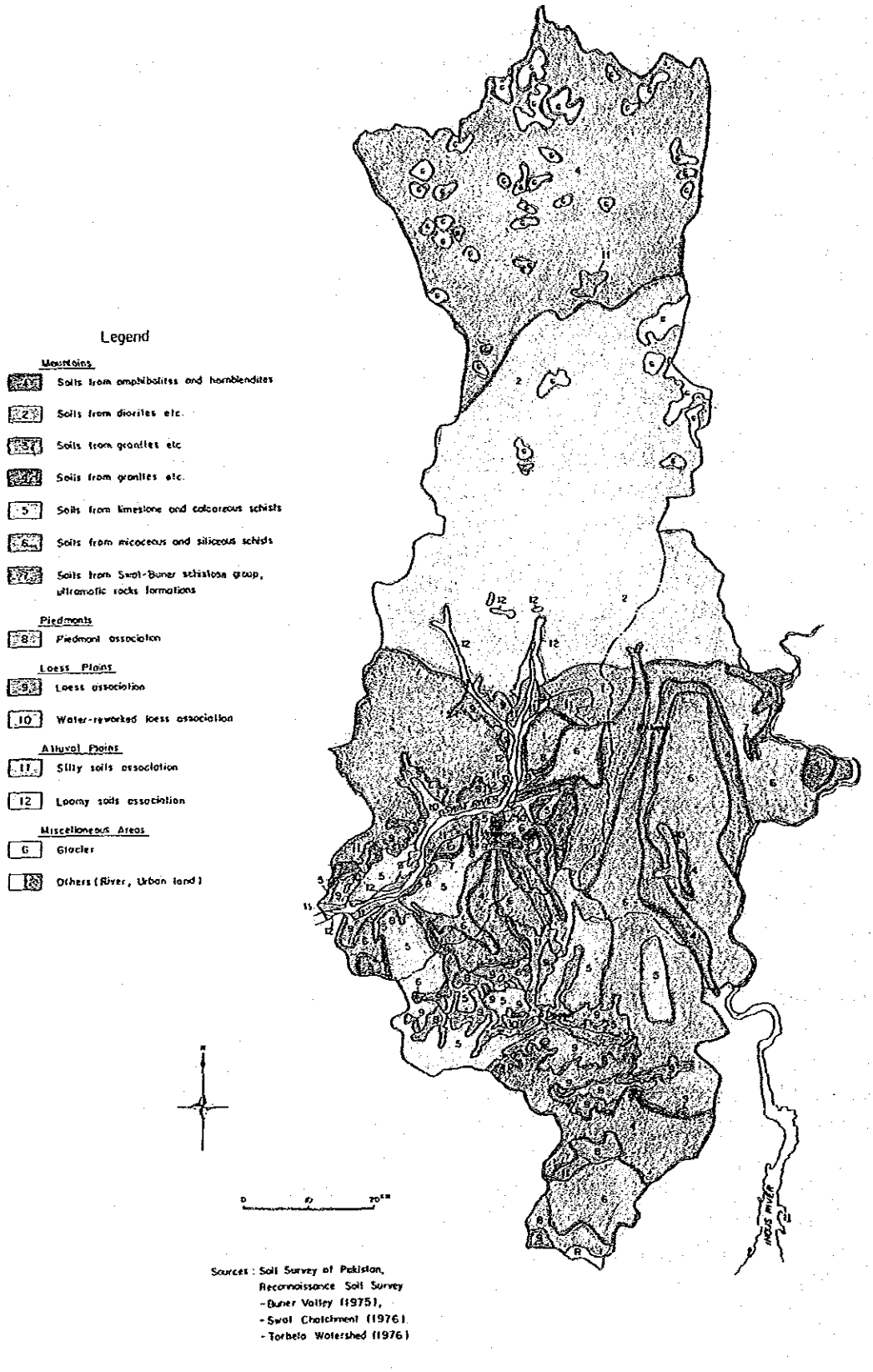
The land in the Project Area is used for crop production, grazing and forest depending upon climate, physiographic position, soil properties, irrigation water availability and socio-economic conditions.

Dominant part of the land comprises steep mountainous land having only a thin soil mantle. Considerably large tracts of the flank of the mountain in the altitude between 1,100 m and 3,300 m are the coniferous forest reserves. The remainder of the slopes are mainly covered with native grasses and shrubs. These lands mainly provide grazing. Lower parts located on less than 1,500 m altitude are used for grazing land throughout the year, while higher parts more than 1,500 m - 3,300 m altitude are grazed only in the snow free period. The land higher than 3,300 m provide grazing during the summer season only.

Crop production is the most important land use of the alluvial planes, piedmonts and mountain slopes at the lower altitude with relatively gentle slope. Such land has thick soils. The main crops are maize, wheat, rice, fodders, pulses, potato, vegetables and fruits. Irrigated cultivation is mainly practised in the relatively flat area along the perennial streams. Good crop yields can be expected only with supplementary irrigation water. Rice, potato, onion, vegetables and fruits are mainly produced under the irrigated cultivation.

