PART I MASTER PLAN STUDY

CHAPTER 1 INTRODUCTION

1.1 Authority

The Scope of Work (S/W) for the Study on National Small Scale Irrigation and Rural Development Program in the Republic of Turkey (hereinafter referred to as 'the Study') and the Minutes of Meeting for the said S/W were agreed upon and signed between the Japan International Cooperation Agency (hereinafter referred to as 'JICA') and General Directorate of Rural Services (hereinafter referred to as 'GDRS') on August 21st 1996. This report is the Draft Final Report prepared in accordance with the Scope of Work.

1.2 Background

Turkey achieved food self-sufficiency in 1993-94, but at present, the food production is under self-sufficiency. The Government under the Seventh Five-Year Plan plans to raise and stabilize the agricultural production to meet the growing population in recent years and unstable weather such as droughts. However the agricultural land area, which registered to largest in 1989 has been declining at the rate about 100,000 ha per year because the reclamation of new land has reached a limit and the conversion of agricultural land to other land use has been accelerated. Therefore in order to increase agricultural production it is necessary to improve the productivity of unit area through irrigation development. The gap among regions has recently expanded because social infrastructures such as roads, water supply and sewage are poorly provided and therefore it is necessary to promote the rural development projects on which small scale irrigation plays a core role to ensure sustainable agriculture and to support rural population.

Under these circumstances, Turkish Government requested Japanese Government to prepare an inventory survey for small-scale irrigation and rural development program, to conduct a feasibility study of selected areas and to prepare guidelines for the establishment and evaluation of projects related to these fields. In response to the request of the Republic of Turkey, Japanese Government conducted a preliminary survey in July 1996 and accordingly the Scope of Works was agreed and signed.

1.3 Objective and Scope of Study

1.3.1 Objective of the Study

The objective of the Study are as follows:

(1) To formulate a master plan on the field of small-scale irrigation and rural development in order to support rural population and maintain a sustainable agriculture.

(2) To conduct a feasibility study on the project for small-scale irrigation and rural development in the areas that have high priority and most typical in accordance with the master plan, and to promote basic data which relates to the financial cooperation from Japan or international financing agencies.

(3) To compile the guidelines for counterpart personnel of the government of Turkey in conducting and evaluating projects on small-scale irrigation and rural development in future. To carry out technology transfer on the methodology of the study and the procedures of planning.

1.3.2 Study Area

The Study area, which covers 56 provinces out of 80 provinces in the whole country (except 24 provinces) include projects with total beneficial area of about 170,000 ha. At the initial stage of the Inception Report, the Study area was considered as the area with comparatively high priority projects for which either Planning Report at Detailed Design Report has been completed. However, in order to coincide approximately the initially proposed project number of 1,370 and beneficial area of 160,000 ha, the projects with Survey Report only are also included in the Study area.

1.3.3 Schedule of the Study

The Study was commenced in December 1996. The meeting of explanation and discussion on the Inception Report was held on 11th and 12th of December. JICA Study Team and Advisory Team and GDRS agreed the contents of the Inception Report. The Study is composed of two phases. The items of the study and the schedule is as follows;

(1) Phase I Master Plan Study

a) Preparatory Home Office Work (2 Dec 1996 – 7 Dec 1996)
b) Phase I Field Work (8 Dec 1996 – 19 Mar 1997)
c) Phase I Home Office Work (1 May 1997 – 29 Jun 1997)

(2) Phase II Feasibility Study

a) Phase II Field Work (6 Jul 1997 – 3 Oct 1997)
b) Phase II Home Office Work (4 Oct 1997 – 2 Dec 1997)

The Final Report will be prepared based on the comments of GDRS and the Turkish government officials concerned after the explanation and discussion on the Draft Final Report. The assignment schedule of the Study Team is shown in Attachment-2. The list of the counterpart personnel assigned by GDRS is shown in Attachment-3.

CHAPTER 2 SOCIO-ECONOMIC BACKGROUND

2.1 National Economy

Characteristics of national economy are summarized as follows ;

- International trade value is fairly small as compared with domestic production
- Western part of territory develops more vigorous economic activities than those in eastern part, thus interior disparity tends to widen. Similar tendency is observed between coastal and inland areas.
- Urbanized areas can accept population exodus from rural areas, but so far as labor absorbing capacity is concerned, agriculture and service sectors contribute much, while industry can do little and urban unemployment has raised a new problem
- Turkey has suffered from bulky foreign debt and fiscal expenditure including budget for subsidies accelerating inflation and imposing heavy burden on the Government fiscal balance.

Economic influence, mostly positive, by EU has got stronger on Turkish economy, while Turkey has lost a favorable trade client, Iraq by the Gulf War.

Debt service for foreign funds and subsidies for agriculture and other vulnerable sectors has led to high rate of inflation, giving benefits to wealthy strata and foreigners but heavy economic damages to poor and economically inactive citizens.

The latest indicators of national economy is tabulated as follows:

Table 2.1. 1 Major Economic Indicators of Turkey

Major Economic Indicators as of :	Jan. 1996	Jan. 1997	Aug.1997
Total Population in million	61.8	63.0	63.9
Per Capita G D P in US.$	2,110	2,262	2,373
Real Annual G D P Growth in %	9.5	7.2	6.5
Consumer Price Inflation	83.3	78.0	85.2
Current Account Balance in Billion US.$	0.20	0.67	0.68
Trade Balance in Billion US.$	-11.5	-14.1	-17.4
Foreign Reserves in Billion US.$	16.3	11.8	16.6
Average Exchange Rate TL : US.$	60,100	108,900	159,000
Bank Interest Rate in %	93.0	93.0	93.0
Exports in 1995 /1996 in Billion US.$	21.64	15.92	14.12*
Imports in 1995 /1996 in Billion US.$	35.71	42.70	26.11*
Fiscal Budget Expenditure in Billion $	35.8	38.2	36.8
Fiscal Budget Revenues in Billion US.$	29.1	26.5	28.8
Fiscal Budget Balance in Billion US.$	-6.7	-11.7	-8.1

Note. Some data indicate only 1995 and 1996. *: data for 1996/1997
Source : Monthly Publishings from Turkish Central Bank

Since 1980s structural inflation with annual price escalation rate of 80% or higher has prevailed, but this is interpreted as inevitable to continue to issue bank notes from the fiscal sustenance measures point of view. After 1994's fastest development, the rate of inflation has settled to milder, more stable trends. The role to be played by agriculture lies in food security, self- absorption of rural population, stabilization of rural living standard and expansion and consolidation of local job opportunities. Agriculture, forestry and fishery contribute to about 15% of total national GDP in 1966, ranked third after manufacturing and commerce, but the growth of agricultural GDP has turned into negative in 1997, indicating -1.1 ~ -2.5 % to 1987 fixed price in the first half.

Aiming at minimizing the disparity between agriculture and other industrial sectors, the following policy objectives are addressed for earlier materialization.

- Ensuring an adequate agricultural growth rate
- Increasing productivity and diversifying farm production by improved technology
- Ameliorating nutritional level of the nation
- Raising the standard of living for those employed in the agricultural sector and reducing underemployment/unemployment
- Improving agricultural structures and ensuring better utilization of production resources/factors
- Reducing intra-sectoral income disparity by controlling exodus of labor force from rural areas.

Among the policies for protecting domestic agriculture by MARA, price support for farm products, low interest loans for the purchase of agricultural inputs, preferential exemption and reduction of export duties as well as reduction of income tax for farm households are notable measures. Farming subsidies comprise a key economic instrument with a role of performing structural adjustment, including direct payment for cereals. However, it has imposed heavy fiscal burden, reaching an equivalent to 3.6 billion US$ in 1996 and the efforts to alleviate the burden by shifting it to input price subsidies and concessions on bank loans have been made. The major issue for input subsidies lies in the fact that poorer farmers can hardly enjoy the benefits from input subsidies because of their limited purchasing and investing power to increase production and income.

2.2 Seventh Five-Year Development Plan

Evaluating the situation until 1995, the Seventh Five-Year Development Plan, covering 1996 to 2000, has been put into effect at a time to which Turkey has been expected to make some radical changes and social transformations in the process of global structural changes in the world.

To carry Turkey into the 21st century, the Development Plan aims at catching up with the new era by making maximum use of the advantages of globalization and gaining for Turkey a distinctive place among developed countries. The Development Plan places its emphasis on

developing human resources, devoting special attention to transformation projects designed to ensure democratization, giving a new impetus on industrialization, enriching the technological capability, and introducing some highly important structural changes in taxation, social security, agricultural policies, public services, local administrations, and infrastructure.

2.3 Policy on Agriculture

2.3.1 Agricultural Sector

Basic principals are to safeguard balanced and adequate nutrition of an increasing population, increase production and exports by placing emphasis on those products where Turkey has a relative advantage, and to ensure increase and stability in producers' revenues. Following are the major provisions of the Plan:

- Agricultural sector's share in value added GDP will be 13 to 13.5 % and the production's share in sectoral developments will be 10.7 to 11.2 % at the end of the Plan term,
- Annual average growth rate of value added for agriculture is projected at 2.9 to 3.7 % during the Plan term, and the production is expected to grow by 2.9 to 3.7 % at constant price basis,
- The share of agriculture in the total fixed capital investments is projected to increase from 5.1 % in the preceding plan term to 5.5 to 5.9 %,
- Public investment index in agricultural sector will be 107.1 and 120.7 (6th plan term=100), corresponding to the projected GNP growths of 5.5 % and 7.1 % respectively, leading to 1.4 % and 3.8 % annual growth rate,
- The use of chemical fertilizers is set to rise from its present 5.1 million to 6.4 million tons by the year of 2000 with due attention to the environment;
- Efficiency and quality in production will be increased by a growing use of high yield and high quality seedlings and propagation farmers,
- Creation of producers' unions and development of the cooperatives will be encouraged to function the marketing of the products and to render services to the producers,
- Improved nutrition is emphasized, especially the need to increase levels of protein intake,
- Efforts will be made to improve access to agricultural information and to produce reliable statistics for the sector, and
- Trend towards privatization and market economy is embodied in resolutions which will minimize the government intervention in pricing, and also will transfer research and extension activities to the private sector.

2.3.2 Rural Infrastructure (Irrigation) Development Sector

Basic principals are to create the infrastructure necessary for a balanced, sustainable and environmentally friendly agricultural development in line with the current agricultural policies. Following are the major provisions of the Plan:

- Land development activities will be promoted during the Plan with an emphasis to building a new irrigation system of over 735,000 ha and maximizing benefits from the area under irrigation, whereby on-farm development services are expected to cover 290,000 ha,

- Land consolidation and on-farm development services will be promptly completed in areas which have been opened for irrigation and land consolidation will be given priority in those areas where construction of an irrigation network has been planned,

- Use of agricultural land, especially irrigated land, for non-agricultural purposes will be prevented,

- Physical and financial participation of beneficiaries in execution and management of agricultural infrastructure investments will be promoted to create resources for new investments and to ensure effective use of the existing infrastructure, and

- Measures will be adopted to ensure the transfer and reimbursement of investments by GDRS, and transfer of the irrigation facilities operated by DSI to the farmers will be accelerated.

CHAPTER 3 THE STUDY AREA

3.1 Physical Features

3.1.1 Location and Topography

This Study is conducted across Turkey, covering 56 out of the total 80 provinces of the country. The Study area is located at a crossroad between Europe and Asia, showing its unique geographical and cultural features. The country's total area of 779,452 km^2 is divided into two parts, namely, Anatolia with 755,688 km^2 and Thrace with 23,786 km^2. Of the total area, 765,152 km^2 is land and the remaining 14,300 km^2 is water surface. The Study area occupies about 70 % of the total land, and borders the Black Sea in the north, the Mediterranean Sea in the south, and the Aegean Sea in the West, and borders on Greece and Bulgaria in the northwest, Georgia, Armenia, and Azerbaijan in the Northeast.

The Study area enjoys extensive resources of both land and water with diversified agro-ecological conditions. The topography's variety is marked by numerous mountains surrounding the central Anatolia Plain. The mountains run in general parallel to the northern and southern coasts with elevations varying from 500 m in the west to over 2,000 m in the east. The Anatolia Plain, surrounded by those mountains, undulates with an elevation between 800 and 1,300 m, leading to the Syrian desert in its southeastern side.

3.1.2 Meteorology and Hydrology

(1) Meteorology

General Directorate of State Meteorology Works is responsible for establishing stations and conducting measurements including agro-meteorological data such as sunshine hour, wind velocity, evaporation, etc. There were 791 meteorological stations, composed of 762 stations belonging to the Directorate and 29 to other institutions, as of June 1995 over Turkey. The country is broadly divided into four climatic zones; namely, 1) Central zone (Anatolia Plateau), 2) Mediterranean zone, 3) Black Sea zone, and 4) Eastern Anatolia zone, each of which is further divided into five to seven sub-zones. The Study area spreads mostly over the first three zones, and the monthly-based climatic condition is tabulated province by province in ANNEX E-1. Table 3.1.1 below is a summary of the major climatic condition:

Table 3.1.1 Summary of Climatic Condition in Four Zones

Zone	Annual Pre.(mm)	Mean. Temp., °C	Min. Temp., °C	Max. Temp., °C	Humidity, %
Central	330 to 840	9 to 18	-35 to -12	38 to 47	49 to 72
Mediterranean	390 to 1200	11 to 19	-28 to -5	38 to 46	61 to 76
Black Sea	460 to 2300	10 to 15	-27 to -7	38 to 41	70 to 77
Eastern Anatolia	370 to 730	4 to 16	-46 to -19	35 to 46	51 to 70

Source: Representative 40 stations quoted in Statistical Year Book of Turkey, 1995

1) Central Zone

This zone covers central Anatolia Plateau. High temperature during daytime characterizes the climate, and prevailing are wide range temperature differences between day and nighttime. Well-known is the coldness during winter with temperature below minus 30 degrees Celsius. Annual precipitation ranges between 300 and 800 mm, insufficient for agriculture, with falls during winter months and May. Precipitation in summer is negligible.

2) Mediterranean Zone

Mediterranean Zone extends from Thrace area to Mediterranean area via Marmara and Aegean areas. Summer climate is characterized by hot temperature often above 40 degrees Celsius. Summer rainfalls usually total less than 300 mm, thus bringing dry climate. Winter, on the other hand, has moderate temperature and certain amount of rainfall reaching 500 to 600 mm.

3) Black Sea Zone

This zone falls in coastal area of the Black Sea, enjoying warm temperature and considerable rainfall throughout the year. There are places receiving as much as 2000 mm rainfall. Most of the rain falls during winter season, showing similar to Mediterranean climate rainfall pattern. It is noted that even the summer season rainfall reaches 100 mm or more on a monthly basis.

4) Eastern Anatolia Zone

This zone borders on Syria, Iraq and Iran, leading to the Syrian Desert and a part of Mesopotamia. Very hot summer prevails in the zone, while temperature in winter goes down below minus 40 degrees Celsius. Scarce precipitation shows up throughout year; almost nil rainfall during summer and even at maximum less than 100 mm per month during winter.

(2) Hydrology

There are two organizations responsible for gauging stream flows; namely, General Directorate of State Hydraulics (DSI) and General Directorate of Electricity Works Administration (EIE). DSI had established 1,226 stations by 1995, and EIE 301 stations by 1992, which include lake gauging stations.

Turkey has 26 basins, 22 of which fall in the Study area. The following table shows mean annual runoffs of those catchment areas, and mean yields expressed in liter per second per square km. Runoff ratio is also calculated by using mean annual rainfall (arithmetic) over the catchment area.

Table 3.1.2 Water Resources Potential By Basins

Basin Name	Mean Annual Runoff, Km^3	Catchment Area, Km^2	Mean Yield l/sec/Km^2	Mean Annual Rainfall, mm	Runoff Ratio %	Remarks
Meric Erdene	1.33	14560	2.90	604.00	15.12	
Marmara	8.33	24100	10.96	728.70	47.43	
Susurluk	5.43	22399	7.69	711.60	34.07	
Kuzey Ege	2.09	10003	6.63	624.20	33.47	
Gediz	1.95	18000	3.44	603.00	17.97	
K. Menderes	1.19	6907	5.46	727.40	23.69	
B. Menderes	3.03	24976	3.85	664.30	18.26	
Bati Akdeniz	8.93	20953	13.51	875.80	48.66	
Antalya	11.06	19577	17.91	1000.40	56.47	
Burdur Goller	0.50	6374	2.49	446.30	17.58	
Akarcay	0.49	7605	2.04	451.80	14.26	
Sakarya	6.40	58160	3.49	524.70	20.97	
B. Karadeniz	9.93	29598	10.64	811.00	41.37	
Yesilirmak	5.80	36114	5.09	496.50	32.35	
Kizilirmak	6.48	78180	2.63	446.10	18.58	
Konya Kapali	4.52	53850	2.66	416.80	20.14	
Dogu Akdeniz	11.07	22048	15.92	745.00	67.39	
Seyhan	8.01	20450	12.42	624.00	62.77	
Asi	1.17	7796	4.76	815.60	18.40	
Ceyhan	7.18	21982	10.36	731.60	44.65	
Firat	31.61	127304	7.87	540.10	45.97	Out of Study Area
D. Karadeniz	14.90	24077	19.62	1198.20	51.65	
Coruh	6.30	19872	10.05	629.40	50.37	
Aras	4.63	27548	5.33	432.40	38.87	Out of Study Area
Van Kapali	2.39	19405	3.91	474.30	25.97	Out of Study Area
Dicle	21.33	57614	11.74	807.20	45.87	Out of Study Area
Total	186.05	779452	7.57	642.60	37.14	Whole Turkey
Total	126.09	547581	7.30	665.65	34.59	Study Area Only

Source: Statistics with Map Bulletin 1995, DSI (Turkish Version)

Turkey's annual surface water potential is about 186 km^3 and the Study area's is 126 km^3. Mean annual yield varies from 2 to 18 ℓ/sec/km^2 and runoff ratio to rainfall is between 14 and 67 % with an average of 37 % (34% for the Study area).

3.1.3 Geology

Turkey is totally placed on the Mediterranean part of the Alpine Mountain formation movement belt. The belt passes through Russia and Siberia blocks at the north, and Africa and Arabia blocks at the south. A part of the belt that includes Turkey is divided into two main sides with east-west directions. These are the North Anatolia-fold-zone which straightly lies and South Anatolia fold zone having a few bends. These main zones correspond to the major mountain ranges which have Alpine characters in terms of topography.

While a tectonic line in East Anatolia separates those folds from each other, middle and west sides of Anatolia are formed by subordinated folds and metamorphic foundations. The intermediate areas involve high-interior plains and subordinate mountain ranges. Orogenic Alpine folds, which are formed by vertical movements, intersect with new epirogenic structures. These structures are formed by fault systems and tectonic basins existed during vertical epirogenic movements.

Although north front depreciation of Alpine belt passes through Black sea zone, it does not enter the area of Turkey. South front depreciation enters to southeastern part of Turkey from the south. It forms Cizre, Siirt, Diyarbakir, Maidin, Urfa, Gaziantep regions and becomes narrower and shallower on the western side of Gaziantep and disappears among folds and blocks.

Because of the above-mentioned regional condition, the following are pointed out:

- The series of the foundation of Turkey which represent geosenclinal and orogenic formations are different from the series of the same era,
- Tectonic lines are originally orogenic, and there are structures that are strongly folded due to horizontal pressures following a major vertical movement. These structures are completely different from the formations which developed in the block areas, having a deformation or a minor fold,
- The deformed morphological surfaces, dominant in large part of Turkey, are the consequences of strong tectonic movements and those have not developed in the block areas, and
- The development and dispersal of every kind of ore-beds are under the effect of orogenic events. On the course of engineering projects, geological difficulties often show up directly or indirectly in terms of earthquakes, erosions, and landslides.

3.1.4 Hydrogeology

Until the end of 1969, an area of 538,000 km^2 had been hydrogeologically surveyed at a preliminary level. A feasibility level hydrogeological survey was started in 1966 and an area of 132,000 km^2 has been covered by means of about 970,000 m of research borings as of 1995. According to the estimation of groundwater reserves based on above figures, an amount of about 12 km^3 is annually exploitable in Turkey and the Study area's is about 9 km^3, by each of which about 600,000 and 450,000 ha respectively could be irrigated in a year.

Provinces well-known for groundwater irrigation are Konya (41,039ha as of Jan. 1, 1995), Nigde (10,420ha), Karaman (18,968 ha), Hatay (12,742 ha), Kayseri (11,091ha), and Afyon (19,694 ha). The major aquifers in Konya are alluvium sand and gravel layers, limestone, and marbles. Salinity and gypsum show up in some places, affecting the safe yield. Nigde's major aquifer is placed in a farctured andesites layer, composed of sand, gravel, tuff, agglomerate and basalt. Karaman's are marbles and limestone. Water bearing formations in Hatay are limestone and conglomerate, basalt, and sand and gravel layers of Quaternary. Kayseri yields the groundwater from clay layers in Karasazlik marshes and around Ambarkoy, and some of the wells drilled are artesian. Salinity sometimes appears and increases toward the middle of the plain. The promising layers in Afyon are composed of alluvium, fissures of hard tuffs and agglomerates under the alluvium, and Quaternary sand and gravel. Those hydrogeological characters are detailed in ANNEX E-2 with the geological characters and related issues such as salinity problem.

