1.2 Socio-economic Condition

1.2.1 Administrative Division

(1) Outline of the Administrative Division

Turkey is administratively divided into Central Government and Local Government. The Central Government consists of Ministries, Province, District and Sub-District. The provincial governor (Vali), the district administrator (Kaymakam) and sub-district administrator (Bucak Muduru) are appointed by the Ministry of Interior. Districts and Sub-Districts are administrative sub-divisions of provinces. The local administrative system consist of Special Provincial Administration (S.P.A), Municipality, and Villages. The government provides the budget of municipality depending on the population size. On the other hand, the village budget is annually self-provided to perform public activities and welfare. The administrative system of municipality and village constitutes a mayor (Belediye Baskan), village chief (Muhtar) and a council elected among the citizens and villagers, and the chief takes responsibility of all the affairs and order in an autonomous way. Both of them have 5 year term of office and directly elected by the citizens and villagers.

The study area consists of 6 districts, 4 sub-districts, and the total number of municipalities and villages in the study area is counted at 13. Table 1.2.1 gives the list of the administrative division of the study area concerned.

Table 1.2.1 Administrative Division of the Study Area

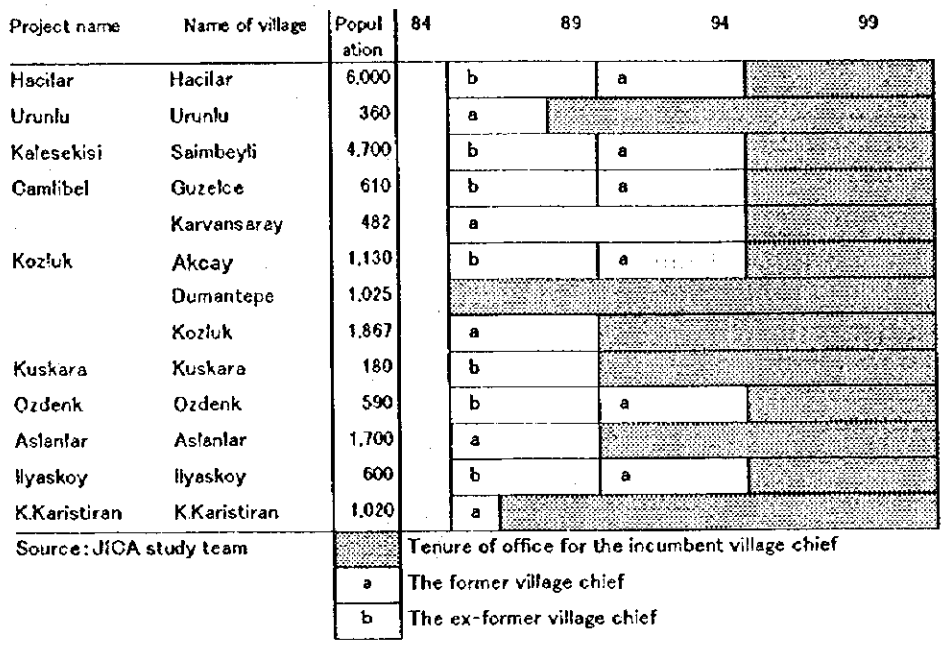
Project No.	REGION	PROVINCE CODE	PROVINCE	DISTRICT	MUNICIPALITY	VILLAGE		
1	ANKARA	71	KIRIKKALE	Hacilar*	HACILAR	-		
2	KONYA	42	KONYA	CUMRA	-	URUNLU		
3	ADNA	01	ADANA	SAIMBEYLI	SAIMBEYLI	-		
4	SIVAS	60	TOKAT	Camlibel*	-	KARVANSARAY	GUZELCE	
5	SAMSUN	55	SAMSUN	TERME	-	KOZLUK	AKCAY	DUMANTEPE
6	KASTAMONU	37	KASTAMONU	MERKEZ	-	KUSKARA		
7	ESKISEHIR	26	ESKISEHIR	ALPU	-	OZDENK		
8	IZMIR	31	IZMIR	TROBAKLI	-	ASLANLAR		
9	BURSA	34	YALOVA	Kilic*	-	ILYASKOY		
10	ISTANBUL	39	KIRKLARELI	Buyukkaristiran*	-	KUCUK KARISTIRAN		

*Sub-District

(2) Village Communities

The administrative of a village (koy) constitutes a village chief and a council elected among the villagers, as stipulated in the Village Act (Koy Konunu), and the chief takes responsibility of all the affairs, coordination, arbitration, decision, and order in it an autonomous way. Village council consists of 4 - 7 council members, accountant, teacher and imam. Teacher and imam are appointed by the central government. Most of the villagers, Village chief elected among the villagers, council members and accountant are appointed by the village chief. The following Table 1.2.2 gives the list of the tenure of office for a member of village chief.