The land use of Swat District is shown in Table 3-2 and Figure 3-2. In Swat District, cultivated and uncultivated lands are of 22 and 71 percents of the total area, respectively.

FIGURE 3-1 SOIL MAP IN SWAT DISTRICT



Sources : Soil Survey of Pakistan,
Reconnaissance Soil Survey
- Buner Valley (1975),
- Swat Catchment (1976)
- Torbela Watershed (1976)

TABLE 3-1 PRINCIPAL SOIL SERIES IN MAIN MAPPING UNITS

Unit	Soil Series	Position, Slope	Soil Characteristics	Land Capebility
(Mountains)				
1. Soils from amphibolites and honblendites				
	Gulibagh	Upper parts of mountain slopes (30-80%)	Gravelly SL, Shallow, Slightly acid	Ⅶe-s
2. Soils from diorites etc.				
	Kedam	Upper parts of mountain slopes (50-80%)	Slightly gravelly Sil/L, Shallow, Slightly acid	Ⅶe
4. Soils from granites etc.				
	Shaldar	Upper parts of mountain slopes (50-80%)	Slightly gravelly L, Shallow, Moderatly acid	Ⅶe-Ⅵe
5. Soils from limestone and calcareous schists				
	Makhnial	Upper parts of mountain slopes (30-80%)	Slightly gravelly SiL, Shallow, Calcareous	Ⅶe-Ⅵe
6. Soils from micaceous and silicious schists				
	Chapri	Lower parts of mountain slopes (25%-50%)	Gravelly SL, Moderatly deep, Slightly acid	Ⅵe
7. Soils from Swat-"Buner schistose group, ultramafic rocks formation				
(Piedmonts)				
8. Piedmont association				
	Jaba	Terraced, gently sloping upland	Slightly gravelly SiCL, Non calcareous	dⅢe
(Loess Plains)				
9. Silty soils association				
	Missa	Main parts of the plain (6-13%)	Weakly structure SiL	dⅢe
(Alluvial Plains)				
11. Loess association				
	Mingora	Main parts of the plain (0-2%)	Mottled, Non calcareous SiL	ir Ⅰ

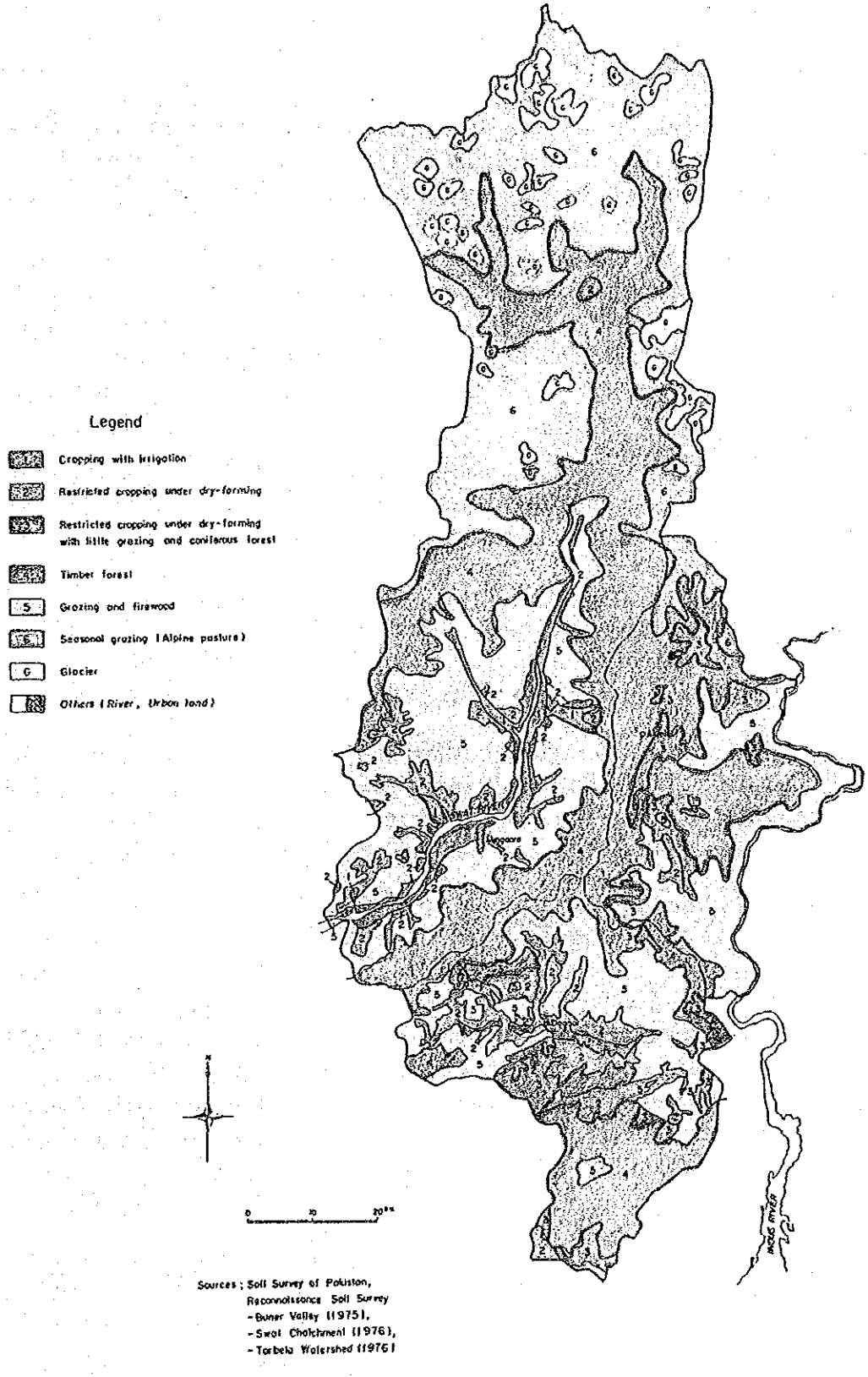
TABLE 3-2 PRESENT LAND USE (1987-1988)