3.1.5 Soil

Soil varies widely in Turkey, the 23 soil groups classified. These are 1) Alluvial Soils, 2) Hydromorphic Alluvial Soils, 3) Colluvial Soils, 4) Salt-Sodium Affected Soils, 5) Organic(Wet Turba) Soils, 6) Red-Yellow Podzolic Soils, 7) Gray-Brown Podzolic Soils, 8) Brown Forest Soils, 9) Non-Calcarious Brown Forest Soils, 10) Non-Calcarious Brown Soils, 11) Chestnut Colored Soils, 12) Red Chestnut Colored Soils, 13) Red Mediterranean Soil 14) Red Brown Mediterranean Soils, 15) Rendzina Soils, 16) Brown Soils, 17) Red Brown Soils, 18) Sierozem soils, 19) Vertisole Soils, 20) High Mountain Meadow Soils(Alpine Soils), 21) Regosol Soils, 22) Basaltic Soils, 23) Coastal Alluvial Marsh. Among these soils, main soil

groups are Brown Forest Soils, Brown Soils and Non-Calcarious Brown Forest Soils, that occupy about 51 % of entirety(detail are referred to ANNEX G). Generally, it tends to be deep, moderately fertile and slightly alkaline where on gentle slope lands, while steeper slope land is shallow, sandy, gravely, rocky and infertile.

Table 3.1.3 Area of the Soil Groups in Turkey

	Soil Group	Area (ha)	Percentage
1.	Alluvial Soils	4,512,087	6.47
2.	Hydromorphic Alluvial Soil	319,005	0.46
3.	Colluvial Soils	2,907,820	4.17
4.	Salt-Sodium Affected Soils	54,347	0.08
5.	Organic (Wet Turba) Soils	33,656	0.05
6.	Red-Yellow Podzolic Soils	1,847,574	2.65
7.	Gray-Brown Podzolic Soils	1,948,641	2.80
8.	Brown Forest Soils	14,933,343	21.42
9.	Non-Calcarious Brown Forest Soils	9,048,804	12.98
10.	Non-Calcarious Brown Soils	4,953,162	7.11
11.	Chestnut Colored Soils	2,802,272	4.02
12.	Red Chestnut Colored Soils	578,554	0.83
13.	Red Mediterranean Soils	1,450,024	2.08
14.	Red Brown Mediterranean Soils	1,626,039	2.33
15.	Rendzina Soils	831,630	1.19
16.	Brown Soils	11,713,909	16.80
17.	Red Brown Soils	4,566,291	6.55
18.	Sierozem Soils	81,342	0.12
19.	Vertisole Soils	598,693	0.86
20.	High Mountain Meadow Soils (Alpine soils)	602,775	0.86
21.	Regosol Soils	673,744	0.97
22.	Basaltic Soils	3,593,607	5.16
23.	Coastal Alluvial Marsh	30,171	0.04
	Total	69,707,490	100.00

Source: Topraksu Genel Mudurlugu, GDRS (1972)

The soil was distributed with different types regionally, developed Brown Forest soils, Red-Yellow and Gray-Brown Podzolic Soils in Black Sea Zone. Red Brown Mediterranean Soils distribute in Mediterranean Zone. And, in large Central Anatolian Zone, Brown and Red Brown Soils distribute mainly.

The land is eroded by wasting of vegetation by cattle and forest felling to between long-range. It is said that about 80 % of the soils over the country suffer from moderate to very severe sheet and gully erosion. Very severely erosion is happening widely at Brown Forest Soils and Non-Calcarious Brown Forest Soils areas.

3.2 Socio-economic Condition

3.2.1 Administrative Division

The local administrative system consist of 80 Provinces and 847 Districts and 36,443 villages. Provincial administration headed by a Governor who is named by the Minister of Interior. After a local election, Provincial assembly is formed and it consists of 5 year term representatives as members. The governor executes its administrative policy with the approval of the assembly.

The study area consists of 56provinces, and the total number of district in these province is counted at 253.

GDRS has 22 regional office. In the study area, there are 13 regional office. The following Table 3.2.1 gives the list of the regions and provinces concerned.

Table 3.2.1 Province belonging to the Region

Regional office	Name of Province (number of district)						
ANKARA	ANKARA	BOLU	CANKIRI	KIRIKKALE			(24)
KONYA	KONYA	AKSARAY	KARAMAN	NIGDE			(31)
ADANA	ADANA	ICEL	HATYA				(13)
KYSERI	KAYSERI	KIRSEHIR	NEVSEHIR	YOGAT			(16)
SIVAS	SIVAS	TOKAT					(16)
TRABZON	TRABZON	ARTVIN	BAYBURT	GIRESUN	GUMUSHANE	RIZE	(17)
SAMSUN	SAMSUN	AMASYA	CORUM	ORDU	BARTIN		(14)
KASTAMOU	KASTAMOUN	ZONGULDAK	SINOP	KARABUKU			(19)
ESKISEHIR	ESKISEHIR	AFYON	KUTAHAY	USAK			(12)
ANTALYA	ANTALYA	BURDUR	ISPARTA				(14)
IZMIR	IZMIR	AYDIN	DENIZLI	MANISA	MUGLA		(28)
BURSA	BURSA	BALIKESIR	BILECIK	CANAKKALE	YALOVA		(17)
ISTANBUL	ISTANBUL	EDERNE	KIRKLARELI	KOCAELI	SAKARYA	TEKIRDAG	(32)

Source : Service Application General Inventory in GDRS

3.2.2 Population

(1) Population and Density

The national census in 1994 shows the total population of Turkey as 60,576x10^3. The census figure in 1990, the population and density were 56,473x10^3 (M50.7%, F49.3%) and 73 person/sq.km, respectively. In the study area, the population and density were 45,072x10^3 (80% of total population) and 84 person/sq.km. The population and the engaged in agricultural sector in the project study area are shown in the following Table3.2.2.

Table 3.2.2 Population and the Engaged in Agricultural Sector

	Population		Total Land		Population Density	Populatioon on working in Agricultural Sector		Population/ Agri. population
1-1 Marmara Region	11,713,039	21%	43,865	6%	267	1,040,310	8%	9%
1-2 Aegean Region	8,083,902	14%	84,931	11%	95	2,018,498	16%	25%
1-3 Mediterranean Region	5,442,555	10%	59,395	8%	92	1,201,617	10%	22%
2 Black Sea zone	5,913,442	10%	70,909	9%	83	1,955,314	16%	33%
3-1 Central Northern Region	7,502,616	13%	119,191	15%	63	1,457,783	12%	19%
3-2 Central Souhern Region	4,572,316	8%	101,443	13%	45	1,225,114	10%	27%
3-3 Central Eastern Region	1,844,669	3%	43,889	6%	42	590,731	5%	32%
Study Area	45,072,548	80%	537,817	69%	84	9,489,376	76%	21%
Whole Country	56,473,035	100%	779,452	100%	72	12,547,796	100%	22%

Bigger population and higher population density, both of these, makes a town "Metropolitan". A town with large population but not high in density would not be called "Metropolitan". The above table shows a relationship between population and size of the region as follows; Marmara region along the Mediterranean shore including Istanbul area and Aegean Region has relatively high in population and density but the area is small. On the other hand, Central Northern and Central Southern region has small population but covering a big area.

(2) Urban and Rural Population

National statistics of urban and rural population, population growth rate are chronologically summarized in the following Table.3.2.3 The rural population rate is smaller in Marmara region (9%), and higher in Black Sea region and Central Eastern Anatolia (33%).

Table 3.2.3 Urban and Rural Population

Year	Population	Annual increase rate	Population (Urban)	Annual increase rate (Urban)	Population (Rural)	Annual increase rate (Rural)	Urban population (ratio)	Rural population (ratio)
1940	17,820		4,346		13,474		24.4%	75.61%
1950	20,947	1.63%	5,244	1.90%	15,702	1.54%	25.0%	74.96%
1960	27,754	2.85%	8,859	5.38%	18,895	1.87%	31.9%	68.08%
1970	35,608	2.52%	13,691	4.45%	21,914	1.49%	38.4%	61.54%
1980	44,736	2.30%	19,645	3.68%	25,091	1.36%	43.9%	56.09%
1985	50,664	2.51%	26,865	6.46%	23,798	-2.10%	53.0%	46.97%
1990	56,473	2.19%	33,326	4.40%	23,146	-0.60%	59.0%	40.99%

The population increase rate observed a peak value of 2.85% in 1950-1960 period, then declining after the peak. During a period of 1985-1990, 4.1% and -0.6% of growth rate in urban and rural area was recorded, respectively. The ratio of rural population has been constantly decreasing, and the urban population (53%) became larger than rural population (47%) since 1985.

(3) Migration

The following trend in migratory movement of the population in the study area was recognized.

About 7.7% of population in Central Eastern Anatolia, and 5.5% of population in Black Sea region migrated to Marmara and Aegis region. Driving force of the migration from rural to urban area can be attributed to the higher job opportunity. As the result of the migratory inflow to Marmara and Aegis region, the population of the project study area is increasing by 1.3%.

Table 3.2.4 Migration

	Population		Migration In	Migration Out	Migration Net	Migration/ Population (%)
Marmara Region	11,713,039	26%	1,414,910	580,073	834,837	7.13%
Aegean Region	8,083,902	18%	627,903	427,618	200,285	2.48%
Mediterranean Region	5,442,555	12%	424,369	243,983	180,386	3.31%
Black Sea Zone	5,913,442	13%	260,524	584,904	-324,380	-5.49%
Central Northern Region	7,502,616	17%	576,932	618,452	-41,520	-0.55%
Central Southern Region	4,572,316	10%	206,350	303,340	-96,990	-2.12%
Central Eastern Region	1,844,669	4%	79,710	221,823	-142,113	-7.70%
Study Area	45,072,539	100%	3,590,698	2,980,193	610,505	1.35%
Whole Country	56,473,035	100%	4,065,173	4,065,103	0	0.00%

3.2.3 Land Tenure and Land Holding

Recent farm-land ownership is characterized by the majority of farmers who own limited acreage of farm-land (more than 90%) and fewer land-less farmers because most of

the latter emigrated from home village to urban areas seeking for off-farm jobs. Another feature shows a tendency of farm-land reparcellation into smaller size of parcels owing to division among successors by heritage concession.

Many of farm households only know the boundary of their owned land but seldom remember precise acreage, because cadastral offices are located at the capital of their provinces, with very few opportunities to visit and identify their registration. Whereas, farm modernization requires larger tract size for the pursuit of "economy of scale" by land consolidation and parcel amalgamation. Table 3.2.5 indicates farm land holding patterns in ten representative provinces in the Study area.

Average farm size per household in Turkey comes to 59.1 decare (5.9 ha), while farm households in Anatolian plateau tend to have larger mean size in contrast to those in coastal areas with much smaller size. In other words agricultural land in the plateau takes less advantage of rainwater, mild atmospheric temperature etc. hence has lower productivity, and farmers require more acreage to sustain their life than that owned by those who live in the coastal regions.

Table 3.2.5 Farm Land Holding Distribution Patterns (Unit : decare, % of total land holding households)

Holding Size	mean size	0 - 5	5 - 9	10 - 19	20 - 49	50 - 99	100-199	200-499	> 500
Ankara	128.9 da	2.7	5.0	9.3	18.1	18.6	23.8	20.0	2.5
Konya	98.0 da	6.5	7.3	13.6	22.1	19.1	18.4	10.7	2.3
Adana	63.7 da	5.5	7.9	14.5	36.0	21.4	8.0	5.3	1.4
Tokat	38.4 da	2.6	7.5	20.9	45.6	17.1	5.3	0.9	0.1
Samsun	37.7 da	2.2	8.4	22.4	44.4	16.7	4.5	1.2	0.2
Kastamonu	36.8 da	3.2	8.2	19.9	44.6	17.6	5.8	0.7	0.0
Eskisehir	130.7 da	3.0	4.6	7.6	16.4	24.8	23.7	16.9	3.0
Izmir	33.8 da	8.1	12.6	22.6	36.7	14.3	4.4	1.3	0.0
Bursa	37.3 da	4.8	10.9	21.4	37.7	19.5	5.4	0.3	0.0
Istanbul	43.3 da	11.2	11.6	19.7	31.8	13.6	8.4	3.5	0.2

Source : Genel Tarim Sayini, 1991

3.2.4 Rural Infrastructure

Judging from the information offered by GDRS and results of interviews through the GDRS regional offices and cooperatives in the rural area as well as results of analyses on long-list survey conducted by the team during the field work, necessity in development of rural infrastructure is obvious. Major subjects for development are shown as follow;

- Irrigation system
- Soil conservation
- Drainage systems
- Land consolidation
- Village road
- Village water supply and sewerage system

These subjects continuously have been implement by GDRS and outlines of the activities are shown as follows;

1) There exist considerable differences in agricultural productivity's and living standard between irrigated and unirrigated villages. This means that development of irrigation

system is essential and can contribute to up grading of the rural living level.
4.3 million ha of farm land in the whole country is irrigated, while GDRS developed 1,146,000ha including 810,000ha or 70% of area in 13 regions in the study area.
4.2 million ha of farm land is expected for irrigation systems in the whole country.

2) From view points of topographical features, land slope, soil conditions and poor earth covering with vegetation, whole territory of Turkey is conditioned by easy soil erosion by rainwater. According to erosion map for Turkey, about 80% of land is eroded and it is extending nation wide, GDRS therefore, has, been promoting Contour farming, terracing, grazing control for domestic animals and re-vegetation as countermeasures against soil erosion. Soil conservation for 350,000ha of farm land has implemented as of 1996. Soil conservation projects are being implemented on a long-team schedule considering the social and natural necessity and budgetary balance.
In the 13 region in the study area, 1,193number of projects which beneficial area covered 200,000ha, have been completed as of 1996.

3) Development of drainage system
Drainage problems in the irrigated area have brought up new complaints by farmers in the semi-arid zone such as Konya and Sivas. Agricultural waste water causes higher groundwater table in the fields without drainage system and recently induces salinity problem. Necessity for simultaneous implementation of both irrigation and drainage system is currently recognized widely.
1,102 drainage improvement projects in number have been implemented by GDRS in last 30 Years from 1965 to 1995 and problem areas of 305,000ha are improved by surface and subsurface drain.

4) Land consolidation
Land consolidation consists of several types of construction work such as land leveling, irrigation/drainage canal construction, reparcelling of farm plots and farm road construction. Integrated effects of land consolidation are recognized by not only farmers but also construction bodies such as GDRS and DSI. Consolidation area developed by GDRS up to 1996 reaches at 192,000ha and it is estimated that consolidation area under implementation as of 1997 is 85,000ha.

5) Village water supply and Sewerage system
According to the general inventory in 1996, village water supply facilities in the study area is 54,330units. Out of which 17,000units or 32% of facilities have water shortage problems. Based on the inventory for the year 1995, water supply systems with pipelines and taps are 15,000units or 43%, and remaining of 19,200units or 57% are still using the draw water system. Reinforcement of water sources and development of water supply system with a conduit (pipe) are future subjects.

6) Village roads
Based on the 1996 statistics, total village roads in the study area are 231,500km in length, of which 85,000km or 36% are unpaved roads and tracks.

Village Road	Length (km)	Percentage (%)
Asphalt paved	32,200	14
Gravel paved	116,500	50
Earth	43,800	19
Track	39,000	17
Total	231,500	100

3.3 Agriculture

3.3.1 Land Use and Cropping Pattern

(1) Land Use

The area of agricultural land in the study area in1994 (The area of fruits and fallow are in 1991) is shown in Table 3.3.1.

Table 3.3.1 Agricultural Land in the Study Area (Unit : 1,000ha)

Cultivated Area					Fallow
Total	Field Crops	Pasture	Vegetables	Fruits	Area
16,411	13,811	157	616	1,827	2,609

Notes : Source : Area of Fruits, Fallow are by Statistical Indicators 1923-1995.
Others area are Agricultural Structure (Production, Price, Value)1994.

The area of field crops involves the area of cereals, pulses, industrial crops, oil seeds and tuber crops, it occupies about 84 % of cultivated area and 73 % of total agricultural land including the area of fallow. The area of pasture involves the area of alfalfa and sainfoin. The ratio of pasture, vegetables, fruit trees and fallow to the total agricultural land area 0.8 %, 3.2 %, 9.6 %, and 13.7 % respectively.

Area of pasture, vegetables and fruit trees has been increased in recent three decades contrasting the decreased area of fallow, but total agricultural land has not been increased.

The area of wheat and barley occupy the larger parts of field crops than other crops. The area of cereal crops including wheat and barley occupies about 77.7 % of the area of field crops in 1994. Pulses, industrial crops, oil seeds and tuber crops occupy about 8.1 %, 7.6 %, 4.8 % and 1.9 % of the area of field crops.

Table 3.3.2 The Ratio of Irrigated Area in 7 Agro-ecological Regions (%)

Regions	Marmara	Aegean	Medit.	Black Sea	Cent. N.	Cent. S.	Cent. E	Total
Field Crops	9.6	25.2	32.6	11.6	9.6	21.2	20.2	17.8
Fruits Trees	27.1	22.1	56.9	3.2	38.7	60.1	88.2	26.2
Vegetables	81.8	84.4	93.3	63.2	65.3	78.2	97.7	79.6

Source : Statistical Yearbook of Turkey, 1995.

Irrigated area and the ratio of irrigated area to the crops and vegetables are varied by regions. However, it does not means that the highly irrigated regions are the progressive regions of agriculture, but it means that the regions have severe climatic conditions to cultivate the field crops and vegetables without irrigation.

Area of fallow are also varied by regions. In Sea Coast regions which are warmer than Central Anatolia, fallow are 2-9 % in total agricultural area, but in Anatolia Highland, fallow occupies about 20 % of total agricultural area.

Fallow have some effect to recover the soil fertility, but leguminous crops have more intensive effect to the improvement of soil fertility. Reduction of the area of fallow by introducing the crops is one of the big problems for the development of agriculture in the regions.

(2) Cropping System

Wheat and barley which are main crops in the study area occupied about 60 % of the cultivated area in 1994. As is shown in Annex Fig. C-1, wheat and barley take over 250 days for their growth and maturing, so, it is very difficult to adopt a double cropping system with summer cereal crops even in warm regions in the study area. Even in warmer regions such as Aegean and Mediterranean sea coast region, many summer crops are sown in March to April and harvested in August to October, and wheat is sown in October after harvesting early growing summer crops such as sun flower and vegetables.

In Anatolia Highland, 2 crops in 2 years or 2 crops in 3 years are common cropping system. Wheat and barley are sown after harvesting the winter cereals, and the summer crops are sown after the field are abandoned as fallow in summer, autumn and winter.

Example of main cropping orders in each regions are as follows:

Marmara, Aegean sea regions :	Vegetables such as tomato- wheat(barley)-potato-wheat Sunflower-wheat(barley) maize(soiling crops)-sugar beet
Mediterranean sea regions :	Sugar beet-wheat(barley)-vegetables-vegetables-wheat (barley)
Black Sea region :	Maize- wheat(barley)- fallow-vegetables-wheat(barley)
Anatolia Highland :	Wheat(barley)-fallow-Pulses-wheat(barley)-sugar beet

3.3.2 Farming Practices and Farm Input

(1) Farming Practices

Total agricultural production occupies about 14.5 % of GNP in 1995's census. Agricultural production has been increased in recent years, showing the 1.51 % of growth rate per year. It has a important role on the national economy. However, population settled in the country side occupies about 53.7 % of total population in 1990. So, the income per person is lower than that of municipal people. One reason of the low income may be caused by small sized farm households which occupies about two third of total farm households.

Average cultivable area of one farm household in regions are 2.29 ha in Trabzon, 8.90 ha in Kayseri. Average area is 4.94 ha in 1991 in the study area. However, over 69 % of total farm household are cultivating the area smaller than 5 ha, occupying the only 27.6 % of total

agricultural area (Annex Table C-2-3). It is very difficult to obtain a sufficient income for the small sized farm households, if they cultivate only wheat and barley.

(2) Use of Chemical Fertilizers

Use of chemical fertilizers on the fields in 1994 is shown in Table 3.3.3. Amounts of fertilizers are calculated by dividing the total fertilizers by field area which include the area of field crops, vegetables and fruit trees.

Table 3.3.3 Use of Chemical Fertilizers in the Study Area (1994), Unit: kg/ha

Fertilizers	21% Nitrogen	16-18% Phosphate	48-52% Potassium	Total
Amounts	246.9	131.2	6.1	384.2
Ingredient	51.8	21.0~23.6	2.9~3.2	

Source : Agricultural Structure (Production, Price, Value) 1994.

Amounts of chemical fertilizers used for crop production are varied by regions. Those are higher in Marmara and Aegean Sea Coast regions and little higher in Black Sea region than Central Anatolia. It may be the reflection of the difference of crops and the ratio of cropping intensity (Annex Table C-4). Nitrogen used in the cultivated field is only 52 kg/ha in ingredient in average, and that of phosphate is 21~24 kg/ha in ingredient. The reason may be caused mainly by the semi-arid climatic condition of the country.

(3) Farm Mechanization

Many kinds of farming machines are used for crop and livestock production. The number of tractors, manure spreaders, chemical sprayers, combines and irrigation pump etc. are increased rapidly in recent year (Annex Table C-5). Cultivation and harvesting of wheat and barley are mostly practiced by such a big machines.

3.3.3 Crop Yield and Production

(1) Planted Area and Yield

Planted area and yields of main crops in the study area is shown in Table 3.3.4. Wheat and barley are main crops in all regions and they occupy a large area in all regions. However, planted area of other cereals, pulses, industrial crops and tuber crops are varied by regions (Annex Fig. C-2). Sunflower and maize are main summer crops in Marmara Sea region. Tobacco and cotton are mainly in Aegean Sea region, Cotton and chick pea are largely in Mediterranean Sea region, Maize and potato are in Black Sea region and pulses and sugar beet are main summer crops in Anatolia Highland (Annex Table C-6).

Planted area of crops has been changed in recent two or three decades. Pulses, sugar beet, sunflower and potato etc. has been increased the planted area, contrasting the decreased area of cotton, tobacco, oats and rye in recent two decades (Annex Fig. C-3).