Table 1.2.2 The List of the Tenure of Office for a Member of Village Chief.



The 6 villages changed administration every term of office. The 4 village chief remain in his present office during two term of office.

1.2.2 Demography

(1) Population and Population Density

The population, population density, house hold, number of family, farm house hold, and ratio of farm household in the study area are shown in following Table 1.2.3

Table 1.2.3 Population and Engaged in Agricultural Sector

Project	Population	Area (ha)	Population Density	Household	Number of Family	Farm Household	Ratio of F.H.H
Hacilar	4,903	4,200	116.74	600	8.17	550	92%
Urunlu	316	350	90.29	70	4.51	65	93%
Kalesekisi	4,699	29,426	15.97	1170	4.02	270	23%
Camlibel	1,235	2,510	49.20	160	7.72	158	99%
Kozluk	4,068	2,800	145.29	700	5.81	700	100%
Kuskara	222	2,800	7.93	35	6.34	35	100%
Ozdenk	486	1,000	48.60	130	3.74	126	97%
Aslanlar	1,559	1,115	139.82	477	3.27	400	84%
Ilyaskoy	533	875	60.91	150	3.55	150	100%
K. Karistiran	1,037	2,550	40.67	190	5.46	170	89%

(2) Urban and Rural Population

The following Table 1.2.4 gives the list of urban and rural population in the project area. The rural population rate is smaller in Kirikkale Merkez district (9%), national level in 4 project area (Tokat Merkez, Kastamonu Merkez, Istanbul Yalova, Kirklareli Luleburgs), higher in 5 area (Konya Cumra, Adana Saimbeyli, Samusun Terme, Eskisehir Alup, Izmir Torbali).

Table 1.2.4 Population and its Changes between Urban and

Province code	PROVINCE	DISTRICT	Year	Total Population	Urban	%in Urban	Rural	%in Rural
71	KIRIKKALE	MERKEZ	1985	228,984	208,018	91%	20,966	9%
			1990	206,688	185,431	90%	21,257	10%
42	KONYA	CUMRA	1985	65,222	24,175	37%	41,047	63%
			1990	74,040	28,781	39%	45,259	61%
01	ADANA	SAIMBEYLI	1985	20,528	4,329	21%	16,199	79%
			1990	20,700	4,699	23%	16,001	77%
60	TOKAT	MERKEZ ILCE	1985	141,367	73,008	52%	68,359	48%
			1990	150,771	83,058	55%	67713	45%
55	SAMSUN	TERME	1985	82,419	18,245	22%	64174	78%
			1990	81,668	20,381	25%	61287	75%
37	KASTAMONU	MERKEZ ILCE	1985	89,563	46,986	52%	42,577	48%
			1990	94,279	51,560	55%	42,719	45%
26	ESKISEHIR	ALPU	1985	18,827	4,999	27%	13,828	73%
			1990	18,679	5,087	27%	13,592	73%
31	IZMIR	TORBALI	1985	62,963	18300	29%	44663	71%
			1990	71,172	21167	30%	50005	70%
34	ISTANBUL	YALOVA	1985	90,228	53,857	68%	36,371	40%
			1990	113,417	65,823	58%	47,594	42%
39	KIRKLARELI	LULEBURGAZ	1985	82,053	43420	53%	38633	47%
			1990	93,060	52384	56%	40676	44%
THE WHOLE COUNTRY			1985	50,664,458	28,140,464	56%	22,523,994	44%
			1990	56,473,035	33,326,351	59%	23,146,684	41%

(3) Demography

Table 1.2.5 summarizes, according to the population and population increase rate in study area. During a period of 1985-1990, population of 7 project area was decrease. population of 5 projects area was decrease during a period of 1990-1996, and decrease rate is higher in Tokat Kuskara village (-4.28%). The highest population increase rate during a period of 1990-1996 is at Ozdenk village (3.95%).