(uint: '000 ha)

Sub-Division	Grand Total (Geographical Area)	Cultivated Land			Uncultivated Land					
		Sub-Total	Irrigated	Unirrigated	Sub-Total	Cultivable Waste	Pasture Land	Grazing Land	Forest Land	Not Available for Cultivation
Swat	545.2	99.1	39.3	59.8	446.1	5.4	20.2	100.5	141.8	178.2
Shangla Par	148.0	41.5	3.3	38.2	106.5	4.1	31.4	14.5	39.8	16.7
Buner	185.6	55.2	6.2	49.0	130.4	5.8	18.1	52.7	31.8	22.0
Swat-District	878.8 (100%)	195.8 (22)	48.8 (5)	147.0 (17)	683.0 (78)	15.3 (2)	69.7 (8)	167.7 (19)	213.4 (24)	216.9 (25)

Source: Revenue Office, Swat District.

FIGURE 3-2 PRESENT LAND USE MAP IN SWAT DISTRICT



3.1.4. Climate

1) General Conditions in Climate

The Project Area is situated in sub-tropical, semi-arid zone resembling that of the Himarayas in the global scale. The climate of this area is marked by two distinct rainy seasons, the Rabi winter rainfall from November to April and the Kharif summer monsoon rainfall from July to October. Such weather change with the associated temperature and day length makes two distinct farming seasons.

The climactical outlook in the Project Area is as follows:

Temperature

The temperature starts rising steadily from January till June. There is a slight but steady fall in temperature with the beginning of the monsoon rains till September. The fall in temperature continues by January. The hottest months are June and July recording 28 to 30 °C of daily mean temperature, and the coldest December and January recording 1 to 8°C of the same.

Precipitation

The remarkable regional difference of the precipitation exists in the Project Area. More than 1,000 mm of annual precipitation is received in the mountainous areas such as northern Swat and Shangla Par regions, while less than 1,000 mm in low belt such as central and southern Swat and Buner regions. Two rainy periods (i.e. Rabi and Kharif) are clearly recognized in the Project. Area.

Humidity

The mean humidity is recorded by about 40 to 60 percent, and both the regional and seasonal trends resemble those of rains in these three regions in the Project Area. However, the high humidity in winter is remarkable at Daggar in Buner region. The variation during a day shows 10 to 15 percent in high land, 20 to 30 percent in low belt.

Evaporation

The annual evaporation is about 2,000 mm in the places lower than 1,000 m altitude, while about 1,400 to 1,500 mm in mountainous area more than 1,500 m altitude.

Wind Velocity

The wind velocity is very low and quite constant throughout the year as recorded at 9 to 15 m/sec in the plains lower than 1,000 m altitude. While, the strong wind blows at the speed of 25 to 30 m/sec in summer season (from May to September) in the mountainous area higher than 1,500 m altitude, however, it is very calm there in winter season (from December to February).

The average figures of meteorological elements observed in and around the Project Area are given in Figure 3-3.

2) Regional Aspect in Climate

The climate changes with altitude and situation, and many types of micro and local climates are formed in the Project Area.

The climates in Swat, Shangla Par and Buner regions are slightly different from each other as explained below;

Swat Region

The area shows sub-tropical temperate as well as alpine zone temperature. Snowfall starts falling on high mountain by middle of October and descends to the forest belt in the middle of November. Generally, snowfall does not occur in the area below 1,200 m altitude. The thaw sets at the beginning of March at lower elevation. The snow in the forest and high mountain areas melts away completely by the end of May. Frost is common in everywhere and starts in November. Its intensity is severe in December and January.

Shangla Par Region

The climate varies from sub-tropical type to sub-humid type and alpine zone type in Shangla Par. The precipitation is received in the form

FIGURE 3-3 METEOROLOGICAL RECORD IN THE STUDY AREA