Table 3.3.4 Planted Area and Yield of Main Crops in the Study Area (1994, 1,000ha, kg/ha)

Crops	Wheat	Barley	Maize	Chick pea	Lentil	Cow vetch	Tobacco	Beet	Sunflower	Potato
Area	7,527	2,373	479	535	165	241	200	345	570	170
Yield	1,942	2,133	3,527	958	793	629	916	31,955	1,185	18,825

Source : Agricultural Structure (Production, Price, Value)1994.

The average yields of wheat and barley are 2- 2.5 ton/ha in the study area, and the yields of other cereal crops are also low in general. Increase of the average yields of main cereal crops such as wheat and barley are very little in recent two decades, only maize, sunflower and cotton are increasing their yield. Some pulses and tobacco have a inclination to decrease their yield (Annex Table C-8, Fig.C-4).

(2) Vegetables and Fruits

Vegetables are produced sufficiently in the study area. Production of vegetables in 1994 in the study area is shown in Table 3.3.5. As is shown in Table, productions are very abundant in fruit and leafy vegetables (also shown in Annex Table C-9-10). Cultivation of fruit vegetables such as tomato and pepper, cucumber and some leafy vegetables such as lettuce and spinach are increasing their cultivated area (Annex Fig. C-5).It may be the reflection of vigorous demand of municipal peoples with the advancement of life quality. The increase of green house especially in the Aegean and Mediterranean Sea Coast regions has also pushed the increased area of these vegetables. Production in green house enables to supply the fresh vegetables to consumers through the year.

Table 3.3.5 Production of Vegetables in the Study Area (1994, Unit:1,000 kg)

Total	Cabbage	Lettuce	Spinach	Melon	Water melon	Cucumber	Egg plant	Tomato	Green pepper	Carrot
15,819	559	203	166	1,374	2,939	1,054	662	5,949	623	215

Source : Agricultural Structure (Production, Price, Value) 1994.

On the fruit trees in the study area, many kinds of fruit trees has been planted and are producing plenty of fruits (Annex Table C-11,12,13,14). Fruits are varied by regions reflecting the differences of climatic and soil condition of the region. Hazelnuts, other nuts and olive planted largely in Marmara and Black Sea Coast regions. Cherries, peaches, oranges and grape are planted largely in Aegean and Mediterranean Sea Coast regions. Apple, pear grape and sour cherries are planted largely in Anatolia Highland.

Number of fruit bearing trees and production in 1994 in the study area is shown in Table 3.3.6.

Table 3.3.6 No. of Fruit Trees and Production in Study Area (1994, 1,000trees,1,000ton)

Species	Hazelnut	Olive	Apple	Orange	Pear	Peach	Figs	Mandarin	Grape
No.*	259,108	78,541	29,411	10,910	10,360	10,095	8,983	7,540	379*
Production	490	1,358	2,002	920	373	367	270	430	2,660

*No. of trees are fruit bearing trees. Grape shows the total planted area (ha)
Source : Agricultural Structure (Production, Price, Value) 1994.

(3) Supply of Agricultural Products

Supplies of agricultural products were shown in table 3.3.7. It was calculated by dividing the total productions by population. Correct amounts of demand of agricultural products are not clear, but the Table will show that wheat, vegetables and fruits are sufficiently supplied to the nation. However, more stable production will be requested because of the increase of population and decrease of the number of farm households and diversion of good arable land into other use in the study area (Annex Table C-15).

Table 3.3.7 Supply of main Farm Products to Nation (1994, Unit : kg/person/year)

Crops	Supply	Vegetables	Supply	Fruits	Supply
Wheat	286	Vegetables Total	291	Fruits Total	195
Barley	114	Leafy Vegetable	24	Pome Fruits	43
Chick pea	11	Fruits Vegetable	247	Stone Fruits	44
Dry Onion	29	Tuber Vegetable	10	Oranges	31
Potatoes	71	Other Vegetable	10	Grape & Others	65

Notes : Source of agricultural products are Agricultural Structure 1994.

3.3.4 Livestock Production

(1) Number of Livestock and Poultry and Their Productivity

Number of livestock and poultry in the study area in 1994 is shown in Table 3.3.8 with the productivity of meat, milk and egg by each animal.

Livestock and poultry are raised by the farm households engaged in animal husbandry and engaged in both crops production and animal husbandry. Sheep are raised in every regions and distributed widely in the study area. Angora goat is distributed only in Anatolia Highland, and cattle is mainly distributed in Black Sea region(Annex Table C-16,17).

Total number of egg and broiler hen are increasing now, but sheep and goat have been slowly decreased their numbers for the last two decades.

Table 3.3.8 No. of Livestock & Productivity of Meat and Milk (1994, Unit:1,000 heads)

Species	Sheep	Goat	Angora goat	Cattle	Milk cow	Broiler hen	Egg hen
No. of Heads	18,817	5,057	727	4,387	4,181	122,459	50,280
Meat Prod.(kg/head)	20	18	17	143			Egg170/year
Milk Prod.(kg/head)	48	61			1,501		

Source : Agricultural Structure (Production, Price, Value) 1994.

As is shown in upper table, the productivity of livestock products are comparatively low in both meat, milk and egg. It may be caused mainly by the shortage of fodder crops and slow development of the artificial insemination and breeding of livestock.

(2) Production of Fodder Crops

Livestock and poultry are fed by cereals such as barley, oats and rye, leguminous pasture such as alfalfa and sainfoin, and wild grasses in natural land. As the number of livestock are quite large, so, it is difficult to supply the sufficient concentrated feed and pasture to the livestock and poultry especially in winter season. Enlargement of the area of pasture and improvement of the productivity of fodder crops will be necessary for the development of animal husbandry.

(3) Supply of Animal Products

The slaughtered animals including sheep, goat and cattle are 10,863,000 heads, and produced meat are 466,190 tons in 1994 by agricultural statistics. Supply of meat to peoples are calculated only 7.6 kg/year/people, that of milk is 173 kg/year and that of egg is 160 eggs/year/people by the statistics (Annex Table C-15).

As shown in table, productivity of meat, milk and egg by these livestock and poultry are low in general. The meat production are insufficient to satisfy the demand of people, and some of meat are imported from other countries. Enforcement of productivity of meat is one of big problems.

3.3.5 Marketing Systems and Prices of Farm Products

Distribution systems of farm products comprise two major types, i.e., controlled and free marketing. The former constitutes a monopoly system for officially controlled commodities through a governmental price intervention mechanism, covering wheat, sugar beet and cotton. The procuring sub-sectors of these commodities have been parastatal but presently their privatization is pursued as a policy target. Wheat and other cereals under pricing control by the government are generally sold to TMO (Grain Authority Branches) after harvesting. Similarly, out of the crops under controlled prices, sugar beet, as a material of processing, is raised on a contract basis with state mills and Pankobirilik (Parastatal Processing Units), which delivers such inputs as seeds, chemical fertilizers and chemicals to the contracted farms in kind at the subsidized or controlled prices so as to secure the required quantity of material for feeding its mills up to their operation capacity. Likewise, cotton and other industrial crops as processing materials are grown under cropping contracts with sales cooperative unions. Raw cotton is delivered to the cotton mills run by the union, and in turn subsidies for input purchase and land improvement are granted to the contracted farms. With a view to facilitating smooth transformation into free market economy, privatization of parastatal enterprises have been encouraged from 1980s, so far leading to the privatization of fertilizer supply etc.

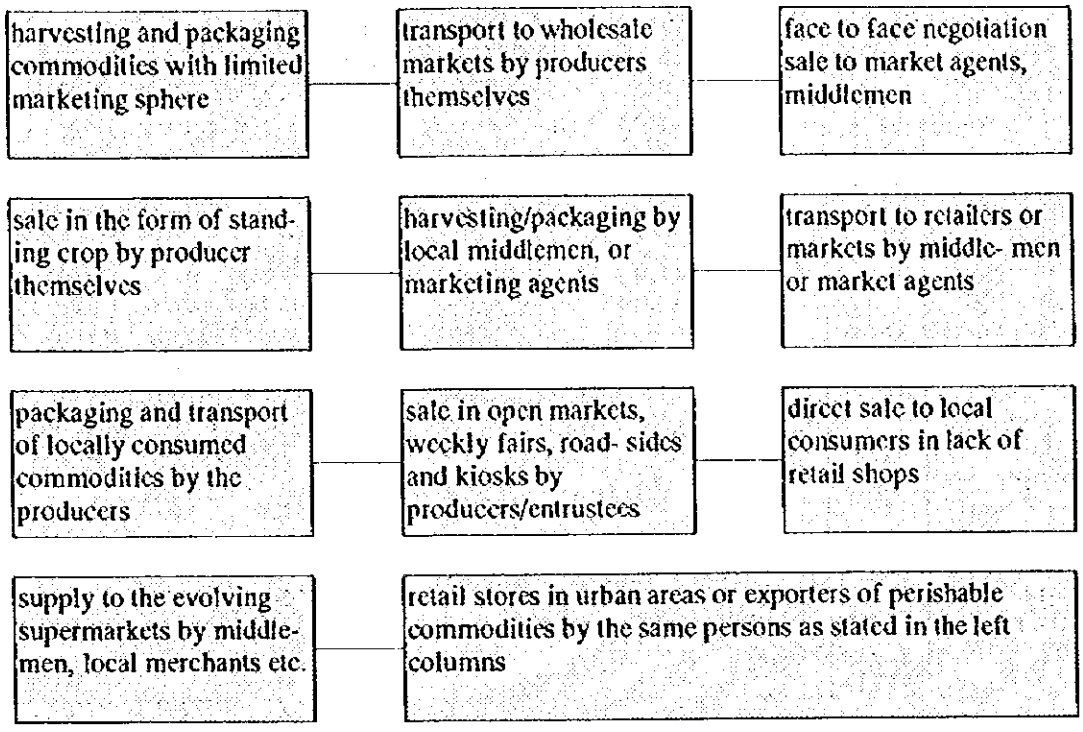
The other marketing system has developed in private sector subject to free market mechanism. It consists of minor routes of direct sale from producers to consumers within rural communities, and major ones through commercial media where large wholesale marketing agents meet large scale domestic (urban) and export demand. Yet, farmers have not been enough organized into groups to involve themselves in marketing of their own products through their sales cooperatives etc., hence in most cases they have to sell the products to middlemen, who carry them to wholesale markets. Though supermarkets seem to have made their debut in urban centers in the process of westernization, it would take much time until they develop their marketing systems to a similar extent to those found now in Europe, with direct delivery routes from producing contractor farms to consuming areas. Wholesale markets are located in the three largest metropolises, but in other medium sized urban centers they are required to establish in future. Therefore, the task of developing basic agricultural infrastructure still remains ahead, including that for marketing facility covering from urban wholesale facility to grass-root packaging units amidst rural communities.

Various causes intervene behind the underdeveloped nation-wide marketing network, but major ones are: backward road networks, feeble degree of specialized producing area formation. Underdevelopment can be detected from the fact that wide difference in unit prices for the same commodity and during the same period among different regions often spreads over the country. Supplementing lack of domestic marketing channels of perishables, peri-urban horticultural centers for vegetable supply emerge in the suburbs of larger metropolises, among which , those developing around Istanbul and Izmir present typical examples.

Marketing mechanism, that reflects and responds supply-demand situations, exerts the pricing of agricultural commodities supplied through general and common marketing channels, like perishables. On the other hand, as to the commodities like cereals and industrial crops serving as processing materials, to which price supporting measures are applied, the kinds of commodities, intervention prices are officially decided annually by assessing them through a parity system, and finally prices and conditions of government purchase are bulletined on official gazettes, and they are applied to the purchase from the farmers by local procurement agencies such as TMO (grain marketing authority), agro-processing mills (commonly called "SEE" or state economic enterprises) and sales cooperative unions. The principal policy objectives of price support stress the protection and sustenance of domestic production through self sufficiency and import substitution. However, whether the supported price levels and terms of their payment can satisfy the producers or not poses another problem. They are usually set at higher levels than internationally traded prices.

1966-67 support prices for cereals are given in Table 3.3.9 and the annual trends are shown in Table 3.3.10 Reasonably, the support prices are determined according to quality grades and the commodity coverage differs from year to year through the annual review. The annual amount of government expense for price supporting comes to 2 - 3% of GNP, imposing a heavy burden on state financing. In parallel with price supporting policy, the standard subsidized prices for input supply to the farmers who contracted the supply of processing material crops to parastatal mills are annually decided, and applied as public unit prices of the inputs delivered to the contracted farms from their contractors or parastatal processing mills.

According to the farm interview survey conducted by the survey team during December 1996 in twelve provinces as shown in Table 3.3.12 as well as a farm economy survey in August 1997, the interviewed farmers obtain considerable revenues by the delivery of their products to TMO and Pankobirlik(SEE) as far as commodities under price supporting are concerned. However, in the case of sales of non-supported commodities, lack of their own marketing organizations inevitably allows middlemen, a traditional marketing channel from producers to consumers, to exploit them. Although their vulnerability in trading can partly be alleviated by such agricultural policy measures as subsides for input purchase, price supporting for official procuring and loans with preferential interest, their livelihood is still threatened by climatic calamities such as droughts and frost biting, impact of inflation arising from boosting production cost.



The latter, price escalation leads to curbing farmers' terms of trade towards their negotiating partners in their markets, in the form of so-called "cost-price squeezing" , namely relative profit-erosion of producers induced by the delay of price adjustment for the harvests from the price escalation rate of inputs applied to the production. The rate of frequencies for utilizing different marketing channels by farmers was given in a table in Annex, but the principal ones for the marketing of free market based commodities are illustrated in the above shown flow.

Table 3.3.9 Official Purchase Prices of Grains as of June 1997, Unit : TL / kg

Kind of Grains	Unit Price	Kind of Grains	Unit Price
Wheat for pasta		**Barley**	*
Anatolian Durum Wheat	44,500	White Barley	24,750
Other Durum Wheat	37,950	Barley for Brewing	23,100
Wheat for Bread		**Rye**	26,000
White Hard Wheat	36,300	**Oats**	26,000
Anatolian Red Wheat	33,000	**Maize**	29,700
Red Semi-hard Wheat	31,550	Premium during period	
White Semi-hard Wheat	29,700	for barley, rye and oats	+1,250
Other (red/white) Wheat	25,000	for wheat sale after Aug.	+1,000

Note : * 2,000 TL/kg for wheat and 1,250 TL/kg for barley is surmounted as premium per month up to September if farmers sell them later than July.

Table 3.3.10 Price Trends of Price-Supported Items

Item of Inputs	unit	1988	1989	1990	1991	1992	1993	1994	1995	1996
FARM LABOR	TL / hr	625	1,050	1,875	2,810	5,187	8,750	16,250	31,250	65,000
MACHINERY	TL / hr	13,801	19,097	30,727	42,360	72,000	86,254	211,750	487,820	1,736,110
N-FERTILIZER	TL / kg	442	634	625	1,802	2,100	4,345	8,750	28,396	57,091
P_2O_5-FERTILIZER	TL / kg	375	530	515	1,026	1,656	2,930	3,750	23,581	52,079
HERBICIDES	TL / kg	5,600	7,750	9,750	15,583	15,280	38,890	99,400	217,100	400,000
DSI-WATERFEE										
CEREAL-Irrigation	TL / kg	1,300	1,820	3,700	6,300	7,000	13,000	24,000	50,000	125,000
CEREAL/PUMP	TL / kg	2,860	4,000	7,900	13,400	17,000	32,000	59,000	126,000	315,000
SUGARBEET farrow	TL / kg	3,060	4,280	8,700	14,800	19,000	36,000	67,000	151,000	380,000
S-BEET/PUMP	TL / kg	6,660	9,320	18,900	32,000	42,000	79,000	146,000	377,000	940,000
OIL of PUMP*	TL / ltr.	436	1,127	1,593	2,253	4,209	5,364	11,752	18,751	50,978
RENTS (dry)	TL / ha	5,000	11,500	17,000	25,000	36,000	50,000	150,000	300,000	500,000
HARVEST-labor	TL / ha	21,000	30,000	58,000	100,000	128,000	200,000	400,000	700,000	1,500,000
TRANSPORT-labor	TL / kg	5.5	8.5	16	20	25	50	100	275	500
BARLEY Seed	TL / kg	140	250	450	750	1,000	2,000	3,000	5,000	12,750
LENTIL SEED	TL / kg	300	450	940	950	3,000	3,500	15,000	53,571	60,000
KIDNEYBEAN seed	TL / kg		1.25							
SEED POTATO	TL / kg	150	500	800	1,074		2,000	3,000	5,000	
MELON SEED	TL / kg	6,000	10,000	25,000	35,000	50,000	75,000	200,000	350,000	500,000
PADDY SEED	TL / kg	400	1,000							
SUGARBEET Seed	TL / kg						77,000			

Note : * ; 4.5 litre / decar / year

Source : GDRS Economy Institute Data

Table 3.3.11 Price Trends of Items without Price-Supporting

Unit: 1,000 TL for crop, livestock products and chicken, million TL for livestock (adult price)

Crop Prod.	1991	1992	1993	1994	1995	1996	Crop Prod.	1991	1992	1993	1994	1995	1996
Feed Briey	0.6	1	1.7	3.1	5.9	11.5	Tab.Grape	4.2	7.1	11.8	25.6	27.0	29.0
Sunflower	2	3.4	5.5	15.3	24.0	35.0	Cherry	3.0	4.3	9.8	15.3	24.5	41.0
Dry Broadbea	1.4	2.3	4.3	10.5	-	-	Melon	1.1	1.7	4.0	5.9	-	-
Garden Pea	2	3.3	6.9	12.9	30.0	61.5	Watermelon	0.8	1.1	2.8	4.4	7.5	13.8
Kidney Bean	3.9	4.9	7.2	21.5	38.5	62.6	Squash	1.4	1.8	3.9	6.7	11.4	21.8
Lentils	2.2	3.6	5.4	12.4	26.8	60.0	Tomatoes	1.4	2.2	5.0	7.8	13.6	24.8
Chick Pea	1.8	3	4.7	14.4	27.5	55.0	Brinjal	1.5	2.5	4.9	8.2	-	-
Raw Cotton I	2.9	4.5	7.1	18.3	33.8	67.0	Cucumber	1.5	2.2	4.5	8.2	-	-
Raw Cottin II	2.9	4.1	5.9	17	-	-	Okra	4.3	7.6	14.1	25.5	-	-
Potatoes	0.9	1.4	2.7	5.5	9.8	16.0	Hen's Egg	0.3	0.8	1.0	1.7	2.7	4.1
Polished Rice	2.9	5.3	7.6	13.7	22.7	42.0	Cow Milk	1.7	2.8	4.3	8.5	16.7	30.7
R.Sugarbeet	0.18	0.29	0.45	1.25	2.4	4.4	Sheep Milk	2.0	3.2	5.0	9.6	-	-
Dried Onion	1.1	1.4	3.2	12.1	17.5	23.0	Chicken	20.9	39.1	62.1	116.0	217.0	379.6
Groundnut	3.9	5.8	10.3	22.1	-	-	Adult Ewe	0.3	0.6	1.1	2.1	3.8	6.9
Dried Clover	0.5	0.7	1.5	3.3	5.7	10.0	Lamb	0.2	0.3	0.6	1.1	-	-
Hazelnuts	4.3	7.6	12.6	38.4	-	-	She-Goat	0.2	0.4	0.8	1.6	-	-
Dried Fig	4.1	7.3	14.5	28.5	-	-	fm.Buffalo	1.7	3.3	5.7	12.4	-	-
Europ' Apple	1.6	2.9	4.3	10.2	13.5	29.5	Milch Cow	1.4	2.9	4.9	9.3	15.3	28.5
Indig' Apple	1.2	2.2	3.4	7.8	12.9	20.0	Calf	0.9	1.9	3.2	6.1	-	-
Juice Orange	1.1	1.9	2.5	5.5	-	-	Europ' Cow	3.2	6.1	10.3	20.4	-	-
Table Orange	1.9	3.3	4.2	8.6	17.4	35.5	Hybr' Cow	2.2	4.4	7.3	14.3	23.6	43.7

Source : Statistic Bulletin of Economics 1995-1996

Current farm-gate prices as of July 1997 at the project sites are summarized in the following table.

Table 3.3.12 Marketing Channels of Farm Products and Inputs

Products / Inputs	self-consumption	middlemen	cooperative	TMA	Factories	Market	Bazaar*
Cereals	10%			80%		10%	
Sugarbeet			15%		85%		
Sunflower			20%		80%		
Tobacco					100%		
Cotton			100%**				
Olive/Fruits		60%				40%	
Vegetables		50%	10%			40%	
Fuelwood	60%	20%				20%	
Livestock	10%	30%			20%***		30%
crop seed	5%+	27%-8%##	50%	5%#	5%++		
fertilizers		30%	65%			5%	
chemicals		30%	45%	10%#		15%	
feedstuff	7%+	40%	30%		5%	15%	3%
farm implement		37%-3%##	55%			5%	
animal stocks	65%	15%		20%			

Note : * weekly livestock bazaar, ** eventually privatized ginneries, *** slaughter houses in towns, + self-supply from owned plot, ++ on contract basis, # agricultural union, ## 27 from middlemen who regularly visit, and 8% from casual brokers or money lenders

Table 3.3.13 Price List of Farm Products as of July 1997 (Unit: 1,000 TL)

CROP	Hacilar	Urunlu	Kalesekisi	Camlibel	Kozluk	Kuskara	Ozdenk	Aslanlar	Ilyaskoy	K.Karistiran
Wheat	33	33		29		25	33	27	27	33
Barley	27	24		20		19	25		21	23
Maize					30					
Paddy					55					
Oat				20					35	
S.Beet		11		11		11	11			11
S.Flower	100	100							32	50
Cotton								120		
Hemp						150				
Alfalfa				20		20				
Beans		70					75-80		100	
Chick Pea						70	70			
Cucumber	25								35	
Eggplant								20	30	
G.Pepper	150							40	100	
Tomatoes	30							18	35	
Potatoes	45					25				
Garlic						85				
Onion							50			
Leeks								40		
Celery								50		
Cabbage								60/piece		
Melon	75									
W.Melon	40	20						15		
Olive oil								150		
Hazelnut					300					
Wallnut			200							
Cherry			100						90	
Grape			80					23.5		
Apple			70						30	
Plum			50						36	
Peach									60	
Apricot	125									
Pear			75						70	
Strawberry			150							

Source : interview survey by the study team

3.3.6 Production Values of Principal Crops

In principle, arable land with favorable cropping conditions has marked yield response to input application, leading to higher crop production values, because yields can be raised considerably irrespective of the past investment. Values of farm products should include those of by-products, namely straw, cake brought about by processing for feeds that are either self-consumed within farm yard or offered for sale as industrial materials, feeds etc. While values of livestock can be calculated from current market price, average life and estimated annual manure production.