Table 1.2.5 Population and Population Increase Rate in Study Area

			1985			1990			85-90
			Population			Population			Annual
code	PROVINCE		Center	Village	Total	Center	Village	Total	rate(%)
71	KIRIKKALE	KESKIN	17,484	21,614	39,096	20,044	21,688	41,732	1.31%
42	KONYA	CUMRA	24,175	41,047	65,222	28,781	45,259	74,040	2.53%
01	ADANA	SAIMBEYLI	4,329	16,199	20,528	4,699	16,001	20,700	1.67%
60	TOKAT	MERKEZ ILCE	73,008	68,359	141,367	83,058	67713	150,771	1.29%
55	SAMSUN	TERME	18,245	64174	82,419	20,381	61287	81,668	-0.18%
37	KASTAMONU	MERKEZ ILCE	46,986	42,577	89,563	51,560	42,719	94,279	1.02%
26	ESKISEHIR	ALPU	4,999	13,828	18,827	5,087	13,592	18,679	-1.58%
31	IZMIR	TORBALI	18300	44663	62,963	21167	50005	71,172	2.45%
34	ISTANBUL	YALOVA	53,857	36,371	90,228	65,823	47,594	113,417	4.58%
39	KIRKLARELI	LULEBURGAZ	43420	38633	82,053	52384	40676	93,060	2.51%
THE WHOLE COUNTRY			28,140,464	22,523,994	50,664,458	33,326,351	23,146,684	56,473,035	2.17%

(4) Economic Active Population

Looking into Table 1.2.6the Economic active population engaged in agriculture sector, the share of the population is 22% for the whole country. The share among the Study area, 9 villages ranges between 82% and 97%. The lowest is Saimbeyli which has high potential non agricultural sector.

Table 1.2.6 The Economic Active Population Engaged in Agriculture Sector

	Hacilar	Urunlu	Kalesekisi	Camlibel	Kozluk	Kuskara	Ozdenk	Aslanlar	Ilyak	K.Karist
Population	4,903	316	4,699	1,235	3,048	222	486	1,559	533	1,037
Population above 12 years	3,645	229	3,436	892	2,918	183	375	1,207	425	892
Economic active population	2,987	204	1,075	775	2,518	174	309	1,002	352	837
Employment	1,865	199	712	757	2,277	169	276	986	252	376
Agriculture worker	1,364	196	289	740	2,205	166	252	852	238	359
Ratio (Agri worker/Eco. act. popu) %	46%	96%	27%	97%	96%	95%	82%	85%	68%	43%

1.2.3 Land Tenure and Land Holding

Farm land holding in the priority project areas has been investigated through socio-economic surveys, especially farm economy survey in July - August 1997. Total acreage of cultivable farmland of ten priority projects amounts to around 5,500 ha, of which 4,140 ha (net acreage 3,834 ha) is proposed as the project area. There 2,624 Farm households have been engaged in farming, so average holding size comes to approximately 2.1 ha (20.9 decare), out of which 1.58 ha is served as cropping for food and feed crops, industrial ones and fallow area.

Table 1.2.7 gives land holding pattern and mean cultivable land holding size per farm household, indicating that fairly large difference in holding size among projects and wide range of acreage distribution in the same project area exist. Generally, villages in Anatolian plateau has larger acreage than those in other regions, as seen in Camlibel and Urunlu, but in Hacilar large tract of cultivated land was transferred to petroleum industry area two decades ago, leading to narrower farm size and fostering off-farm activities among traditional farm households. Kozluk has narrowest acreage because of hilly and mountainous topography and most of acreage under hazelnut is not included in the project, and if this is counted mean acreage accounts for 36.4 dacare instead of 8.7 decare. Projects in the western provinces have smaller holding size and this is common character among Marmara and Mediterranean coastal zones. Kalesekisi has specific background where recently reclaimed orchard field of limited acreage has been allocated to many town dwellers, many of whom have other vocation like store keepers etc. at their home in municipality Sayinbeili.

As to land tenure, no precise data is available but interviewed results in farm economy survey. The fact of rent and tenant relation was found in Urunlu, Ozdenk and Ilyaskoy and in lesser degree in Aslanlar and K.Karistiran. Since number of interviewed samples are quite limited, big divergence exists between tenants and rented land owners. The related results of the survey is tabulated in Table 1.2.8. The farm economy survey result shows that some farmers own more than 30 ha (equivalent to 300 decare or 320 dönün) but few of them let their land on lease because they have tractors to cultivate all the land area they own. Traditional forms of tenancy, such as ortakçılık, iarcılık and murabbacılık have not been observed in the studied sites, but "icare" was found in a few sites in which the rate of rent at 1 - 6 million TL per decare (equivalent to 60 - 360 US$ per ha) is paid from tenants after the harvest. Many small-holders cannot earn enough agricultural income to sustain their families, so they have to rely a part of their income on labor service to well-off neighbors in the form of wage-basis (600 - 2,000

thousand TL per man-day or 3.6 - 12 US$ per diem) or as shepherd for cattle or sheep herd catering. Farmland prices vary with regions and crop productivity, ranging from 200 - 1,000 million TL per ha or 1,200 - 5,900 US$/ha for rain-fed field but the rate comes to 50% higher for irrigable land. According to the farm interview survey, farmland is rented in four sites, Urunlu, Kozluk, Ozdenk and Aslanlar, but the percentage of rent to total holding gives lower figures at maximum 26 %, implying that cultivated land is basically owned by cultivators themselves.