Rough estimation of crop values from so far collected data, as of July 1997, are summarized as follows, though they vary from a province to another because different prices to which local and state-wide demand influences are recorded for each province in terms of marketed produce other than price-supported. Also, considerable seasonal fluctuation in the same province can occur on these values responding to changes in demand and supply situation.

Table 3.3.14 Current Values of Major Crop (Unit: ton/ha, million TL/ton, million TL/ha)

CROP	Agro ecological zone *	Year Recorded	Rainfed Yield	Yield of Irrigated Crop Mean	Max.	Min	Rate of increment	96 unit price	96 cost production of	96 rate margin	increment profit	by product yield rain fed	irrigated	product value rain fed	irrigated	value increment
Wheat	Ankara 3 - 1	1977	2.42	4.15			171%	38.3	82.9	47.8%	31.7	3.63	6.23	35.2	119.6	84.4
d.o.	Ankara 3 - 1	1992	2.88	4.19			145%					4.32	6.29	30.2	44.0	13.8
d.o.	Erzurum 3 - 1	1994	1.15	1.75			152%					1.73	2.63	12.1	18.4	6.3
d.o.	Aksaray 3 - 2	1992			3.64	4.72	209%									
d.o.	Eskisehir 3 - 1	1989	1.95	3.05			156%					2.93	4.58	20.5	32.0	11.6
d.o.	d. o. 3 - 1	1989	3.17	4.85			153%	38.3	82.9	55.4%	35.6	4.76	7.28	71.8	153.8	82.0
d.o.	Eskisehir 3 - 1	1994	1.74	4.05			233%					2.61	6.08	18.3	42.5	24.3
d.o.	Ankara 3 - 1	1992			3.92	-	126%									
d.o.	Konya 3 - 2	1992				5.13	177%									
d.o.	Konya 3 - 2	1996	0.45	1.05			233%					0.68	1.58	4.7	11.0	6.3
d.o.	Konya 3 - 2	1994	2.17	2.65			122%	38.3	82.9	18.3%	3.4	3.26	3.98	23.0	46.4	23.4
Paddy	Edirne 1 - 1	1994			-	5.35	214%	55	304.0	-3.3%	0.0	0.00	0.80	0.0	-6.5	-6.5
d.o.	Izmir 1 - 2	1994			-	5.40	216%	55	294.0	1.0%	0.0	0.00	0.81	0.0	6.2	6.2
Barley	Konya 3 - 2	1992	2.45	5.43			222%	26.0	57.2	59.5%	46.1	4.31	9.56	20.3	114.6	94.3
d.o.	Aksaray 3 - 2	1992			4.12	4.63	175%									
Maize	Samsun 3 - 1	1994			2.23	4.65	216%									
d.o.	Cukrova 1 - 3	1993	1.82	2.51			138%	34.5	93.5	-8.0%	-1.9	2.18	3.01	-24.2	2.1	26.3
Potatoes	Ankara 3 - 1	1977	10.73	20.66			193%									
d.o.	Izmir 1 - 2	1983	13.89	26.28			189%	25.0	502.0	23.6%	73.1	-	-	-154.8	155.0	309.8
Kidney Bean	Ankara 3 - 1	1992	0.00	1.30			500%					0.00	2.24	0.0	33.5	33.5
Chick Pea	Eskisehir 3 - 1	1580	1.10	1.86			169%	108.0	125.0	37.8%	31.0	1.89	3.20	22.2	123.9	101.7
d.o.	Eskisehir 3 - 1	1994	0.93	1.40			151%					1.60	2.41	24.0	36.1	12.1
Lentil	Cukrova 1 - 3	1993	0.70	1.90			271%	99.0	125.0	33.5%	39.9	1.20	3.27	-37.6	112.1	149.8
Groundnut	Cukrova 1 - 3	1993	1.90	3.00			158%	116.0	180.5	48.1%	61.4	3.27	5.16	88.9	244.9	156.0
Alfalfa Colver	Ankara 3 - 1	1977	0.00	12.06			500%									
d.o.	Cukrova 1 - 3	1979	0.00	11.00			500%									
d.o.	Tokat 3 - 3	1989	1.30	16.01			1238%	9.0	106.0	26.4%	35.0	-	-	-94.3	38.1	132.4
Feed Bean	Konya 3 - 2	1984	0.00	4.07			500%									
Sugar Beet	Ankara 3 - 1	1988	20.56	48.23			235%	11.0	375.0	29.3%	89.2	3.29	7.72	-124.2	213.4	337.6
d.o.	Ankara 3 - 1	1996	4.80	6.50			135%					0.77	1.04	5.8	7.8	2.0
d.o.	Konya 3 - 2	1984	11.17	68.39			612%	11.0	375.0	50.2%	315.7	1.79	10.94	-238.7	459.4	698.1
d.o.	Ankara 3 - 1	1977				51.7	431%									
d.o.	Konya 3 - 2	1996	85.00	147.0			173%					13.60	23.52	102.0	176.4	74.4
d.o.	Tokat 3 - 3	1978				64.8	540%									
Cotton	Izmir 1 - 2	1984	3.65	5.20			142%									
d.o.	Cukrova 1 - 3	1986	3.71	5.77			156%	120.0	510.0	26.3%	65.1	-	-	-64.8	182.4	247.2
d.o.	Samsun 3 - 1	1977	5.85	7.64			131%									
d.o.	Adana 1 - 3	1977	1.57	5.06			322%									
Sunflower	Ankara 3 - 1	1984			1.48	2.72	191%									
d.o.	Eskisehir 3 - 1	1994	1.13	1.65			146%									
d.o.	Tokat 3 - 3	1994	1.41	2.23			158%	35.5	28.8	63.7%	18.5	-	-	21.3	50.4	29.1
d.o.	Cukrova 1 - 3	1993	0.60	2.70			450%									
Tomatoes	Ankara 3 - 1	1996	50.00	80.00			160%	24.8	258.4	34.8%	258.8	-	-	981.6	1725.6	744.0
d.o.	Cukrova 1 - 3	1993	19.00	41.00			209%									

Source: GDRS Annual Reports *: agro-ecological zones '+: dry matter grass

This estimation reveals that cases are often encountered in which increment of production values by irrigation remains at conservative levels in spite of high net gain ratio (net gain/gross gain). In fact, increment in net profit shows higher values for vegetables, potatoes and feed crops owing to irrigation. However, profitability of industrial crops (sugar beet, fiber crops and oilseeds) and of paddy is not so attractive as expected though it is highly variable with their yield levels.

3.3.7 Farm Economy

Agricultural GNP accounts for one seventh of the total GNP, whereas population who depends on agriculture counts 35% of the state total, so per capita income of dependable population on agriculture amounts to only one third of the average per capita revenue in the whole nation. It follows that a pure farm in Turkey can hardly sustain livelihood by single farm income, but needing off-farm income to supplement farm income. National per capita GNP in 1996 is estimated at 50 million, while the mean annual income of the household interviewed stays 91 million for four family members, hence recent rural household revenue remains at less than half of the national average. Even lower levels of prices and taxes in rural area are counted in, there seems meager livelihood allowance for household sustenance of a farm family.

The implementation of land improvement projects is an indispensable precondition for modernizing agriculture in Turkey, but the extent of actual implementation has been quite limited due to deficit in budgetary provision in every fiscal year. Coping with budgetary limitation, an institutional arrangement has been established since 1961 where projects can be started with loans from national financing agents like Agricultural Bank, so that beneficiaries do not have to wait for a long time the disbursement of national budgets. So far, 20 - 27% of the total beneficiary area has been annually covered by the system. Though the loans are granted with discounted interest rate, around half as much as ordinary bank interests, only wealthy applicants with valid mortgages and capacity of amortizing loans are eligible to receive them. Furthermore, the entire amount of project costs cannot be covered by these loans, and around 30% of the cost must be met by the farms involved in the project.

Likewise, operation and maintenance costs of land improvement facilities are also met by the beneficiary farms appropriating from their agricultural revenue. This implies that whether these management costs are in reasonable range or not should be assessed in addition to ordinary production cost in the study of farm economy. Lately, the escalation rate of O&M cost, especially rapid rise in unit fare of electricity supply, has outweighed that of farm-gate prices of farm products. Yet, the fact that crop yields in rain-fed fields where irrigation is not available lie in exceedingly low levels whereas profitability of cash crops like that of equipped horticulture stays at quite high levels implies an economic compatibility for irrigation development. Currently, O&M cost levels of irrigation facilities accounts for 16 - 21% of the total crop production costs, but it is imperative that the irrigated fields have enough capacity of holding productivity that is by far superior to that of rain-fed ones. In general, the crop production cost for rain-fed fields is economized up to two thirds to three fourths of that of irrigated ones, but in turn their gross income remains in less than half of that from irrigated land.

Table 3.3.15 A Sample of O&M Cost Performance (Unit: thousand TL/ha)

CROP	Tariff of GDRS water coop		Tariff of DSI water coop		Fuel/Electricity Energy Tariff	Labor Wage for irrigation
	Groundwater	Lift by pump	by Gravity	Lift by pump		
Sugarbeet	1,976.0	532.8	676.0	1,460.0	2,645.0	2,636.3
Sunflower	642.2	177.8	396.0	830.0	228.0	581.3
Squash Marrow	988.0	222.3	446.0	980.0	1,368.0	1,083.8
Watermelon	963.3	266.8	446.0	980.0	912.0	1,053.8
Paddy Rice	2,470.0	1,667.3	1,676.0	3,680.0	-	-
	Total Fare of Irrigation	Production Cost 1994 Record	Converted Cost to 1996 Price	Cost Share of Irrigation Fee	Production Cost of Rainfed Crop*	Ratio to Cost for Irrigation
Sugarbeet	5,957	30,366	22,516	19.6%	-	-
Sunflower	1,205	7,146	4,555	16.9%	5,538	77.5%
Squash Marrow	2,897	13,903	10,948	20.8%	9,128	65.7%
Watermelon	2,412	14,863	9,115	16.2%	11,397	76.7%
Paddy Rice	-	-	-	-	-	-

Note: *as 1994 performance Total irrigation cost by DSI gravity irrigation unit tariff of electricity, in 1994 644TL/kwh+15%VAT, in1996 2,434TL+15%VAT

Source: Excerpted from Journal Report of Rural Development, December1996

Farmers can use bank credits for their farm investment, up to 500 million TL per farm household annually through Tarim Kredi Kooperatif to which discounted interest rate has been applied (ordinary bank interest ranges 83.9 - 84.5 for 6 months and 91.6-93.7 for annual term but it offers loans originally granted from Ziraat Bankasi at 73 % for annual term, whereas Ziraat Bankasi itself provides them with loans at the annual interest rate of 50% hedged with valid mortgage). However, only a few per cent of farm household can be eligible for Ziraat Bankasi credits due to lack of valid mortgage, though more households can borrow credits from Tarim Kredi Kooperatif.

3.3.8 Agricultural Support Services

(1) Organization for Agricultural Extension

The agricultural extension system and offices are belonging to the General Directorate of Development of Agricultural Production of MARA. The General Directorate has branches in all provinces, and the extension offices in each province has one Directorate, each district has one sub-directorate. Provincial offices have a section of farmers education and some specialists belong to the section to teach on crop cultivation and animal rearing etc..

Each specialists guide the progressive farmers in the village at first, and other farmers in the village imitate the new cultivation techniques and raising methods of the animals from the progressive farmers.

(2) Research Institutes of Agriculture

There are two agricultural research organizations in Turkey to develop the agriculture and rural affairs in the country. One is the General Institutes of Agricultural Research which belongs to MARA. They have Central Research Institute for Field Crops and Regional Research Institute, and have responsibilities mainly for fundamental subjects such as breeding of new varieties and plant protection. Another is the Research Institute of Rural Services under GDRS.

GDRS has one National Institute and ten Regional Institutes. The former is the Soil and Fertilizer Research Institute in Ankara and the latter are Ankara, Tarsus, Menemen, Kirklareli,

Eskisehir, Konya, Tokat, Samsun, Sanliurfa and Ertulmu Institutes. These Institutes have responsibilities mainly on practical subjects such as irrigation methods, water management and soil conservation etc.

(3) Agricultural Credit Services

There are some types of agricultural credit services to support the farming practices. These services are given through the Agricultural Bank, other Funds and some kinds of farmers organizations. These funds are contributed for the development of crop and animal production, fishery, irrigation facilities and rural industries in the country. The amounts of credit expanded so largely in recent years reflecting the inflation in the country.

(4) Agricultural Cooperative

Districts and big villages in provinces have a agricultural cooperative for the development of agriculture and for the safety-supply of farming materials. Farmers pay some amounts of investment when they join the cooperative, and they can get the farming materials such as fertilizers, chemicals and some irrigation instruments by credit.

3.4 Irrigation and Drainage

3.4.1 General

Two organizations are in charge of irrigation development; namely, GDRS and DSI. Law No. 3202 established GDRS in 1985 as the successor to the Soil and Water General Directorate (TOPRAKSU), while DSI by Law No. 6200 enforced in 1953.

GDRS is responsible for developing small scale irrigation which exploits water not more than 500 ℓ/s, applying on-farm development to the areas which have been opened for agriculture by DSI, as well as soil conservation, land consolidation, drainage and land reclamation, rural road, village water supplies, and village electrification. The Law also specifies GDRS can conduct, with prior approval from DSI, irrigation developments requiring more than 500 ℓ/s.

DSI is empowered for the nation's overall water resources planning and execution (including groundwater), therefore its responsibility is with major irrigation and drainage development, flood control, swamp reclamation, hydropower development, and water supply to cities with a population over 100,000.

Referring to the Laws, GDRS conducts, at his own authority and responsibility, the small-scale irrigation developments that utilize river runoff, upon application by farmers. On the other hand, both organizations will be responsible concerning DSI initiated irrigation projects; namely, DSI for main irrigation system including secondary and tertiary canals in some cases and GDRS for on-farm development such as farm ditches, land leveling and land consolidation. Some problems have shown up where on-farm development has not well kept pace with DSI due mainly to the GDRS's insufficient budget, leaving farmers waiting.

For groundwater irrigation, DSI exclusively takes responsibility for design and implementation of wells despite the project size, while GDRS for only on-farm irrigation system. GDRS gives survey reports to DSI, and DSI carries out feasibility studies (including irrigation systems). Feasibility reports are then delivered to GDRS, and both organizations

proceed to each detail design and its implementation. This system creates procedure-related-problems in addition to the aforementioned.

3.4.2 Water Resources

Given below is a summary water balance based on the nationwide water potential and sector-based-consumption. A total 107.2 km^3 of water potential was identified as of 1995, which is composed of 95 km^3 (89%) of surface runoff and 12.2 km^3 (11%) of groundwater. The total development of water resources by public institutions reached 33.5 km^3 in 1995. This means that 31 % of technically usable potential has been developed, and as high as 38 % is the estimated in the year of 2000. Almost 75 % of the developed water resources are being used for agricultural purposes.

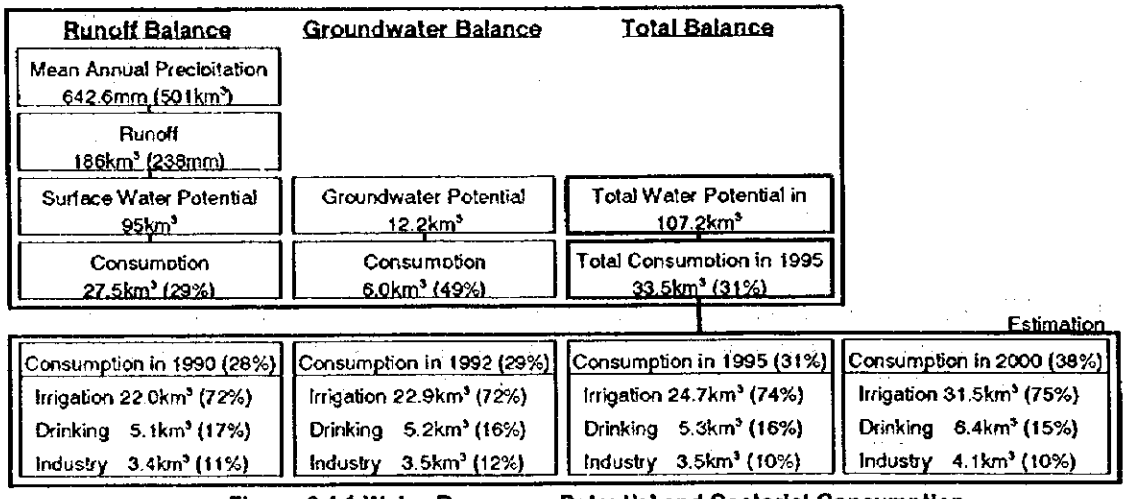


Figure 3.4.1 Water Resources Potential and Sectorial Consumption

3.4.3 Irrigation

An 8.5 million ha, out of 25.9 million irrigable area, has been identified as economically feasible to irrigate with major and minor irrigation works (Statistics with Map Bulletin, 1995, DSI). The feasibly irrigable area consists of 7.9 million ha with surface water and 0.6 million ha with groundwater. Already opened to irrigation are, as of end of 1995, 3.7 million ha for surface water (47%) and 0.4 million ha for groundwater (67%). The total opened area of 4.1 million ha engrosses half of the feasibly irrigable area (See ANNEX E-3 for provincial based detail data).

GDRS has carried out numerous small scale irrigation projects, total of which amounted to 1.15 million ha in gross; viz., 0.90 million ha for surface water and 0.25 million ha for groundwater, as of January, 1996. These areas are comparatively illustrated below. It shows that GDRS has opened about 33 % of the total state area opened for surface irrigation and 74 % for the groundwater.

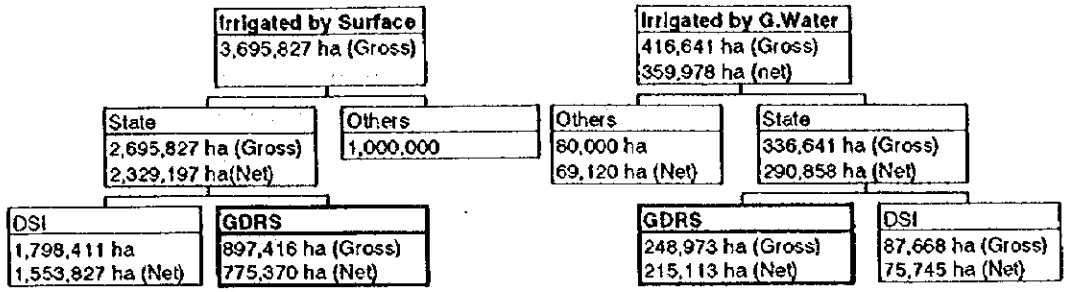


Figure 3.4.2 Irrigation Area Developed by GDRS and Others

Figure 3.4.3 shows past performance, carried out by GDRS and the predecessor TOPRAKSU, by irrigation type such as dam, weir and groundwater (See more details in ANNEX E-4). Also summarized is the Table 3.4.1 showing the works with a number of the projects as of January 1996.

GDRS has constructed about 500 dams (No. of projects is 1,484) irrigating 119,800 ha, about 13,6000 weirs (777,600 ha), and about 1,460 groundwater irrigation systems (249,000 ha), thus opened total 1.15 million ha in gross. The average irrigation areas are 239 ha for dam (81 ha for project base), 57 ha for weir, and 171 ha for groundwater. GDRS has also completed about 2,050 small dams for live stock watering.

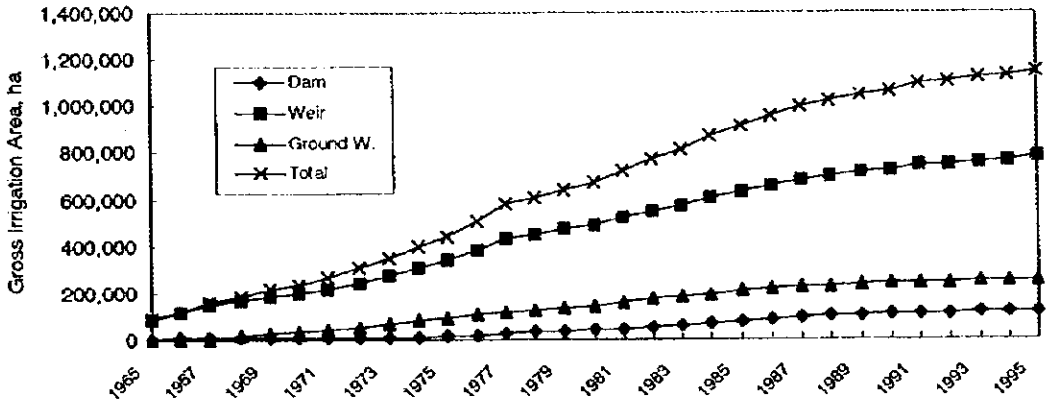


Figure 3.4.3 GDRS Past Performance of Irrigation Related Works

Table 3.4.1 Summary of Irrigation Projects by Type undertaken by GDRS

Irrigation	No. of Projects	Gross Area (ha)	Ave. Area/ Project (ha)
Dam Irrigation	1,484(1,276)/*502(426)*	119,807 (100,761)	81 (79)/*239(273)*
Weir Irrigation	13,578 (9,307)	777,612 (529,571)	57 (57)
Groundwater	1,457 (1,340)	248,973 (214,009)	171(160)
Total	16,519 (12,349)	1,146,392 (844,341)	69 (68)/*74(76)*

Note: Figures in ( ) are those of 13 regions taken in this Study.
Figures in Italic are for No. of Dams, not for No. of Projects.

On-farm irrigation is mostly carried out by surface irrigation such as border, furrow and basin. Though reliable data are absent, about 95 % of irrigation is practiced by the surface schemes and the remaining 5 % mostly by hand-move sprinklers.

3.4.4 Drainage

The following table shows drainage works undertaken by GDRS as of January 1996. GDRS has carried out about 1,200 drainage projects covering 319,000 ha, most of which have been conducted by means of open ditches in wet lands and water-logging areas, thus accompanied reclamation works.

Table 3.4.2 Summary of Drainage & Reclamation Projects undertaken by GDRS

	No. of Projects	Gross Area (ha)	Ave. Area/ Project (ha)
Drainage & Reclamation	1,167(1,110)	318,756(306,523)	273(276)

Note: Figures in ( ) are those of 13 regions taken in this Study.
Figures above do not include on-farm drainage works relating to DSI developed area.

3.4.5 Operation and Maintenance

Upon completion of surface irrigation projects by GDRS, the irrigation system is handed over to the Muhtar (village chief) who, as farmers' representative, applied the irrigation development. The farmers are not obliged to bear any amount of the construction cost as long as it concerns surface irrigation. The responsibility of operation and maintenance is solely left on beneficiary farmers, and presently no water users association (or cooperative) exists as a legal entity.

Though farmers who benefit from groundwater are also exempt from any reimbursement to the construction cost of on-farm irrigation system undertaken by GDRS, they have to reimburse 25 % the investment cost of well(s) and pump(s), which are installed by DSI. The reimbursement is made on 25 years installments with a 5-year grace period, and no interest is applied. All groundwater irrigation systems have water users cooperatives since DSI undertakes the work upon establishment of the cooperative for the purpose of facilitating the amortization and managing the electric fee incurred. The operation and maintenance is conducted by the officially entitled cooperative.

No monitoring & evaluation is systematically undertaken by GDRS at present. In case deficit or damage occurred for a project that has been carried out by GDRS, Muhtar asks either provincial, regional or GDRS office for the restoration. No agricultural extension services, including modern irrigation practice, is carried out by GDRS. The responsibility of extension services is exclusively within MARA, while MARA is not in charge of any type of irrigation development. For conducting extension services, required are either coordination between the both organizations or otherwise establishment of extension related department within GDRS.

3.5 Inland Fishery

3.5.1 Outlines

Since predominant culture found in Turkey has been subject to more influence from Bedouins than that from oceanic ethnics, the source of protein for national dietary composition is more dependent on livestock meat than on fishery products. Among the items of per-capita annual food consumption, meat constitutes 25 kg but fish accounts for only 6 kg. On account of such pattern, fishery products presently tends to be exported for earning foreign currencies, while marketing channels for fish are rarely encountered throughout inland

regions. In particular, quantities of both production and consumption of fresh water fish are limited to such an extent that annual catch of fresh water fish accounts for only 40 thousand tonnes, or 7% of the total annual fishery landing, or 600 thousand tonnes. In the sub-sector of fish farming, major species include sea bass, bream, sole and sea trout, but as minor ones fresh water trouts and carps are also cultured, though the fresh water aqua-culture activities are stagnated reflecting low domestic demand.

Fish farming in relation with GDRS irrigation projects has so far been planned in 55 projects, equivalent to only 3.8% of the long list inventory totaled at 1,418 projects. Of which 53% are concentrated in Adana and Izmir. As for fish species, the most common is fresh water trouts, distributing in 7 regions, followed by mirror carp found in 5 regions, then common carp in 4 regions and bass/perch in one region. On the other hand, according to information of inland fishery in short list inventory, it is distributed in 6 regions out of the total 13, with the plan of providing 1,174 fishing ponds the water surface of which covers 30 ha, where about 400 ton of annual fish landing is envisaged. Most of the target species constitutes trouts, also bass and carps are planned as minor species. Since fresh water aquaculture has low profit but expensive levels of investment, importance of incorporating it has not yet been enough recognized by the planners as a component of the projects sponsored by GDRS.

3.5.2 Target Water Body for Aquaculture

As stated above, farming of inland fish has been in slack, the promotion measures therefor was initiated just from 1981. In 1994, MARA and DSI liberated 21 reservoirs and 6 lakes to the private culturing activities, but the real activities over these water bodies are limited to only 1% of the water surface. MARA has granted the permission for 25 aquaculture projects with the annual capacity of producing 2,500 tons in ten reservoirs until the end of 1996. Except the activities mentioned above over the limited water surface, DSI has not so far approved any type of aquaculture in any reservoirs nor canals within its controlled areas. Judging from such restrictive conditions, there is an interpretation that the time does not yet ripen for the promotion of fish farming activities. The location of fresh water culture is concentrated in the coastal areas of Marmara Sea, Mediterranean and Black Sea, where three fourths of aquaculture plans are located. As to the geographical distribution of fresh water aquaculture, 30% of the total locations are found in Marmara Sea Coast, another 30% in Mediterranean, 15% in Black Sea, 10% in central Anatolian plateau and 10% in eastern plateau. The reasons why fresh water culture is dominant in the western part of the country may lie in availability of abundant water sources, markets located in the vicinity of producing areas and the ready access to the secured outlet in the advantage of shorter distance to major consuming areas. Table 3.5.1 indicates the target water body used for aquaculture.

3.5.3 Production System

As of 1996, 710 fresh water aquacultural projects with the annual production of 35 thousand tonnes have been registered throughout the country. Of which 399 trout farming units (with an increasing trend) and 40 carp farming (with a declining trend) are now in operation. These operations consist of predominant extensive aquaculture activities and minor intensive ones. The former is mostly operated by the local petty scale enterprises with the limited size of fishing ponds ranging 0.5 - 1.0 ha each. In these extensive activities,

fingerlings of fresh warm-water species (such as carp, wels, bass/perch and catfish) are grown.

Table 3.5.1 Target Water Bodies for Aquaculture

Fishery Production Resources	Number of Water Bodies	Water Surface (ha)	Length of Water Bodies
Natural Lakes / Ponds	200	906,118	-
Artificial Reservoirs	174	357,030	-
Streams / Rivers	33	-	177,714
DSI controlled Reservoirs**	267	-	-
GDRS controlled Dams *	2,261	123,477	-

Note : * Figures as of 1995, ** Figures as of 1994 Source: MARA Annual Report

Few of them accompany feeding and manuring of organic matter, mainly resorting to natural growth. These extensive aquaculture units are chiefly located in the vicinity of such water bodies as streams, wells and fountains.

In addition to these extensive aquaculture, intensive systems are practised for mainly fish culture of temperate trout species. These have different sizes ranging 2 - 120 thousand square meters, but the unit size of each culture pond for the most part measures at 0.25 ha.

Major practices include; regular water replacement making use of tidal interchange, or filtering with fiberglass. In case of fresh water salmonoids concrete raceways, the size of which 25m in length, 3m in width and 1.5m deep are often installed with the practice of crowder-feeding. Annual unit production of fish farming under intensive management ranges 1 - 8kg per sq.meter of pond surface in the case of rainbow trout, with farm sale price of 300 thousand TL per kg. Hence, The gross revenue of a trout farm with an average capacity of 4,000 sq. meter and annual sale of 20 tonnes amounts to about 6 billion TL, but the incurred production cost per kg of trout comes to 250 thousand TL (of which 180 thousand TL is spent for feeding cost, 50 thousand TL for depreciation and 20 thousand TL for the procurement of fingerlings), leading to the net gain of 0.5 billion TL (equivalent to 6 thousand US$ on the rate as of 1996) only. If the labor wage is counted in, the net gain further dwindles to that comparable to ordinary peasants. Also, in the case of carp farming, unit farm price is offered at as low as 200 thousand TL per kg, whereas the production cost amounts to 180 thousand TL. It follows that the net gain will be lower, and this has likely led to the recent decline in the number of carp farms.

A number of problems have been issued, among which feeding poses utmost serious one. Costlier price levels of artificial feeds essential for efficient culture, like fish-meal pellets prevail (at 90 thousand TL/kg). Furthermore, since feed conversion ratio ranges as low as 14:1 - 1.2:1, higher risk of failing cost recovery always threatens fish farms unless they can maintain high yields of landing. Similarly, issues arise from seed procurement, for that of fertilized trout eggs relies heavily on imports and fry/fingerlings are not necessarily readily available to farms. Another hardship stems from the water body that is available to fish farming is confined to what is stated above, and various limiting factors such as requirement of license for launching new farm operation, limited availability of capital credits granted from Agricultural Bank and other financing sources that makes capital provision more difficult. Because high level of transport and marketing cost are required for raw fish marketing, terminal retail prices tend to get boosted . This not only affects farm prices of raw fish in a way that producers' share margin is more often kept in narrower frame but the

survival of existing farms are threatened by an aggressive export access from neighbor states, such as East European countries having capacity and conditions of producing cultured fish at lower wage costs.

3.5.4 Institutional Framework

Institutional framework of promoting inland fishery by liberalizing public water body was commenced since 1959, the major fish species of which are dominated by common carp, mirror carp and hard-scale carp, but there are also such minor species as perch-pike, trouts, cray-fish and grass carp are included. This promotion program is sponsored by three related agencies (MARA, Ministry of Forestry and Ministry of Resources and Energy), each of which is responsible for its own experimental stations and sub-sector of fry producing . For example, Agricultural Promotion Bureau of MARA runs fishery facility located in Yalova along Marmaran coast and in Antalya along Mediterranean coast. Though these state farms don't have mandate to carry out researches, they provide fingerings for the purpose of promoting private fish farming activities and activating efficient use of inland water bodies exclusive of barrages. Species include common carp, mirror carp, trout, mullet, wels, pike and crayfish. Currently the farm in Antalya targets annual production of about 5 million carp fingerlings(sized 3 - 5 cm), 3 million fry (less than 1cm), 300 thousand fingerings of rainbow trout and 1000 ducklings a week in the 9-month season. Besides it produce aquarium fish for sale offering to private demand. The farm products are sold to the private sector or released for conserving resources in enhancement of public water bodies. Performance of these public fish farms is given in Table 3.5.2.

Table 3.5.2 Performance of State Agents Concerned in the Promotion of Inland Fisheries such as Fry Releasing (Unit : Number of Sites, 1000 fry)

	M. A. R. A.			Ministry of Forestry			Ministry of Resources/Energy (DSI)		
Year	Water Bodies	No. of carp fry released	No. of trout fry released	No. of fresh water fry released	No. of Sale of Fresh W. Resources	No. of Reservoir Released	No. of Small Weirs	No. of Released Fr. W. Fry	Annual No. of Produced Fry Fingerlings
1980	-	-	-	-	-	43	18	2,124	5,000
1985	-	-	-	-	-	59	39	8,294	5,700
1990	-	-	-	-	-	104	48	16,584	4,400
1991	227	7,806	50	-	-	115	68	20,584	4,420
1992	176	4,375	30	820	484	126	93	26,084	4,450
1993	153	4,520	-	1,693	715	133	109	37,134	4,460
1994	272	5,000	-	1,966	856	136	115	45,634	4,750
1995	80	4,000	-	235	1,336	141	130	59,634	4,900
1996	129	2,785	5,300	-	-	-	-	-	-

Source : 1996 Statistics of Fisheries

Ministry of Forestry has the responsibility for breeding and producing fingerlings for releasing into water bodies in forest lands, or selling them to fish farms. At present it has 16 trout hatcheries and production units for fingering production. The biggest six hatcheries are located at Yedigoller in Bolu District, established in 1993, Ovacik for trout built in 1976 in Tunceli D., Ilgaz in Kastamonu Province for trout in 1980, Cerkes in Cankiri District for carp in 1981, Camlihemsin in Rize D. for trout, in 1983, (annually producing 110 thousand trout fingerlings) and Kemelpasa in Izmir P. for trout, in 1984. The ministry is reported to have released about 1.5 millions of trout fingerlings per annum by these facilities. Outline of these is summarized in Table 3.5.3. GDRS has carried out potable water facilities and small scale

irrigation for local communities, but no fishery promotion measures has so far been materialized.

The ministry of energy and natural resources, through DSI, one of its agencies, has six stations/hatcheries for fish production throughout the state, also conducting some research. These are located at Seyhan in Adana Province, close to Seyhan Barrage, at Ipsala along the River Meric in Edirne District, at Keban in Elazig D. on the Keban Barrage, at GolKoy in Bolu D., at Amasya City on Yedikir River close to Altinkaya Barrage and at Urkmez in Izmir P. Two new stations are under construction, namely at Urfa on the new Ataturk Barrage, and Camligoze in Sivas P. Fisheries operations in DSI-controlled barrages are leased to fishermen's Cooperatives by auction held by the ministry of finance and customs, with MARA licensing fishing rights to the members of cooperatives that knocked down the bidding.

Table 3.5.3 Facilities Managed by State Agents Involved in Inland Fishery Promotion (Unit: *1,000 fry, 1,000 fertilized eggs)

Kind of Facility	Opened Year	Site of Jurisdiction	No. of Facility, Location	Target Species	Production Capacity/yr*
M. A. R. A.					
Seed Production	1960	Marmara Sea	Yalova	-	-
Seed Production	1960	Kepez, Medit Sea	ANTALYA	Carp, RB. Trout	8,000+300
Ministry of Forestry					
Tr.Hatchery & Pr.	1973	Ilgaz etc.	1 6 sites in the state	Rainbow trout	9,350
Pr. of seed trout	1976	Kemerpasa etc.	2 5 sites in the state	Trout species	2,205
Tr.Hatchery & Pr.	1981	Cerkes etc.	4 sites in the state	Mirror Carp	2,050
Pr. of seed trout	-	-	5 sites in the state	Common Carp	1,000
Min. of Energy and Natural Resources (DSI)					
Urkmez	1993	Aegean Sea	Izmir Province	Carps, Trout	-
Golkoy	1974	Central Anatolia	Bolu District	mirror carp, trout	-
Sayhan	1971	Mediterranean Sea	Adana Province	mirror carp, trout	-
Yedikir	1991	Central Anatolia	Amasya District	Carp Species	-
Ipsala	1996	Marmara Sea	Edirne District	Grass Carp, etc	-
Keban Elazig	1990	Eastern Anatolia	Elazig District	freshwater fish	-
Ataturk Dam	1997	Southeast Anatolia	Urfa District	Mirror Carp	-
Camligoze	1997	Central Anatolia	Sivas Province	Common Carp	-

Source : Annual Report of the Ministries concerned

3.6 Social Status in Rural Area

3.6.1 Rural Community

The administrative system of village (koy) constitutes a village chief and a council elected among the villagers, as stipulated in village Act (koy Konunu), and the chief takes responsibility of all the affairs and order in it an autonomous way. Both of them have 4 year term and directly elected by the villagers. The village budget is annually sele-provided to perform public activities, welfare and environmental improvement. The village population in the nation totals 23,146 thousand, living in 36,443 villages, results average population per village as 635, in the year 1990.

(1) Rural Social-economic Survey

GDRS has good number of construction and implementation experience in irrigation project, though the know-how in the field of software such as project survey, planning, and farmers' participation is limited. This survey was carried out not only to collect info on the agriculture practice but also to provide the qualitative understanding of village life and problems they are facing now. In addition, the villagers opinions on the project was investigated.

Number of priority survey villages was 300. A two hundred of the survey villages (200) were selected form the "Short List" recollected by GDRS, and one hundred (100) was named through the discussion between study team and GDRS with the careful selection to cover geographical and farm operation variety in the study area.

The following table shows the village statistics by region, obtained from 305 sampled villages.

Table 3.6.1 The Village Statistics by Region

	Sample village	Population	Population/ Village population	Household	Number of family	Agriculture Household	Agriculture household/ Household
Marmara Region	46	35,890	780	5,765	6	4,870	84.5%
Aegean Region	47	59,506	1,266	12,987	5	11,680	89.9%
Mediterranean Region	27	44,442	1,646	9,498	5	9,078	95.6%
Black Sea Zone	60	25,752	429	4,835	5	4,707	97.4%
Central Northern Region	27	14,669	543	2,570	6	2,210	86.0%
Central Southern Region	76	91,174	1,200	18,340	5	15,872	86.5%
Central Eastern Region	22	28,038	1,274	4,637	6	4,392	94.7%
Study Area	305	299,471	982	58,632	5	52,809	90.1%

Regarding the average population per village the smaller size in the Black Sea region as 429, while in the Mediterranean region it was 2.6 times of national average. Combining with the population migration data in the provisos section, the village population migration from the Black Sea region towards the Mediterranean region as well as the Marmara region (Istanbul). The family size of 5 was common in all the study area. The rate of agriculture sector population in a village was larger in the Black Sea and the Mediterranean region as 95% or more, and smaller in Marmara and Anatolia Central-North region as 86%.

(2) Farmers

National statistics shows the 93.5% of farm household operating the combined agriculture with live stock. Similar trend was found in the result of the 305 villages surveyed. Out of 305 farm household surveyed, only 8 household (2.6%) was operating without any livestock.

Inland water fishery was observed in 24 villages; 9 in the Aegean region, 4 in Anatolia South region and the Mediterranean region. The future planning of starting inland water fishery was not a favorite one in the Aegean region.

Table 3.6.2 Inland Fishery

	Existing	Plan	
		Yes	No
Marmara Region	2 (46)	1	1
Aegean Region	9 (47)	1	8
Mediterranean Region	4 (27)	2	2
Black Sea Zone	2 (60)	2	0
Central Northern Region	0	0	0
Central Southern Region	4 (76)	1	3
Central Eastern Region	3 (22)	3	0
Total	24 (305)	10	14

( ) Number of sample village

Interviews on the income and on the feelings of satisfaction of village life was conducted and summarized the results from 305 villages in the following table.3.6.3. The average income per household was 2.3 times higher (303 thousands TL) in the Marmara region than that of the Black Sea region (130 thousands TL).

In the Anatolia region and the Black Sea region, more village chief replied with the pessimistic future projection such as continuous poverty or inconvenience of village life than other regions.

Table 3.6.3 Average Income and Satisfaction of Village Life

	Average income (thousand TL)	Satisfaction of village life					
		Present			Future life		
		Poor	Medium	Good	Not comfortable	Medium	Comfort
Marmara Region	303.04	9	31	6	11	27	8
Aegean Region	170.15	11	29	5	25	10	10
Mediterranean Region	186.30	5	17	5	9	6	12
Black Sea Zone	130.85	17	39	3	35	14	11
Central Northern Region	201.85	3	23	1	8	17	1
Central Southern Region	194.87	18	41	19	58	14	3
Central Eastern Region	152.73	10	12	0	15	5	1
Study Area	191.60	73	192	39	161	93	46

(3) Recognition of the Problems

The questionnaire on the current problems that the villagers are facing were summarized in the following table.3.6.4 A scoring system is applied to the raw data to appraise the problems as follows: serious(-4) for 4 points, very bad(-3) for 3 points, bad(-2) for 2 points, fair(-1) for 1 point, and Not a problem(0) for 0. The above analysis clarified the villager's biggest concern was "Irrigation".

Table 3.6.4 Recognition of the Problems

Item	Ranking	Problem				
		0	1	2	3	Point
1 Irrigation	1	14	21	39	230	789
2 Lack of health personnel & facility	2	38	34	51	166	634
3 Poverty	3	15	71	118	100	607
4 Domestic water supply	4	93	36	52	124	512
5 Animal disease	5	74	62	99	70	470
6 Depopulation	6	97	54	71	82	442
7 Migration of young generation	7	102	70	73	57	387
8 Poor transport	8	157	48	46	54	302
9 Crop disease	9	149	62	57	37	287
10 Lack of school	10	152	4	47	49	245
11 Water pollution	11	224	26	22	30	160
12 Land salinity	12	230	36	28	11	125
13 Water salinity	13	255	27	16	7	80
14 Human disease	14	267	18	11	9	67

3.6.2 Public Organization Responsible for Agricultural Development

The following ministries and agencies are directly or indirectly related to the agriculture development project.

(1) National Level

1) MARA

This ministry consists of four major departments, namely Agricultural Production · Improvement Dept., Plant Quarantine · Administration Dept., Organizations · Support-activity Dept., and Agriculture Research Dept.

2) GDRS

GDRS was a part of MARA, now an independent agency under the direct administration of the central government. This agency covers agricultural development and small scale irrigation for the small villages population less than 3000. Also responsible for rural water supply, local roads, small irrigation ponds, and land consolidation. There are 22 regional branch offices (13 in the project area) and 80 district offices (56 in the project area).

3) Ministry of Public Works and Settlement

DSI under this ministry is planning, design, and construction of the following projects; Large scale irrigation, hydropower plant, water supply in the urban area, water resources development, river management, and flood control.

4) Ministry of Forest/Forestry

This ministry manages and controls the forest and forestry became independent from MARA.

5) Ministry of Environment

Detailed explanation of this ministry is in the Environment section of this report.

3.6.3 Farmers Organization

Two types of farmers' organizations are identified in Turkey, Farmers Union and Agricultural Cooperatives. These have been organized for the purpose of securing rural welfare and assisting farmers' activities. The main function of the former is to make proper use of agricultural infrastructure . It provides such services as farmers' legal registration on issue of tax receipts.