Table 1.2.7 Land Holding Pattern

Unit : per cent to total farmland, average; ha household

Project Name	Landless in 1991#	0- 0.5ha	0.5-1ha	1 - 2ha	2 - 5ha	5- 10ha	10- 20ha	20- 50ha	over 50ha	Average holding
Hacilar	5.4	17.0	26.0	29.0	27.0	1.0	0	0	0	1.1ha
Ürünlu	9.5	19.0	17.1	42.3	11.1	5.9	2.1	1.3	1.2	7.5ha
Karesekisi	10.0	10.3	27.6	27.6	34.5	0	0	0	0	1.2ha
Çamlibel	3.3	5.0	7.0	14.0	10.0	30.0	10.0	10.0	14.0	9.1ha
Kozluk	2.8	0	17.0	20.3	22.7	21.1	6.3	0.9	0	1.1ha
Kuskara	3.7	5.3	17.1	24.1	37.4	14.4	1.7	0	0	3.7ha
Özdenk	4.4	6.5	40.3	16.1	13.5	12.9	6.5	2.3	1.9	1.1ha
Aslanlar	12.4	0	33.3	49.2	8.3	4.2	3.3	1.7	0	1.5ha
Ilyasköy	5.2	11.2	39.3	45.0	4.5	0	0	0	0	1.2ha
K.Karistiran	1.4	5.3	19.4	36.9	38.9	6.8	3.2	0	0	1.3ha

Note : * Provincial figures according to Village Inventory Survey, # General Agricultural Census 1991

Land holding size tends to dwindle as heritage transfers are going on from generation to generation, land holding size is diminishing while number of parcels are increasing, leading to more dispersed land distribution and tillage condition by tractors getting worse, as seen in the following Table.

Table 1.2.8 Land Tenure Situation in Six Project Sites

Unit : decare, per household, H.H. = household

Project Site	Owned Land	Rent Land	Lease Land	Sample H.H.	Owner H.H.	Tenant H.H.	No. of parcels
Ürünlu	132.1	37.9	n.a.	7	n.a.	4	6.0
Kozluk	57.3	0.6	n.a.	19	n.a.	1	3.1
Özdenk	102.2	11.1	n.a.	9	n.a.	2	7.9
Aslanlar	58.1	9.0	1.0	15	1	5	7.6
Ilyasköy	60.3	13.6	n.a.	11	n.a.	1	5.4
K.Karistiran	163.0	9.0	5.0	10	1	3	8.1

Note : Number of parcels indicates averages per household, landowner and tenants expressed in number.
Source : Farm Interview Survey by the Study Team

1.2.4 Rural Infrastructure

The selected 10 priority projects are located in the rural area, thereby, standards are low in the following areas compared to these in the urban area.

- Density of road network
- Domestic water supply and sanitary sewerage system
- Village roads and drainage system
- Public facilities, i.e. park and school, etc.

As it could be observed, it is considered that minimum requirements of infrastructure for living are met, and it is to improve the quality and standard in the future.

1.3 Agriculture

1.3.1 Land Use and Cropping Pattern

(1) Land Use and Planted Area

Existing planted area and their ratio of each crop in the ten study area are shown in Table 1.3.1 by hectare and 1.3.2 by percentage. Cropping orders in three or four succeeding years in the study area are shown in Table C-21. Existing cropping pattern in each study area are shown in Fig. C-7-1 to C-7-10 by the percentage of planted area of crops comparing with the proposed cropping pattern.

Agricultural land use shown by crops and their planted area are differed by the study area. Total number of crops planted in the study area are over 26 species, but number of crops in each study area are 4 to 9 species. Among these crops, wheat is cultivated in every study area and occupies about one-third of the total planted area in the study area. Among other crops, barley and some industrial crops such as sugar beet and sunflower are occupying comparatively large area. But the planted area of leguminous, oil seed and tuber crops are small and varied by the area. Planted area of vegetables and fruit trees in the study area are 121 and 303 hectare respectively, and occupies about 2.9 and 7.26 % of the total planted area of the study area. Fallow are found in three study area and occupies 238 hectare and 5.7 % of total planted area in the study area.