Agricultural cooperatives are classified into three types, agricultural development cooperatives, agricultural credit cooperatives, and agricultural sales cooperatives. The agricultural development cooperative is subdivided into three sub groups; village development cooperative, irrigation cooperative, and water products cooperative, as described as follows:

(1) Village Development Cooperative

The village development cooperatives have been established for promoting better agricultural production and product sale in rural areas. Many villages do not have village development cooperatives. According to this survey, very few farmers join them and most of them sell their farm products to the merchants who visit them, or directly to consumers at the local bazaars. This implies that most farmers may not understand the role of cooperatives in the sale of their farm products, and do not know how to establish such cooperatives. Low rate of their association is likely attributable to their dissatisfaction with the management of existing cooperatives, or to their habitual inclination toward individualism.

(2) Irrigation Cooperative

Currently 790 cooperatives have been organized jointly by GDRS and DSI, and all of these use groundwater sources, but none of the cooperative under GDRS has surface water sources. For groundwater irrigation implemented by DSI, it takes responsibility for design and implementation of wells irrespective of the project size. GDRS gives survey report to DSI, and DSI carries out the feasibility study including irrigation system. Upon completion of surface irrigation project by GDRS, it hands over the project facilities to the established cooperatives for their operation and maintenance. Every member of these cooperatives has the obligation to pay irrigation fee.

The cooperatives take responsibility of operation and maintenance for these facilities. No monitoring and evaluation is systematically undertaken by GDRS.

Any agricultural extension services, including modern irrigation practice, is not carried out by GDRS. The responsibility of extension services resides exclusively with MARA, while MARA does not take charge of any type of irrigation development. As far as the extension of irrigation techniques is concerned, it still remains in a blank and void space to be filled. In conducting extension services, what is required are either coordination between the both organizations or establishment of a responsible department in charge of extension within GDRS.

(3) Water Products Cooperative

The water products cooperatives have been established for better fishery production and sale of products in rural villages. In particular, production and consumption of fresh water fish

are limited, while marketing channels for fish are rarely encountered throughout inland regions. Under such circumstance very few farmers join the water products cooperatives

(4) Agricultural Credit Cooperative

Agricultural credit cooperatives have been established for the purpose of providing loans and inputs to their associated members at low interests. These services are supported by the Agricultural bank. These funds have contributed to the development of crop and animal production and irrigation facilities. The amounts of credit have been expanded in recent years reflecting the inflation in the country.

(5) Agricultural Sales Cooperatives

Generally the role of the agricultural sales cooperatives is to evaluate the products of their associated members in the best way, to return the highest share of the retail prices to them, to regulate the market price of products, and to stabilize prices both for the producers and the consumers. This cooperative performs activities dealing with purchase from the producers, and evaluation of various agricultural outputs such as cotton, sunflower, figs, raisins, etc. Land holding size of cooperative members is generally small with insufficient margin from crops. This leads to their limited capacity to save money, resulting in poor financial ability of cooperatives themselves. Hence, they cannot provide for full amount of running cost.

3.6.4 Public Services

Public-services-related-infrastructure in rural villages, including rural road network rural electrification, hygienic facilities and educational media, are generally properly kept and well maintained, though in some limited regions problems arise in their maintenance. No pressing demand for consolidating social infrastructure was heard in a questionnaire survey to village chiefs covering 305 villages.

(1) Farm Road

Farm road consists of village road and forest road, both maintained by GDRS. Out of 305 surveyed villages, 54 villages listed poor farm roads condition that needs to be improved. Also, village infrastructure improvement was pointed out as the top serious issue in 21 villages and while a second ranked poorer condition was marked in 36 villages (total of 57 out of 305 villages). By agro-ecological regions, the villages in the Aegean region and the Black Sea region listed the issue as the "bad condition" but didn't do as the "urgent need of implementation". On the other hand, Central Anatolia villages mentioned the issue as "urgent". Farm Road is a "life line" of rural villages. The central Anatolia villages deem improvement of roads as an urgent issue because the area's infrastructure remains poor relative to the other regions in the nation and the greater needs for the access to the expanding market such as Ankara and Adana.

Table 3.6.5 Farm Road

Region	No. of village	Farm road			
		Bad condition		Urgent issue	
Marmara Region	46	5	11%	7	12%
Aegean Region	47	13	28%	4	25%
Mediterranean Region	27	5	19%	7	12%
Black Sea Zone	60	15	25%	8	14%
Central Northern Region	27	2	7%	1	2%
Central Southern Region	76	11	14%	18	32%
Central Eastern Region	22	3	14%	2	4%
Study Area	305	54	18%	57	37%

(2) Rural Electrification

Electric power supply by TEAS and Turkish electricity distribution cooperation covers all over the nation, and the coverage is 100% (National census bureau). Despite the statistics shows 100% coverage, some villages (37 villages out of 305) list the needs for the electric supply. Most of the 37 villages belong to the Mediterranean region. The following table shows the summary of the survey results.

Table 3.6.6 Village with Electricity

Region	No. of village	No. of villages with electricity	Percentage of villages with electricity
Marmara Region	46	46	100%
Aegean Region	47	47	100%
Mediterranean Region	27	18	67%
Black Sea Zone	60	60	100%
Central Northern Region	27	24	89%
Central Southern Region	76	76	100%
Central Eastern Region	22	18	82%
Study Area	305	289	95%

(3) Education

Education system consists of elementary, junior-high, high, vocational-high, and college/university. School attendance in the study area is lower than national average in elementary school but slightly higher in junior-high and high school.

Table 3.6.7 Education

		Children of school age	Students	Ratio of entering school
Primary	The whole country	8,379,679	6,707,725	80.0%
	Study area	6,688,038	5,043,060	75.4%
General Junior High	The whole country	4,055,748	2,242,875	55.3%
	Study area	3,236,997	1,937,044	59.8%
General High	The whole country	3,832,431	990,760	25.9%
	Study area	3,058,762	837,341	27.4%

3.6.5 Gender Issues

Gender make up in economic and agriculture activity within the study area is shown in the following table with the national average.

Table 3.6.8 Population of Economic Activity

	Population of economic activity					Population of agricultural activity					Ratio of economic activity per agricultural activity		
	Male		Female		Total	Male		Female		Total	Male	Female	Total
Marmara Region	3,603,458	75.9%	1,143,725	24.1%	4,747,183	484,212	46.5%	556,098	53.5%	1,040,310	13.4%	48.6%	21.9%
Aegean Region	2,563,104	65.0%	1,381,162	35.0%	3,944,266	953,912	47.5%	1,054,581	52.5%	2,008,493	37.2%	50.9%	50.9%
Mediterranean Region	1,560,876	65.9%	809,275	34.1%	2,370,151	554,702	46.2%	646,915	53.8%	1,201,617	35.5%	50.7%	50.7%
Black Sea Zone	1,585,034	54.6%	1,317,653	45.4%	2,902,687	765,339	39.1%	1,189,975	60.9%	1,955,314	48.3%	67.4%	67.4%
Central Northern Region	2,127,415	66.5%	1,071,180	33.5%	3,198,625	641,365	44.0%	816,418	56.0%	1,457,783	30.1%	45.6%	45.6%
Central Southern Region	1,245,781	61.5%	781,263	38.5%	2,027,044	554,295	45.2%	670,819	54.8%	1,225,114	44.5%	60.4%	60.4%
Central Eastern Region	502,928	58.3%	359,709	41.7%	862,637	268,599	45.5%	322,132	54.5%	590,731	53.4%	68.5%	68.5%
	13,188,626	65.8%	6,863,967	34.2%	20,052,593	4,222,424	44.5%	5,256,938	55.5%	9,479,362	32.0%	47.3%	47.3%

Female population in the economic activity within the study area accounts for about 34 % as a whole. Regional characteristics are; the Black Sea region has the highest rate as 45 % and the Marmara region has the lowest as 24 %. Judging from the fact that the comparison of regional GNP results in the Marmara region with the highest value, the female labour force is in the jobs which does not contribute much to the GNP increase. The Black Sea region, as explained in the population section, the migration rate is high and subsequently there's more job opportunities for female workforce. As to agricultural population as a part of economic active population, it seems that about 90 % of female active economic population stays in the agriculture sector in the Black Sea region and the Anatolia Central-Eastern region.

The female workforce in farm household play a dual role such as the supplemental work force in cultivation and the "house keeping" workforce including cooking, child care and washing. When the project planners recognize the importance of female role in farm household as mentioned above, the involvement of female can not be neglected and need to be duly considered in the project.

3.7 Environment

3.7.1 Institutional Framework for Environment Administration

(1) Organization of Environment Administration

The Ministry of Environment(MOE) was established in 1991 (Promulgation: Official gazette No.20967, 21 August 1991). It was originally the Environment Undersecretaries, later it was turned into a General Directorate of Environment and then again into an Environment Undersecretary, always being under the responsibility of a Ministry of State. Finally, in 1991 it was upgraded to the Ministry of Environment to better implement and coordinate the various environmental activities. The main parts are following.

- Coordination of land use and resources control among to the ministries
- Establishment of environmental planning and law and/or regulation
- Examination of the report for environmental impact assessment
- Environmental education

The Ministry of Environment is in charge of control of the environment at the 3 bureaus which are Environmental Assessment, Environmental Pollution and Control, and Protection of Environment. Moreover, the 12 sections function under the 3 bureaus, planning, assessment, south Anatolian areas, coast areas, inventory and information, air administration, water and soil administration, wastes and chemicals, animal protection, standard planning,

sensitive ecological system, natural protection, and wild life protection, respectively (Figure 3.7.1, detail are referred to ANNEX G).

Many ministries concerned with environmental issues include mainly, the General Directorate of State Hydraulic Works, the Bank of Provinces, the General Directorate of Rural Services, the Ministry of Health, the Ministry of Forestry, and the Ministry of Culture.

(2) Environmental Law

The Environmental Law of no. 2872 was established in 1983. The Law becomes with basis of rule maintenance concerning with atmosphere, water quality, noise, and industrial wastes. Based on the Article 10, Regulation on Environmental Impact Assessment was established in February of 1993. The purpose of this Regulation is to regulate the administrative and technical principles during the process of Environmental Impact Assessment, and to evaluate all possible impacts on environment of investment decisions of all public or private organizations, institutions and agencies whose proposed activities may cause environmental problems.

(3) Situation of Join to the International Act

In Turkey, there are bio-geographically important areas as point of contact between Asia and Europe, or Europe and Africa. Therefore, Turkey joins following the international acts on environmental conservation.

- Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention)
- Convention on Biological Diversity
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (Washington Convention, CITES)
- Convention on Conservation of European Wildlife and Natural Habitat
- FAO International Undertaking on Plant Genetic Resources
- Convention for Concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention)
- Convention Long-range Transboundary Air Pollution, LRTAP
- Vienna Convention for the Protection of the Ozone Layer, Montreal Protocol on Substances that Deplete the Ozone Layer
- International Convention for the Prevention of Pollution from Ships
- Convention for the Protection of the Mediterranean Sea against Pollution
- FAO International Code of Conduct on the Distribution and Use of Pesticides

3.7.2 Policy and Guideline for Environment Impact Assessment

(1) Activities Subject to Environmental Impact Assessment (EIA)

The project which is made the target of Environmental Impact Assessment, is classified into 2 project types which should make environmental impact estimation papers and preliminary investigation papers.

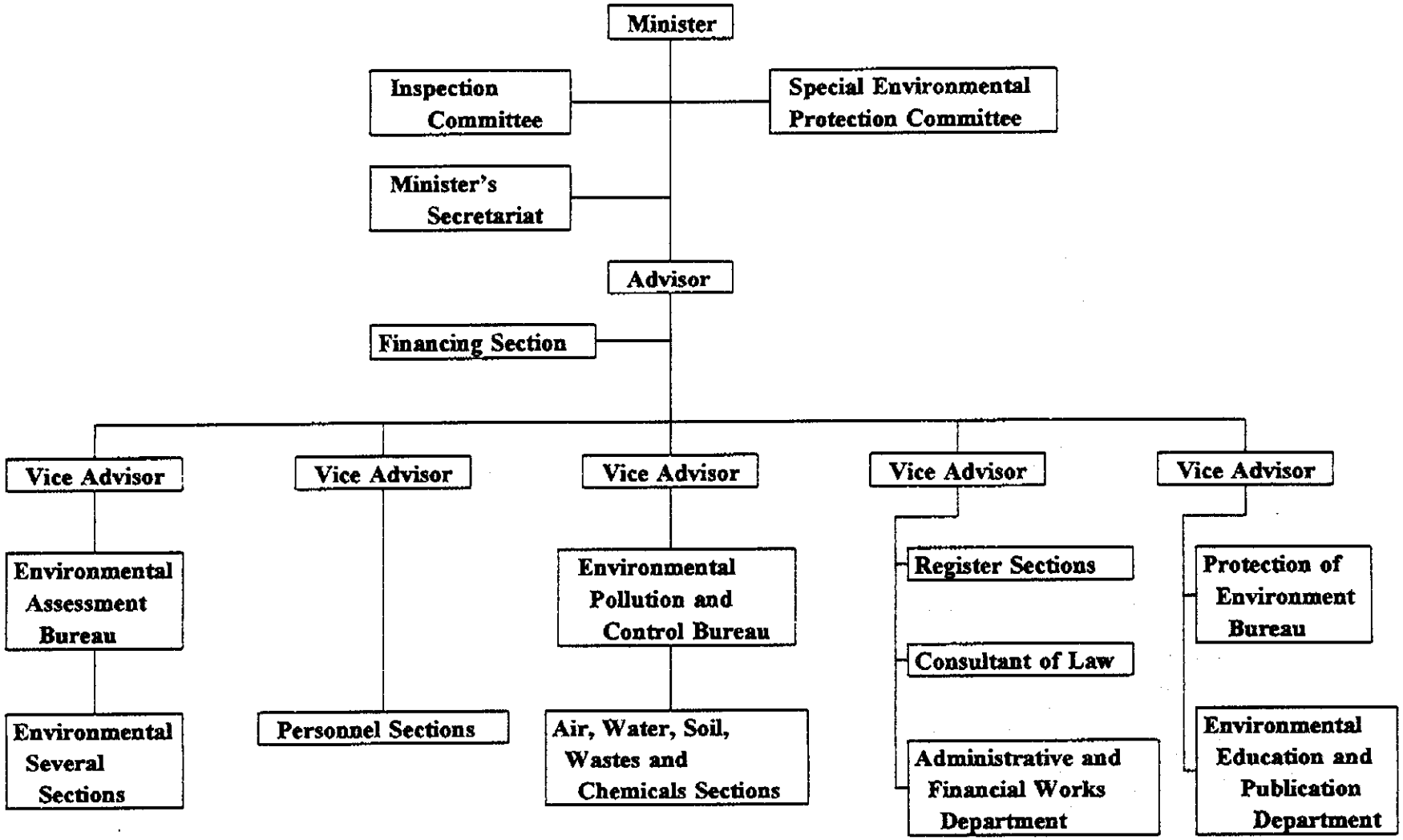
The list of activities subject to EIA which will be applied, were divided to 31 categories. There are large scale industries and plants, for example, thermal and nuclear power plants, taking of underground water with a volumetric capacity 10 million cubic meters or over per year, stone and soil industry. On the other hand, in case of preliminary investigation papers, they have 8 categories for comparative small scale industries, for example, electronic and elect-mechanic installations, processing of metals, chemical industry, food and drink industry.

(2) The Assessment Evaluation Matrix

In the preliminary investigation papers, the project is to be examined by the check matrix for preparation, construction and operation stage, and impact level should be simultaneously assessed by points from 1 to 5. The evaluation form is shown in Table 3.7.1.

After examination of Environmental Committee, MOE decides that "environmental impacts are significant" or "insignificant" for the activities, tell the result to owner of the activity.

Figure 3.7.1 Organization of Ministry of Environment



Source: Ministry of Environment, 1997

Table 3.7.1 The Assessment Evaluation Matrix, in Turkey

		NAME OF PROJECT	ACTIVITIES AT LAND PREPARATION AND CONSTRUCTION STAGES												ACTIVITIES IN THE OPERATION STAGE							
			a Excavation	b Filling in water media, construction	c Flood prevention and drainage	d Dust emitting activities	e Excavation in water media, dredging	f Water to be used and its disposal	g Wastes and recovery	h Noise	l Trees to be cut down	j Agricultural areas to be disposed	k Risky of dangerous activities for human beings	l Other activities	a Raw material	b Hazardous and toxic materials	c Water to be used and disposal	d fuels and combustion systems	e Solid wastes and recovery	f Noise	g Dust emitting activities	h Other activities
a	Meteorology and climate																					
b	Geologic structure																					
c	Surface water sources																					
d	Thermal and geothermal water sources																					
e	Soil																					
f	Vegetation																					
g	Agricultural areas																					
h	Forest areas																					
i	Protected areas																					
j	Landscape values																					
k	Flora and Fauna																					
l	Husbandry																					
m	Minerals and fossil fuel sources																					
n	Land under the authority of the State																					

(*):In the intersecting squares of the Assessment Evaluation Matrix , the impacts of the activities at land preparation and construction and operation stages on physical and biological environment are assessed by points from 1 to 5.

(+)shall be used for positive impacts and (-) for negative impacts, 1-2 = insignificant low impact 3=medium impact 4-5 = high significant impact.

CHAPTER 4 DEVELOPMENT RATIONALE

4.1 Basic Concept of Agriculture Development

4.1.1 The Role of Turkish Agriculture

The role to be played by Turkish Agriculture was already stated in Chapter 2, but the basic concept of the development as the future orientation directed from the review of the current status, the efforts to seek for the radical solution of the currently faced problems or the way of mitigating them. The following are the articles to be regarded in implementing agricultural development plans:

(1) to formulate the so-called "sustainable" context,

(2) to design the plan in which local characteristics are taken into account as well as in a diversified rather than in uniform way,

(3) to foster an agricultural system capable of flexibly responding to the changes in demand,

(4) to aim higher productivity so that agriculture may be oriented to an efficient one fully competitive in the international market.

Firstly, as to (1), attention should be paid on how to make development "sustainable". It can be accomplished by relevant formulation of such a system that has the pace and content of development suitable for the amelioration of local, conventional level of production technology as well as for environmental care, especially ecosystem conservation, also which can secure the approval and participation of beneficiary population in a maximum way.

As regards (2), it is suggested that development be oriented in such a way that the production system keeps pace with and be consistent with the characteristics of the agro-ecological region, in conformity with the real state of progress in the regional economy. A project designed to incorporate newly adaptable crops or livestock varieties into the traditional specialties may avoid over-production and secure outlets.

What is stated in (3) reiterates the basic concept on how to consolidate agricultural infrastructure. In this context, cases would arise that require a drastic crop conversion depending on agricultural trade development, *inter alia*, in the aspect of future trends of production and consumption in Mediterranean countries around Turkey, because similar crops or cropping patterns are prevailed in these countries and in the Near East, east European as well. Such improvement as irrigation, drainage, land consolidation and soil conservation be promoted so that more diversified cropping can be realized to cope with such a development.

With regard to (4), the aimed target is oriented to foster smooth development of farming systems by which so-called "higher profit by lower cost" be pursued, and thereby Turkish agriculture becomes fully competitive with that found in Europe and Middle/Near East, in harmony with the agricultural internationalization as stated above. In Turkey, although small land-holders account for by far the majority, consolidation of farming systems capable of realizing "economy of scale" through the adoption of group farming etc. should be addressed as an indispensable condition for sustaining competitiveness of international commodity marketing.

Such a system can be created by a relevant effort for better organization and mobilization of local population.

Until 1990s, Turkish agriculture has been successfully oriented to modernization with its proper agricultural policies and development strategies such as import substitution. However, beyond 2000s, it will become acute to apply a mode of new development, so as to properly cope with population growth, westernizing of economy as well as internationalization of agriculture.

Judging from current policy trends like joining of EU Customs Union, possibility arises for Turkey to affiliate under an umbrella of EU's common agricultural policies (CAP). For this provision, it is forecast that Turkish agriculture is more oriented to accelerated modernization and it may gradually employ agrarian and farming institutions of European style, policy regimes for agricultural promotion and protection. Once Turkey joins CAP, it becomes subject to various restrictive measures like production adjustment, whereas farming subsidies under CAP can be applicable to Turkish farmers in a different forms from existing granting mechanism. With a view to maintaining and fortifying competitiveness with EU member countries, it'll be essential to strengthen the productivity and other characters prior to the affiliation. Likewise, the secure outlet and share of Turkish farm products will be expanded since their marketing sphere must be extended to the whole European continent. However, considerable increase of investment and input supply would be inevitable, and the additional measures be taken for cost saving, consolidation of marketing facility, improvement of technological levels etc., as essential means to cope with the impact arising from equilibration of marketing prices, application of restrictive norms on product quality etc.

In view of the preconditions stated above, it will be both technically and institutionally hard to deploy a campaign to promote the countermeasures for filling gap and disparity between Turkey and EU in a limited period. It follows that it'll be relevant, for the time being, to employ measures to consolidate in a concentrated way production infrastructure in fairly developed areas like western part of Turkey where productivity and investment levels have reached comparable levels to European countries and farmers are equipped with higher technology. Yet, such selective preference would accompany some risk of expanding regional disparity between eastern and western areas. Even though the state makes desperate efforts in maximizing resource inputs in the eastern areas where productivity still remains in a lower level and farms are poorer, they only incur additional expenses causing much delay in reaching efficient production stage. This handicap in eastern regions is partly attributable to hitherto low levels of public investment observed in poorer road networks etc., that likely incur additional needs for off-farm investment along with that specially bound for agriculture. The alternatives in agricultural development in the years to come are thus focused on whether the equilibrated investment distribution be pursued in the long run so as to minimize regional disparity, keeping certain distance from EU's policy regime, or investment be concentrated on only promising areas or sub-sectors by joining EU / CAP.