As is shown in Table C-21, rotational cropping systems are adopted in the most of the study area. Cropping order of annual crops by years are reasonable with their climatic and soil conditions. However, introduction of leguminous crops which have some role on the soil fertility are in comparatively low level. It will be caused mainly by low productivity in the semi-arid area. Cropping intensity in the study area are under 1 even in warm regions because of the shortage of irrigation water.

(2) Staple Crops in the Study Area

Each study area has some staple and special crops which the area hope to characterize and develop. These are sugar beet in Urunlu, Camlibel and K.Karistiran, cherry in Kalesekisi, garlic in Kuskara, fruit vegetables in Aslanlar and hazelnuts in Kozluk. These crops are suited for soil, climatic and social conditions and are characterized for the staple and special crops in the area. These crops will be developed their planted area and production after accomplishment of the irrigation facility.

Table 1.3.1 Existing Cultivation Area of Each Crop in the Ten Study Area (Unit: ha)

Project Name Province	Hacilar Kirikkale	Urunlu Konya	Kaleseki Adana	Camlibe Tokat	Kozluk Samsun	Kuskara Kastamon	Ozdenk Eskisehir	Aslanla Izmir	Ilyaskoy Yalova	K.Karist Kirklareli	Total
Study Area(ha	580	490	233	1,438	610	130	140	263	130	126	4,140
NetBenefitArc	580	490	233	1,438	610	130	140	263	130	126	4,140
Wheat	222	299	11	468	2	43	46	127	88	59	1,365
OtherWinter				481	39	16	59		24	7	626
Maize					144	13			3		160
Rice					28						28
Dry bean		23					3				26
Lentil	56			21							77
Chick pea	39										39
Cow vetch				118							118
Sugar beet		150		213		32	17			8	420
Sunflower	111					2			11	48	172
Cotton								47			47
Tobacco								74			74
Hemp						3					3
Potatoes					17	3					20
Alfalfa				21			3			2	26
Vegetables						7	0	0	4	2	13
Water Melon	33	11						4			48
Melon		7									7
Tomatoes	8				30			4			42
Garlic						11					11
Hazelnuts					184						184
Cherry			89								89
Grape			22					7			29
Apple							1				1
Others			111		166						277
Fallow	111			116			11				238
Total	580	490	233	1,438	610	130	140	263	130	126	4,140

Table 1.3.2 Percentage of Existing Cultivation Area of Each Crop in Ten Study Area (Unit: %)

Project Name Province	Hacilar Kirikkale	Urunlu Konya	Kaleseki Adana	Camlibe Tokat	Kozluk Samsun	Kuskara Kastamon	Ozdenk Eskisehir	Aslanla Izmir	Ilyaskoy Yalova	K.Karist Kirklareli	Total
Wheat	38.3	61.0	4.7	32.5	0.3	33.1	32.9	48.3	67.7	46.8	33.0
OtherWinter				33.4	6.4	12.3	42.1		18.5	5.6	15.1
Maize					23.6	10.0			2.3		3.9
Rice					4.6						0.7
Dry bean		4.7					2.1				0.6
Lentil	9.7			1.5							1.9
Chick pea	6.7										0.9
Cow vetch				8.2							2.9
Sugar beet		30.6		14.8		24.6	12.1			6.3	10.1
Sunflower	19.1					1.5			8.5	38.1	4.2
Cotton								17.9			1.1
Tobacco								28.1			1.8
Hemp						2.3					0.1
Potatoes					2.8	2.3					0.5
Alfalfa				1.5			2.1			1.6	0.6
Vegetables						5.4			3.1	1.6	0.3
Water Melon	5.7	2.2						1.5			1.2
Melon		1.4									0.2
Tomates	1.4				4.9			1.5			1.0
Garlic						8.5					0.3
Hazelnuts					30.2						4.4
Cherry			38.2								2.1
Grape			9.4					2.7			0.7
Apple							0.7				0.0
Others *			47.6		27.2						6.7
Fallow	19.1			8.1			7.9				5.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Notes : In Adana, the other is bush area, and in Samsun, the other is the area of poplar trees.