In this study, the former would be a desirable stance, especially for selecting priority projects from the viewpoint of realizing homogeneous development in the production media and infrastructure throughout the country. However, if the other alternative is preferred keeping pace with progressive tide prevailing in the global agriculture, it would be rather efficient to promote so-called " selective expansion" , following the way of specifying the

promising areas where the population can enjoy advantaged productive conditions, and they have already fulfilled considerable levels of productivity. In this alternative, irrigation is exclusively applied to lucrative cash-crops, and western coastal areas, suitable ones for raising these crops, or zones endowed with advantageous natural conditions, are solely chosen as target areas to fortify the diffusion of such less-popularized facilities as drip or sprinkler systems that are much costlier than conventional watering methods. Such selective or concentrated systems are easily acceptable by EU agricultural regime under a pure marketing economy. Whereas, if the same amount of investment is put into the development of furrow irrigation mainly applied to cereal production in the poorer producing areas, the output response might be less but it would give greater comparative advantage to more households covering wider areas.

Though the equitable implementation of such projects enables poorer strata to alleviate their poverty, their production capacity would still remain in an economically inviable degree in the context of European standards. As recent OECD analysis reveals, Gini's coefficient of Turkey lies at higher position, by more than 1.5 times as high as European average. Yet, it is imperative to ease the current degree of income disparity among rural population strata, from higher purchasing or investing power in rural media and equitable access to the benefits from improved rural infrastructure including irrigation facilities, so that the maximum population absorbing capacity can be held amidst rural communities. Otherwise overpopulation in urban quarters and excessive migration or exodus from rural areas become chronic and finally out of control. This never fails to end up in larger economic disparity between eastern and western part of the country, because urban areas are mainly found in the west.

Development projects operated by GDRS have rather been oriented to rectifying measures against disparity for more uniform welfare, because more of its responsibility of consolidating social infrastructure accounts for major part of the activities, aiming at improving living standard in remote communities. Therefore, as far as the formulation and implementation of selective expansion is concerned, MARD is rather more suitable in handling such efficient programmes.

As to food self-sufficiency, Turkey achieved high rate of self-sufficiency in the past. The basic agricultural policies of Turkey not only strive for securing as high self-sufficiency as possible for the sake of saving foreign currency, but they call for production increase grains, oil-seeds and livestock to meet the population growth. Particularly, it is required that livestock production quarters must be created in the areas under a crop rotation consisting of feedgrains such as maize, sorghum and oats as well as clovers, or grains with industrial crops for the purpose of securing the production of value-added dairy and meat products meeting both exports and domestic demands, with side-effect of creating local food-industry offering expanded local hiring opportunities. Livestock industries in Turkey tends to stagnate by the influence of recent dairy overproduction throughout Europe, but it is desirable that in near future production can timely meet increasing demand for exporting to East Europe, Middle/Near East or Russia, and domestic one proportional to the population growth.

4.2 Necessity of Small Scale Irrigation and Rural Development Program

Despite the fact that the share of agriculture in GDP fell from 17.5 % in 1990 to 15.6 % in 1995, its share in total civilian employment remains at a high rate of 45 %. This means a considerable portion of the population, inhabiting mostly in rural areas, continues to make a

living on agriculture. The agriculture produces virtually all the commonly needed food crops, largely coming from the rural areas, and also plays a key role in supplying raw materials to industry.

High attention is given to mitigating regional imbalances and to improving income distribution among various sectors of society. Urban population is rising by about 4.5 % annually, while the share of rural population has been decreasing as a result of substantial migration to the urban areas. It is estimated, based on the past population trend between rural and urban shown below, that the urban population will reach as high as 70 to 75 % while rural population decrease 25 to 30 % by the year of 2000, causing inequitable and imbalanced development over the country.

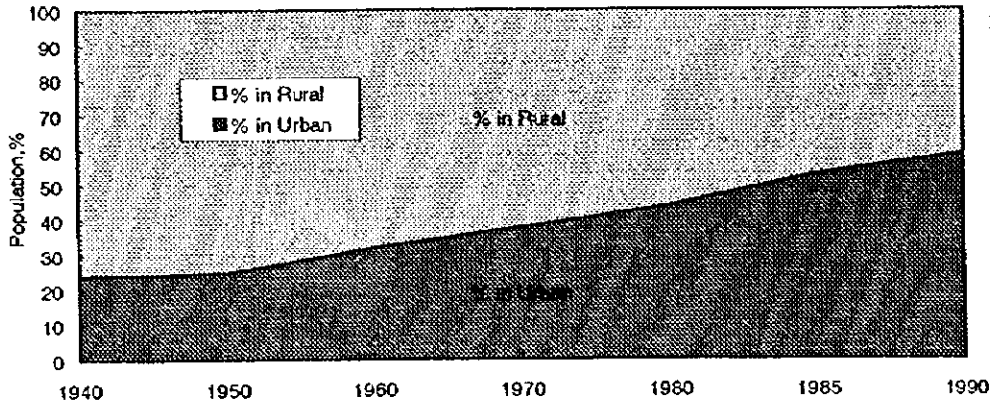


Figure 4.2.1 Population Change in Percent between Urban and Rural

In view of above, the promotion of *"small scale irrigation and rural development"* is recognized to be a most effective instrument for improvement of rural standards currently affiliated with poverty, creation of employment in the rural area, and arrest of the trend for migration of rural population to the urban areas. This approach gives an additional advantage of mitigating urban problems caused by over-migration in search of elusive job opportunities.

Thus, rural development enhanced by small scale irrigation and other rural infrastructure improvement such as village road and drinking water is considered essential to eliminating regional disparities and achieving equitable national development, as well as with the aims of improved agricultural productivity, better storage and processing, easier access to markets, greater food self-sufficiency and food security, and higher agricultural income.

4.3 Target Area

4.3.1 Long List Inventory

GDRS implements a number of rural development projects as mentioned above, and it has a great many in the waiting list. Out of these, 1,418 projects has been proposed as the long list inventory, for which the inventory items as agreed between GDRS and the study team are filled. Majority of these are located in Anatolian plateau, and the projects distributed in five regions, namely Sivas, Trabzon, Konya, Ankara and Kastamonu, account for two thirds of the total inventory.

The following articles and figures 4.3.1 to 4.3.12 provide the result of long list summary of the whole projects for major study items (refer to Annex the detail of computation by 13 regions and 7 agro-ecological zones, but attention must be paid to the fact that some blanks due to omission are unavoidable and so some totals fail to come to 100 % where number of blanks is not specified).

Figure 4.3.1 Project Components

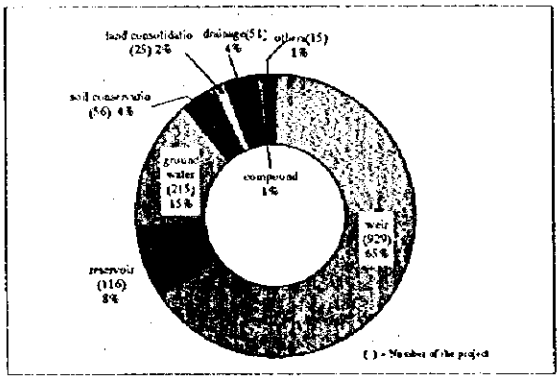


Figure 4.3.2 Average Area per Project

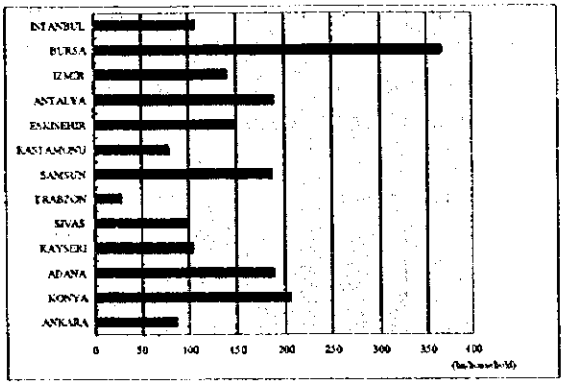


Figure 4.3.3 Number of Household

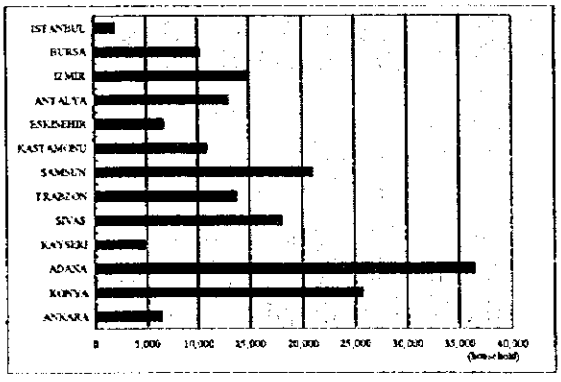
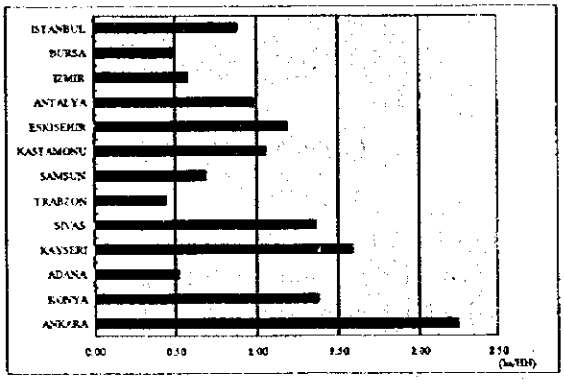


Figure 4.3.4 Mean Area per Household



(1) As shown in figure 4.3.1, number of projects with completed detailed design (DD) accounts for below 43%, lower than initially expected, while those with completed preliminary design (PR) does around 29% and those with only reconnaissance survey has the share of over 28% of the total projects. The cumulative number of projects that finished site study but not yet implemented so far is not available, but if those for which inventory forms were not submitted or delivery of the filled forms was delayed are included, the number will reach over 1,500. With regard to the distribution of planning year, 19% of them were planned in 1980s, 20% were done in 1995 with the top share, 19% in the most recent 96/97, 13% in 1994 and 9% in 1993, totally major share is occupied by the projects with fairly recent survey.

(2) Concerning the number of projects by type of works and their distribution, irrigation projects account for 90% of the total inventory, of which share of weir comes to about two thirds, followed by ground-water use with the share of 15%, and that of reservoir represents only 8%. The share of soil conservation and drainage projects accounts for each 4%, while land consolidation has the least share of 1.5%. As to the distribution of these projects by agro-ecological zones, areas utilizing ground-water source are mainly

distributed in Aegean coast (1-2), middle to southern part of Anatolian plateau (3-2). Irrigation projects by reservoirs is chiefly found in Marmara/Aegean coast and Anatolian plateau except eastern Anatolia. Drainage projects are concentrated in northern and eastern Anatolia, while soil conservation projects are aggregated in Black Sea coast. Land consolidation projects tens to distribute in Anatolian plateau. As for regional distribution, dam projects are located in Konya, Adana (southern areas), Izmir (western) etc. while those by ground-water distribute not only in Anatolian plateau (Konya, Eskisehir, Kastamonu and Kayseri) but Izmir. Irrigation projects by surface water are widely distributed throughout the country, with especially larger share in the total irrigation projects found in Ankara, Sivas, Trabzon, Samsun and Antalya.

(3) Number of beneficiary households per project often reaches over thousand in drainage and land consolidation projects with wider area coverage, but in the cases of small scale irrigation only a few households comprise a project. The average of the total inventory falls 232 households per project. In The projects in Bursa, Samsun, Adana and Konya tend to have more beneficiary farms but those in Sivas Trabzon and Kastamonu have mean beneficiary farms less than half of the total average. In respect of beneficiary acreage, those in Bursa, Konya and Adana has larger acreage per project, while those in Trabzon, Kastamonu and Ankara hold much smaller acreage, with an average of 121 hectares per project or the total inventory. As to beneficiary acreage per household (though the figure of land holding per household is not available), the grand average comes to 0.93 ha, with the larger size above 1.5 ha on average found in Ankara and Kayseri, the smaller size below 0.6 ha on average in Trabzon, Bursa Adana and Izmir.

Figure 4.3.5 Planned Year of the Project

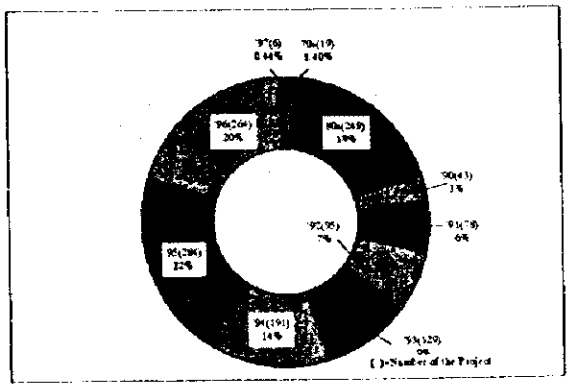
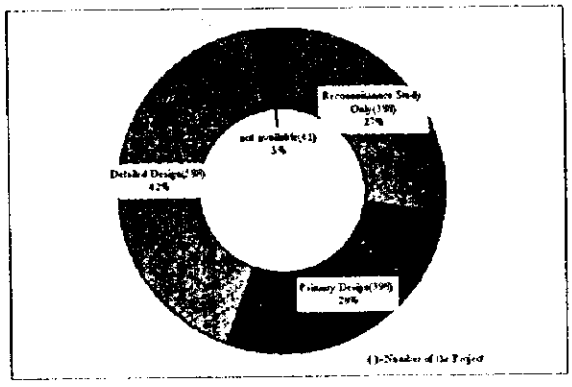


Figure 4.3.6 Project Status (Maturity)



(4) Project cost is converted into per ha cost (unit of value representing million TL but the unit is omitted in the following text). The original cost in the projects planned before 1996 was converted into 1996 cost equivalent for comparison by a table of the official conversion factors, but the converted figures tends to be costlier with less statistical confidence. Computation result for those planned in 1996 only reveals that the grand average cost comes to 157, with the lowest unit cost of 35 in Trabzon, the highest one of 366 in Antalya, while the dearest unit cost by type of projects reaches over 300 for land consolidation and compound projects with plural project components, medium ones come to 184 for reservoir, 119 for well, 123 for both surface water irrigation and soil conservation and the lowest one gives 83 for drainage.

Figure 4.3.7 Average Project Cost per ha

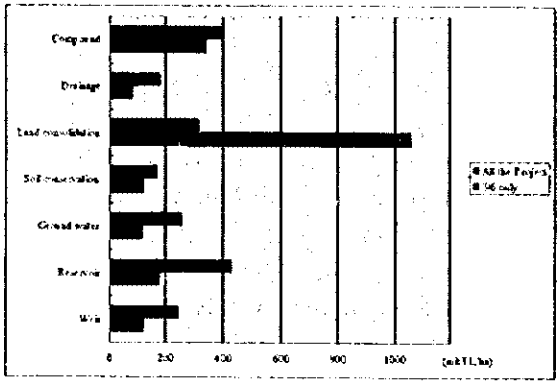
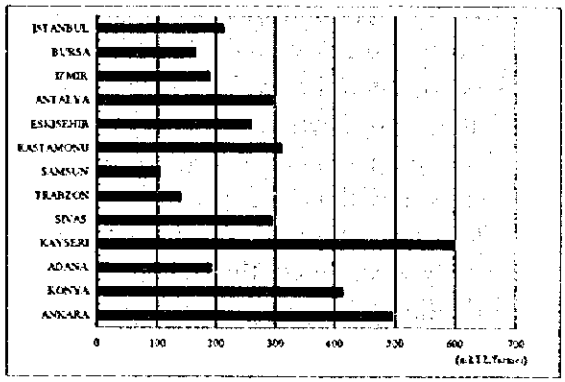


Figure 4.3.8 Project Cost per Farmer



The grand average unit cost for the entire inventory including those planned in the past comes to 276 for all types, considerably higher than that for single 1996. Regionally, unit cost in Adana and Kayseri gives higher averages while that in Samsun does lower average. As for unit cost by type of projects, land consolidation and compound ones counts over 300, that of reservoir gives the highest of 431, followed by that of ground-water (261), that of surface water (250), that of soil conservation (172) and that of drainage represents 182 , and all of these costs are somewhat higher than the 1966 unit cost of the corresponding type of projects. By the way, project cost per beneficiary household falls 284 (namely around 300 US$ at 1996 conversion value), with lower levels of below 200 in Samsun and Trabzon, more expensive levels above 400 in Kayseri, Ankara and Konya.

Figure 4.3.9 Average Number of Household per Project

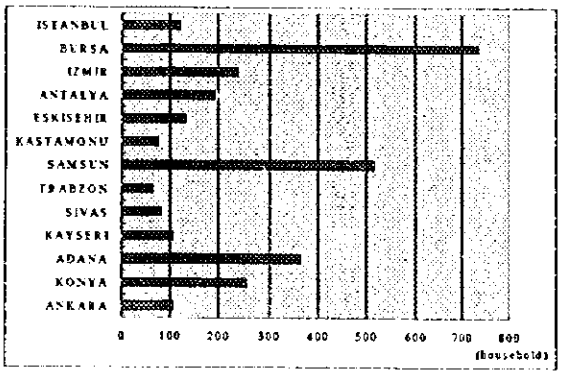
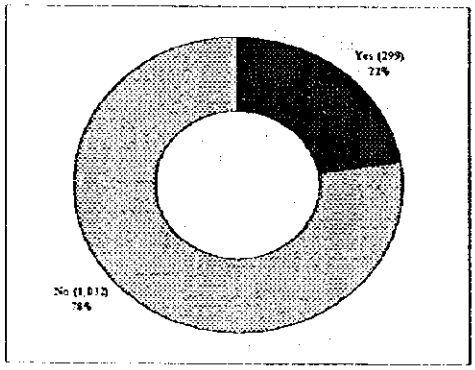


Figure 4.3.10 Farmers' Organization



(5) Field conditions, cropping and farm planning are as follows: distribution of soil fertility includes 14% of highly fertile soils, 43% of fairly fertile, fairly infertile ones and 43% of poorest ones (double counted as a project has various soil compositions). By region, Those in poorest soils tends to be found in Trabzon and Konya. With respect to target crop composition, vegetables account for 17% or the largest share, followed by industrial crops out of which sugar beet does for 13%, cotton 9%. In the context of cereals, share of wheat represents over 10%, maize for feeding approximately 10%. For other crops, orchard represents 9%, pulses does about 6%, sunflower around 4% and feeding grasses 2%. As regards regional distribution of target crops for irrigation, combination of wheat - sugar beet is predominant over Anatolian plateau including Ankara, Konya and Samsun, cotton is concentrated on Adana, while maize is mainly found in Samsun and Adana.

Vegetables are spread over Samsun, Adana, Ankara and Konya, sunflower is concentrated in Samsun, while orchards are mainly distributed in Adana and Konya.

As regards methods of irrigation, furrow irrigation is by far common, applied to wheat, sugar beet, maize and meadow grasses, accounting for almost two thirds, followed by basin that is used for paddy and cotton, then as minor components sprinkler constitutes less than 7%, while drip irrigation does less than 2% applied to vineyards and orchards. This indicates that expensive methods constitute rather minority. As concern irrigation period, May to September accounts for 44% or the biggest share, followed by April - September (16%), then April - October and May - June (5 - 6% each).

Figure 4.3.11 Cultivated Crop Composition

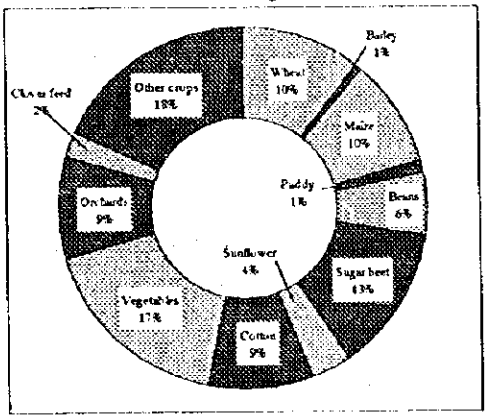
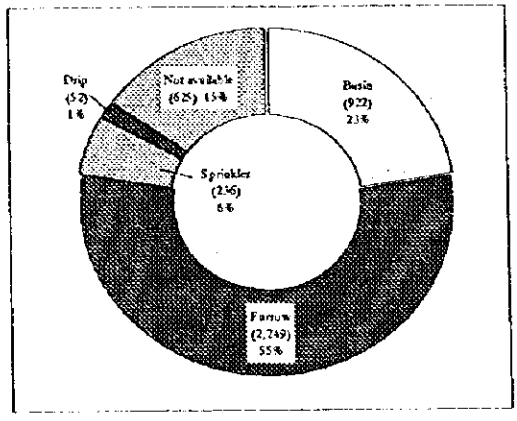


Figure 4.3.12 Irrigation Method



For other results of summarizing the long list, refer to Annex.

4.3.2 Selection Criteria of Short List Inventory

Discreet consideration is required to select the projects for short list inventory not biased into particular regions, since the objective of providing it lies in the provision of representative priority projects. To this end, all thirteen regions were covered as in the spectrum of project sorting, and criteria were employed so that all types of projects are selected in the short list inventory. It is desirable that the projects to be selected in the short list inventory ought to have the content of planning as a representative of the long list, and readily implemented. Various criteria were examined as to whether these preconditions are satisfied by applying them for selecting the short list inventory, and finally an eliminatory selection method was employed in which beneficiary area, number of beneficiary household and unit project cost as per ha cost were adopted as exclusion factors. Any projects having deviated figures from the standards are excluded from the short list inventory.

(1) around 16% of the projects in the long list inventory fail to complete the filling and most of them fall in the category of reconnaissance survey (SR). In the first stage of selecting the short list inventory, those with poorest filling could not help sorting out.