1.3.2 Crop Yield and Production

(1) Crop Production

Number of farm households by size and the number of main agricultural machinery in the study area are shown in Table 1.3.3. Cultivation area of each farm household are varied by the study area. Farm size in Hacilar, Kalesekisi, Aslanlar and Ilyaskoy area are comparatively small and those of Urunlu, Camlibel and Kuskara are comparatively large on the contrary.

However, mechanization in crop production are progressively developed even in the areas of small size. The number of agricultural machinery such as tractor, harvesting combine, chemical sprayer, fertilizer spreader and irrigation pump are increased progressively in recent years and are used actively by farmers even in small size. Many farming works in the field are conducting with these machines.

Table 1.3.3 No. of Farm Households by Size and No. of Agricultural Machinery in the Study Area

Project Area	Hacilar	Urunlu	Kalesekisi	Camlibel	Kozluk	Kuskara	Ozdenk	Aslanlar	Ilyaskoy	K.Karist
Number of farm households by size (Unit: No., size: ha)										
0.0~0.5	85		81				10	30	10	27
0.5~1.0	130		108	5	10		16	25	70	44
1.0~2.0	145		54	10	100		25	40	55	49
2.0~5.0	135	33	27	45	75	5	21	25	15	46
5.0~10	5	16		65	10	26	22			4
10~20		16		28	3	4	10			
20~				5	2		22			
Number of main farming machines										
Tractor	150	70		102	18	30	25	120	38	165
Harvester	2			8		20	1			3
Spreader	100			17	3	2	5		25	157
Sprayer	40	70	100	8	15	20	12		40	145
Irrigation Pump		5		85	10	20	60	45	30	30

On the procurement of seeds, seed of wheat are provided in every three or four years from the government with the explanation of characteristics of the varieties. The seeds of barley, maize and potatoes are also provided from the government in every few years. Seed of sugar beet are provided from sugar beet factory. The seeds of oats, sunflower, alfalfa and other crops are mostly self supplied by farmer themselves. Seeds of vegetables are provided usually by city market.

On the sowing rate (quantity of seed for sowing), sowing rate for cereals are very large in general. For example, sowing rate of wheat in the study area are 180~230 kg/ha and those of barley are 200~250 kg/ha. These are about one-tenth of the production. It may be caused by the low tillering in the low fertile soil in the study area and uncertain germination under semi-arid climatic conditions. However, sowing rate of winter cereals can be cut by half through the sowing in optimum period and covering with soil in optimum depth.

On the chemical fertilizers, ammonium-nitrate, di-ammonium phosphate, urea and compound fertilizers are commonly used for crop production. Quantities of these fertilizers and quantities of agricultural chemicals used for crop production in the study area are shown in Table 1.3.4. The more detailed data are shown in Table C-22, 23.

Table1.3.4 Quantities of Fertilizers and Chemicals for Crop Production in the Study Area

(Units; Quantities of fertilizers are ingredients; kg/ha, chemicals; g/ha)

Crops	N	P2O5	K2O	Herbicides	Insecticides	Fungicides
Wheat	44~132	0~138	0~30	500~2,000	0~1,000	0~1,000
Barley	44~132	46~138	0~0	0~2,000	0~1,000	
Maize	38~173	22~276	0~0	0~1,000	0	0
Dry bean	0~112	0~60	0~60	0~1,000	0	0
Sugar beet	62~450	38~345	0~113	600~2,000	1,000~2,000	0~2,500
Sunflower	31~65	0~53	0~0	0~1,500	0	0
Alfalfa	0~52	0~210	0~0	0~1,000	0	0
Tomatoes	26~183	42~105	0~105	1,000~3,300	0~1,500	0
Water melon	65~166	0~75	0~75	0~2,000	0~5,000	0
Hazelnuts	106~157	55~138	0~0		25,000	
Cherry	34~63	86~161	0~0	600~2,000	1,000~5,000	1,000~2,000

As shown in upper Table, the quantities of chemical fertilizers are lower in winter cereals than those of industrial crops such as sugar beet, vegetables and some fruit trees. The reasons may be due to the low productivity of winter cereals under rain fed condition. Utilization of agricultural chemicals are also little in general except some industrial crops and fruit trees which are cultivated under irrigated condition. It may be mainly caused by the light injuries of insects and weeds under semi-arid condition and heavy injuries under irrigated conditions.

(2) Irrigation

Farmers in the study area are cultivating some crops under partly irrigated conditions preparing the irrigation equipment such as irrigation pump and sprinkler by themselves. Irrigated crops are wheat in some area, maize, rice, dry bean, sugar beet, alfalfa, vegetables and some fruit trees, which are expected to contribute the high benefits to farmers. The outline of existing irrigation time, methods and frequency in the area are shown in Table 1.3.5, and more detailed existing data are shown in Table C-24 on each study area and crop.