(2) willingness of the beneficiary for project implementation, maturity of the project in the preparatory stage, beneficiary acreage of projects, number of beneficiary households and per ha project cost.

(3) maturity of the preparatory stage: the short list inventory is limited to those which completed reconnaissance survey and further accomplished preliminary design or detailed design.

(4) area of beneficiary farmland :basically, only the projects were selected the beneficiary area of which lies within the range from the regional average for each type of projects to + sigma (standard deviation).

(5) number of beneficiary household: those projects were selected which has the number of beneficiary household within the range around the regional average by type from minus sigma to plus sigma.

(6) project cost on "per ha" basis: basically, only the projects were selected the project cost "per ha" basis of which stays below the regional average by type, but within normal and acceptable level.

The reference values for these selection criteria were extracted as shown below from the whole long list inventory after the elimination of those reluctant to implementation and poor filling of the inventory formats.

Out of the collected 1,418 projects, 125 were eliminated from the short list because the filling in inventory formats was terribly poor, ad then 101 were also refused due to reluctance to the implementation. Then, applying the criterion (1) shown above, 29% of the remaining projects were dropped out and 846 projects were selected. Further, the criterion (2) was applied to the remaining ones, and 23% were sorted out leaving 651. Then, the criterion (3) was used to eliminate 22% of the remaining, and 508 were selected. Finally, the last criterion (4) was employed to eliminate 57% of the remaining and 218 projects survived. Short list formats, the preparation of which were consulted with GDRS prior to the distribution and filling, were filled for these projects but the formats of thirteen projects could not be filled properly, hence these were eliminated. Eventually, 205 projects were listed as the short list inventory.

Figure 4.3.13 Process of Selecting Short List Projects

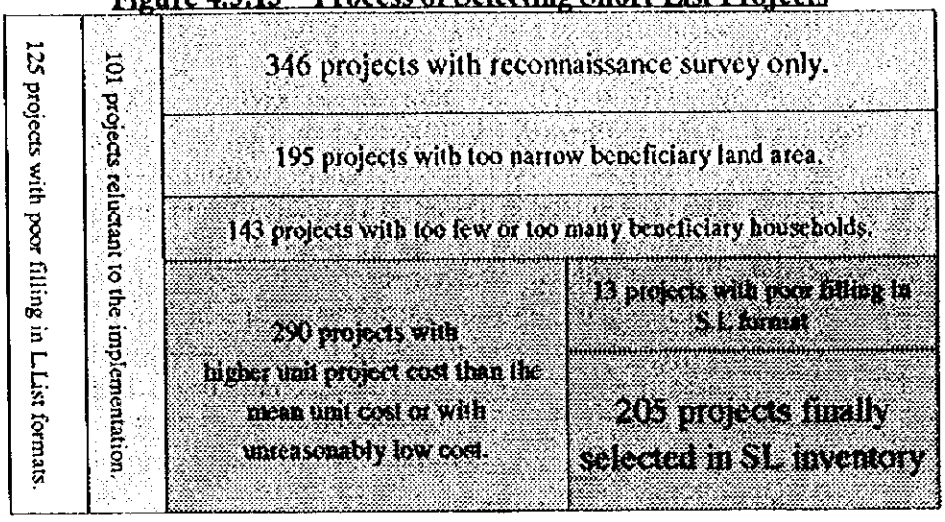


Table 4.3.1 Criteria for Selecting Short List Inventory

Name of Region	No. of Proj. in L.L & S.L	Statistical indicators	Criteria for Crop-field Area: Project Area by Type of Works: Weir	Reservoir	Well	Soil Con.	Land Consol.	Drainage	Compound Proj	Criteria for Number of Household: Project Household Number: Weir	Reservoir	Well	Soil Con.	Land Consol.	Drainage	Compound Proj	Criteria for 1996 based Project Cost: 1996 Project Cost per hectare: Weir	Reservoir	Well	Soil Con.	Land Consol.	Drainage	Compound Proj	Converted Proj. Cost from the Past: Average per Hectare Project Cost: Weir	Reservoir	Well	Soil Con.	Land Consol.	Drainage	Compound Proj
ANKARA	167	Average	468.8	1198.6	148.6	374.3	-	195.1	-	280	261	90	150	-	67	-	259	120	138	-	-	24	-	240	362	254	149	-	162	-
	10	S.D.	394.0	852.3	85.1	261.8	-	226.6	-	230	206	98	260	-	75	-														
KONYA	171	Average	114.1	266.6	168.9	300.0	-	319.5	1181.8	168	304	100	60	-	-	2258	102	379	158	-	691	-	347	75	642	232	16	-	15	52
	42	S.D.	105.6	163.8	124.3	-	-	119.5	522.2	129	140	71	-	-	-	1791														
ADANA	103	Average	156.2	338.2	98.0	97.3	-	545.1	-	175	889	173	83	-	3388	-	83	271	152	125	3802	-	-	372	270	243	123	617	-	-
	15	S.D.	62.3	228.5	58.8	81.8	-	565.6	-	85	670	140	44	-	3546	-														
KAYSERI	78	Average	77.6	222.0	113.1	185.3	-	-	-	92	340	132	108	-	-	-	64	-	-	75	-	-	-	377	772	397	185	-	-	-
	9	S.D.	58.5	27.0	59.9	65.6	-	-	-	76	110	85	81	-	-	-														
SIVAS	248	Average	61.8	98.5	-	90.0	838.0	359.2	-	77	129	-	170	113	13	-	35	100	-	-	-	200	-	208	275	-	213	327	7	7
	16	S.D.	59.5	59.6	-	10.0	261.9	183.3	-	59	120	-	30	68	23	-														
TRAB-ZON	211	Average	39.7	42.0	-	38.8	-	23.5	-	65	93	-	69	-	60	-	38	100	-	37	-	24	-	311	974	-	220	-	32	32
	16	S.D.	24.1	38.7	-	26.0	-	-	-	47	79	-	52	-	-	-														
SAMSUN	79	Average	505.8	130.8	5.7	113.0	-	-	166.5	535	165	258	113	-	-	275	88	173	-	86	-	-	-	129	350	105	314	-	44	524
	21	S.D.	44.8	108.1	1.2	27.6	-	-	97.9	198	95	43	27	-	-	125														
KASTA-MONU	146	Average	70.7	64.4	96.3	112.5	90.7	79.0	-	85	60	63	50	59	66	-	131	150	38	84	-	-	-	317	299	243	87	199	461	-
	52	S.D.	55.2	57.0	45.4	84.0	87.0	48.6	-	52	53	35	22	10	53	-														
ESKI-SEHIR	52	Average	86.9	132.7	106.6	84.8	665.5	-	-	72	107	104	89	305	-	-	131	60	75	107	52	-	-	167	344	207	185	201	-	-
	16	S.D.	59.3	60.0	49.6	42.7	417.3	-	-	36	86	55	39	170	-	-														
ANTA-LYA	68	Average	60.7	313.6	49.0	454.7	-	1791.9	-	136	188	135	234	-	1273	-	98	325	178	500	-	-	-	338	314	243	225	-	49	49
	14	S.D.	54.3	163.0	9.0	445.4	-	2138.8	-	114	78	35	216	-	1489	-														
IZMIR	63	Average	131.2	131.1	162.1	78.7	-	-	-	219	253	259	126	-	-	-	171	19	131	44	-	-	-	315	290	356	148	-	-	-
	26	S.D.	80.3	88.5	101.6	51.8	-	-	-	145	241	188	68	-	-	-														
BURSA	14	Average	226.8	406.5	129.8	-	-	-	-	201	316	3850	-	-	-	-	476	-	178	-	-	-	-	203	1136	264	-	-	-	-
	8	S.D.	56.8	235.2	88.2	-	-	-	-	167	130	3650	-	-	-	-														
ISTAN-BUL	18	Average	51.7	110.0	136.5	-	-	-	-	75	144	97	-	-	-	-	130	-	-	-	-	-	-	215	315	417	-	-	-	-
	3	S.D.	36.7	56.5	21.0	-	-	-	-	27	80	27	-	-	-	-														

4.3.3 Short List Inventory

The application of the criteria as mentioned above for the extraction of short listed projects has led to the selection of 205 projects, equivalent to about one seventh of the total long list inventory. The short list formats, items mainly covering present farming conditions and

Figure 4.3.13 Process of Selecting Short List Projects

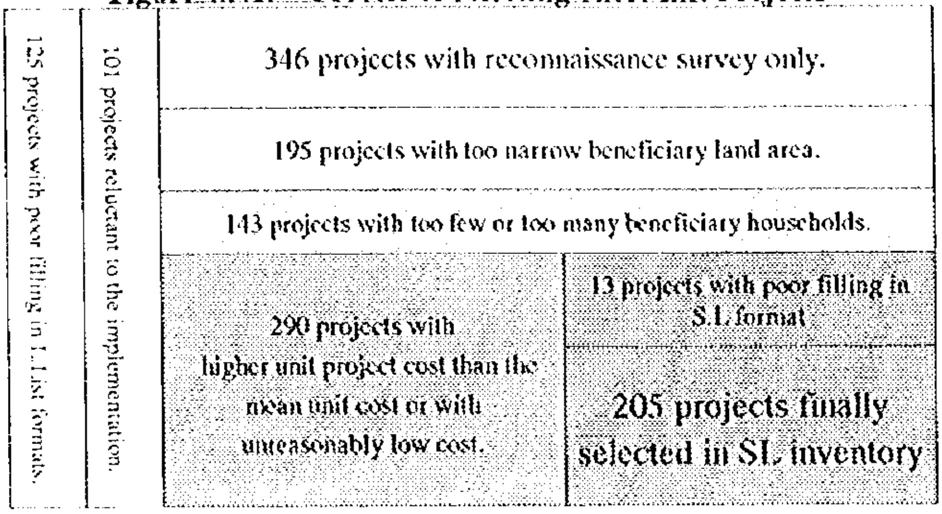


Table 4.3.1 Criteria for Selecting Short List Inventory

Name of Region	No. (L.L & S.L)	Stat.	Criteria for Crop Field Area: Project Area by Type of Works (Weir, River, Well, Soil Cons., Land Consol., Drainage, Compound Proj.)	Beneficiary Household Number (Weir, River, Well, Soil Cons., Land Consol., Drainage, Compound Proj.)	1996 Project Cost per hectare (Weir, River, Well, Soil Cons., Land Consol., Drainage, Compound Proj.)	Cost per beneficiary household (Weir, River, Well, Soil Cons., Land Consol., Drainage, Compound Proj.)
ANKARA	167	Average	268.8 1168.6 148.6 374.3 195.1	280 261 90 150 67	259 120 138 24	240 362 254 149 162
	10	S.D.	394.0 852.3 85.1 261.8 226.6	230 206 98 240 75		
KONYA	171	Average	114.1 266.6 168.9 300.0 319.5 1181.3	158 304 100 60 2258	102 379 158 693 347	75 642 232 16 15 52
	42	S.D.	115.6 163.8 124.3 149.5 522.2	129 140 71 1791		
ADANA	103	Average	156.2 338.2 98.0 97.3 545.1	175 880 173 83 1388	83 271 152 125 3802	372 270 243 123 617
	15	S.D.	62.3 228.5 58.8 81.8 565.6	85 670 140 44 1546		
KAYSERI	78	Average	77.6 222.0 133.1 185.3	92 340 132 198	64 75	377 772 397 185
	9	S.D.	58.5 27.0 59.9 65.6	76 110 85 81		
SIVAS	248	Average	61.8 98.5 90.0 838.0 359.2	77 129 170 113 33	35 300 200	208 275 213 327 7 7
	16	S.D.	59.5 50.6 100 261.9 183.3	59 120 31 68 23		
TRABZON	211	Average	39.7 42.0 38.8 23.5	65 93 60 60	38 100 37 24	311 974 220 32 32
	26	S.D.	24.3 38.7 26.0	47 79 52		
SAMSUN	79	Average	505.8 130.8 5.7 113.0 106.5	535 165 258 113 275	88 173 86	129 366 105 314 44 524
	21	S.D.	44.8 108.1 1.2 27.0 97.9	198 95 41 27 125		
KASTAMONU	140	Average	70.7 64.4 96.3 112.5 900.7 79.0	85 60 63 50 59 56	133 150 38 84	317 246 243 87 199 46
	52	S.D.	55.2 57.0 45.4 84.0 87.0 48.6	52 53 35 22 30 53		
ESKISEHIR	52	Average	86.9 132.7 106.6 84.8 665.5	72 167 164 80 365	131 61 75 107 52	167 111 207 188 233
	16	S.D.	59.3 66.0 49.6 42.7 417.3	36 86 55 30 175		
ANTALYA	68	Average	66.7 313.6 30.0 454.7 1761.9	136 188 135 264 1273	98 325 178 500	358 104 243 225 46 44
	14	S.D.	54.3 163.0 9.0 435.4 2138.8	114 78 35 216 2389		
IZMIR	63	Average	131.2 131.1 162.1 78.7	219 253 259 126	176 19 131 44	315 290 39 138
	26	S.D.	80.3 88.5 102.6 51.8	145 241 158 78		
BURSA	13	Average	226.8 406.5 129.8	202 316 3650	476 178	203 139 204
	8	S.D.	56.8 235.2 88.2	167 130 3650		
ISTANBUL	18	Average	51.7 110.1 136.5	75 144 97	18	215 315 417
	3	S.D.	39.7 56.5 21.0	27 58 27		

4.3.3 Short List Inventory

The application of the criteria as mentioned above for the extraction of short listed projects has led to the selection of 205 projects, equivalent to about one seventh of the total long list inventory. The short list formats, items mainly covering present farming conditions and

status, were provided for all these projects, and the data were processed. The major findings from data processing are summarized as follows:

(1) As for the distribution of the short list inventory projects, 205 or 23% of the total projects are located in central and southern Anatolia (2-3 of agro-ecological zone), about 20% in Aegean coast (1-2), another 19% in central to northern Anatolia (3-1), 15% in Black Sea coast (2), but only 10% are situated in eastern part of Anatolian plateau.

(2) Summary on number of projects by water source and by type of project components shows that the share of irrigation projects reaches 84%, of which those of surface water source accounts for 40%, ground-water irrigation does for 31% and those of reservoirs does for 13%. The share of soil conservation projects comes to 8% and others, including drainage and land consolidation projects account for each 2%, respectively. In comparison with the project type composition in the long list inventory, those with ground-water and dams have relatively higher share.

Figure 4.3.14 Topography

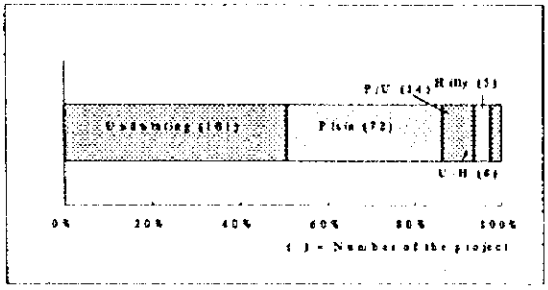
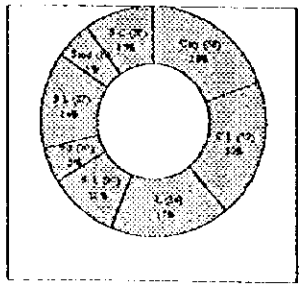


Figure 4.3.15 Soil Texture Distribution



(3) Out of natural conditions that are summarized according to agro-ecological zoning, climate and soils are given in Annex, but topography and outline of soil texture distribution are described below.

As to topography distribution covering the total listed projects, 49% of the total is found on flat land, 49% on undulated topography and the rest 16% is situated in hilly and mountainous areas. Flat plains are mostly distributed in the agro-ecological zone 3-2, as well considerably in 1-2. The distribution of undulating topography cover all zones except those mentioned above, especially abundant in 3-1 and 2. As concerns soil texture distribution, 44% of the total is classified as fine texture or clayey, 32% falls on the category of medium or loamy, and the rest 24% consists of sandy soils. Regionally, the rate of fine texture is high in the zone 1 or Marmara, Aegean and Mediterranean coasts, 3-2 and 3-3, while in 2 and 3-1 sandy soils are predominant.

(4) In land use, the average of the total short list gives a high cultivated land ratio, 73%, and in plateau the average comes to higher than this grand average, while in coastal areas, particularly in Aegean and Mediterranean coasts the ratio is lower. In the crop composition on the cultivated land, the rate of annual crops, perennial ones, grass land and fallow land constitutes 38%, 17%, 10% and 8%, respectively. The rate of annual crops is higher in both 1-3 and 3-3, but lower in 1-2. While higher rate of perennial crops is observed in 1-2 and 3-2 and lower rate in 1-3. That of grassland is higher in the pasturing area as stated above, reaching 12 - 18%, but lower in 1-2, 2, 3-1 than 2%.

(5) The breakdown of target crops for irrigation as the average of the total short listed projects, shows 34% of cereal crops, 11% of industrial ones, 9% of vegetables, 6% of orchard trees and 4% of pulses, with high variability by region.

Figure 4.3.16 Arable Area (ha)

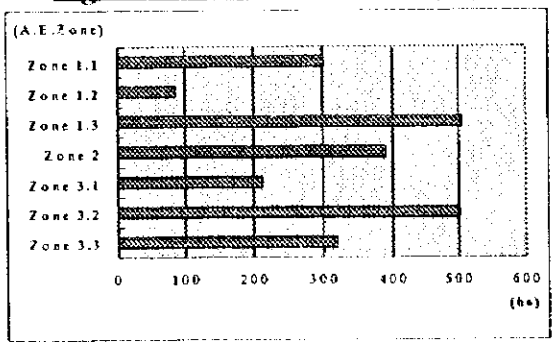


Figure 4.3.17 Land Use "Annual Crop"

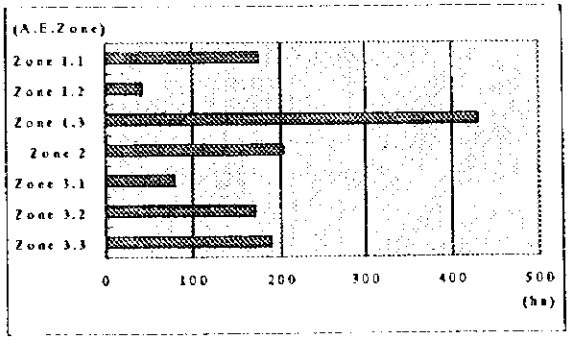


Figure 4.3.18 Land Use "Perennial Crop"

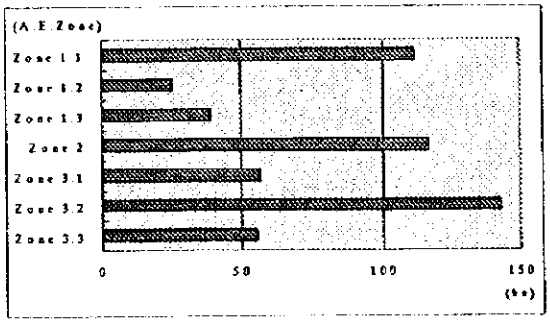


Figure 4.3.19 Land Use "Fallow"

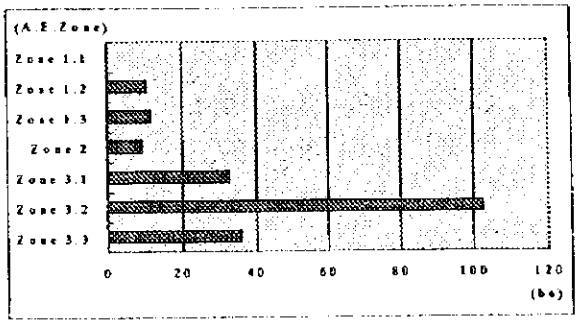


Figure 4.3.20 Land Use "Grass Land"

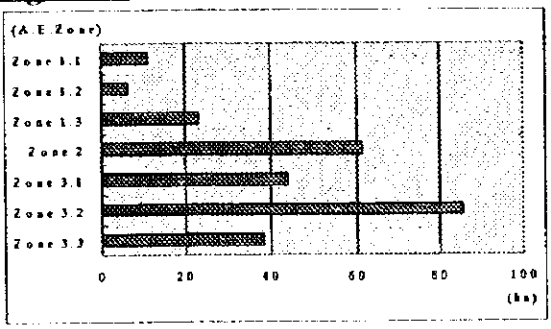
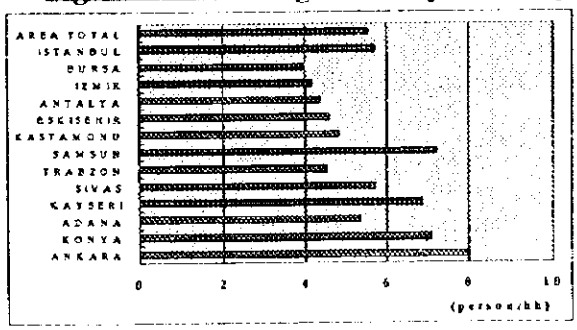


Figure 4.3.21 Irrigated Crop Intensity



Cash crops indicate higher rate in western regions, for instance the rate of orchard trees exceed 70% in Izmir, while the share of industrial crops reaches 36% and 33% in Istanbul and Antalya, respectively. The rate of vegetables in Samsun accounts for 30%, and in Sivas potatoes, or the specialty crop have the share of 58%. Whereas the rate of cereals comes to 68% in Kayseri, and 62% in Istanbul, other regions show the range of 20 - 40%. The ratio of irrigated area to the total cropped area gives 38% for the total inventory. In Izmir and Sivas, this ratio stays as high as 98% and 72%, respectively. while in Antalya and Samsun have the same ratio of 56%. However, it inclines to show low levels commonly in plateau, for example in Trabzon, Ankara, Eskisehir and Konya it remains as low as 20% or less.