Table 1.3.5 Existing Irrigation Time, Methods and Frequency in the Study Area

Crops	Time	Methods	Frequency	Remarks
Wheat	Mar.~June	Sprinkler, Basin	Mainly 1 time	In some area, after sowing
Maize	Mar.~June	Furrow	2~4 times	
Dry bean	May ~Aug.	Furrow, Sprinkler	3~7 times	
Sugar beet	Apr.~Sep.	Furrow, Sprinkler	2~10 times	
Sunflower	July~Aug.	Furrow, Sprinkler	Mainly 2 times	Some area no-irrigation
Alfalfa	May ~Sep.	Mainly sprinkler	5~10 times	Irrigation after cutting
Vegetables	Apr.~Sep.	Furrow, Sprinkler	3~10 times	Fruit vegetables are furrow.
Fruit trees	Mar.~Aug.	Basin to root zone	2~6 times	Irrigation on root area

(3) Existing Crop Yield

An outline of existing yields of crops in the study area are shown in Table 1.3.6. As the existing yield of crops are differed by the regions and conditions on water supply, so, the yields in the Table are shown by range. The more detailed data on existing yields are shown in Table C-25 by each study area and crops .

Table 1.3.6 Existing Crop Yields in the Study Area (Unit: kg/ha)

Crop	Wheat	Barley	Maize	Rice	Drybean	Sugarbeet	Sunflower	Alfalfa	Watermelon	Tomato	Pepper	Grape	Hazelnuts
Min.	2,000	3,000	2,500	3,750	1,200	35,000	500	30,000	30,000	30,000	12,000 5,000	950	
Max.	3,000	3,700	3,000		1,500	60,000	1,200	35,000	35,000	40,000			1,000

Notes: The yields of sugar beet, alfalfa and vegetables are under partly irrigated conditions.

The yields of crops shown in the Table are obtained by hearing survey from farmers in the study areas, and it contains some estimation and round number. The yield of some crops such as wheat and sugar beet were seemed to be little higher than those of statistical data in the provinces (Table C-26).

However, the data show that the existing crop yields are varied by study area and are little higher in good conditions of site and partly irrigated conditions than those of opposite site.

The outline of crop cultivation techniques of main crops in the study area are shown in Table C-27 with the quantities of fertilizers, chemicals and existing crop yields.

1.3.3 Livestock Production

(1) Number of Livestock and Livestock Breeding Farm Household

The number of livestock and the average production of milk by cow in the study area are shown in Table 1.3.7. The more detailed data are shown in Table C-28 with the number of livestock breeding farm households and the average number of livestock in a farm household of each study area.

Table 1.3.7 Number of Livestock and Milk Productivity in the Study Area

Area	Hacilar	Urunlu	Kalesekisi	Camlibel	Kozluk	Kuskara	Ozdenk	Aslanlar	Ilyaskoy	K.Karist
Sheep	1,500	1,500		3,000	500		2,000	1,200	350	1,350
Goat	300	10					500		60	
Beef Cattle	600	200			300	350	15		100	45
Milk Cow	500	100	20	200	300	200	235	250	250	455
Hen	3,000	9,000	250	300	1,700	350	600	3,500	1,500	2,100
Goose and others						50	100			600
Milk Productivity (kg/head/year)										
Improved variety	4,000	3,500	4,000		3,000		4,200	3,300	3,150	4,200
Domestic variety				1,500		1,000				1,000

As is shown in Table 1.3.7, milk cow are bred in every study area, and beef cattle are also bred in large number in study area such as Hacilar, Urunlu, Kozluk and Kuskara. Sheep are also bred in many study area and some area such as Camlibel and Ozdenk have larger number. However, the breeding of goat are not so active in the study area.

Average number of cattle bred by a farm household are 10 and 6 respectively in Kuskara. Those of other areas are from 1 to 5 heads per farm household respectively, and it shows that the breeding of livestock are supplement of crop cultivation for the farmers in many study areas.

Milk productivity of dairy cow in the study area are mostly in 3,200 - 4,200 kg per head per year in improved varieties such as Holstein-Freisian, and are mostly in 1,000 - 1,500 kg per

head per year in domestic varieties. Milk productivity of domestic varieties are very low, so, the selection of low productive cow and the breeding of high productive cow are requested to develop the livestock breeding.

(2) Forage Production

It requires large quantities of good forage to develop the livestock production. As the number of livestock in the study area are very high as shown in upper Table, and the areas for forage crops are limited, so the straw of wheat after harvesting the grain and whole crops of other winter forage crops such as barley and oats are dried and packed by machines and utilized for the good feed of livestock in the study area. Leaves of sugar beet after cutting the beet and residue after sugar manufacturing are also used for feed.

The existing area of feed crops, estimated yield and total production in the study area are shown in Table C-29. The crops shown in Table are contained not only forage crops but also some other crops which stem or straw, leaves and grains can be utilized for animal feed. The yield of straw, leaves and grains of each crop are obtained by hearing survey from farmers in the study area. The data in Table show that the amount of feed are insufficient to breed the livestock shown in upper Table.

The study area except Kalesekisi and Kuskara area have some area of grassland. The area are in 30 to 1,100 hectare, and used for grazing of sheep, goat and cattle. However, the grazing capacity of the grassland are very low because of the low fertility of grassland soil under semi-dried climatic condition and unsuitable grazing such as hastened grazing before sufficient growth of grass.

1.3.4 Marketing System and Prices

Farmers in the project sites consume their products like cereals, vegetables, fruits, feed crops and livestock, selling only surplus. Under their living environment without convenient stores, depots and trading places, main foods and feeds have been self-supplied by themselves. Small holders must make desperate efforts to secure their self-sufficiency with their staples and subsidiary crops. Others, middle and large scale farmers grow industrial crops, oil-seeds, fiber crops and other cash-crops in addition to food crops. Among these cash crops, sugar beet, sunflower, cotton, hazelnut, onion and garlic are of high economic value, while fresh cherry, watermelon, hemp, milk etc. have also significant economic values.

With respect to marketing systems for these marketable products, TMO, a state marketing agency plays an important role to buy and store grains and pulses. Processing mills, like state run or private sugar mills, private sunflower oil mills and cotton ginneries, have their networks in collecting materials from farmers. Sugar-mills are distributed throughout the country covering major producing areas so that growers can deliver beet root up to their collecting depots, while sunflower oil factories are concentrated around Istanbul-Izmir area, and the growers sell seed either to sunflower-cooperatives (Trakya Birlik etc.) or to brokers. Cotton ginneries are also located in southern and western areas, or near producing area, where growers sell cotton balls to brokers. Hazelnut constitutes one of Turkish specialty export commodities and a number of processing mill cooperatives like Findik Kirma are located along Black Sea coast in Samsun. Farmers sell their nut either to these factories or middlemen who

come from Istanbul and other urban centers and collect nut to deliver to urban export commodity channels.

As regards input supply, Tarim Kredi Koop. (agricultural credit cooperative, abbreviated as TKK) has by far the major function with a state-wide network for providing member farmers with their basic needs and farm inputs at uniform prices throughout the state for price-supported inputs. It can serve as a financing agency dealing with credit loans from the Ziraat Bankasi (state agricultural bank), granting loans up to 500 million TL per household. Any farm household can become its member by paying one million TL for the membership fee to utilize the service. It has another mediating function to deliver member's order to manufacturers, banks etc. who supply machinery, processed feeds, provide farming insurance.

As to farm-gate prices as of July 1997, official support prices for cereals and other gazetted commodities are fixed according to varieties and quality, that are valid throughout the country as tabulated in Part I, Table 3.3.12. Other farm gate prices without any official control are highly volatile depending on climate and crop performance, by season and local trade situation, are inquired in farm economy survey and summarized in Part I, Table 3.3.11.

As to farm-gate prices, official supporting prices and supported items have been annually gazetted in official gazettes, though the date of publication varies item by item. The newest supported prices for grains are listed in the following table.

Table 1.3.8 illustrates marketing and processing sites that farmers in the studied sites utilize.

Table 1.3.8 Marketing Sites

Project Name	T.M.O.	T.K.K.	Sugar Mill	Sunflower Oil-mill	Other Mills	Livestock Market
Hacilar	Kirikkale**			Yozgat	flour mill	Kirikkale
Ürünlu		Cumra 10km	collection##			
Karesekisi		Tufanbeyli				
Çamlibel		Camlibel	25km*			Camlibel
Kozluk		Dumantepe			rice mill	
Kozluk					Hazelnut M.	
Kuskara		Kastamonu	2km			
Özdenk	Alpu 20km	Bozan 8km		cooperative		Eskisehir
Aslanlar	Izmir#	Torbali				
Ilyasköy	Sakarya#	Subasi10km				Yalova
K.Karistiran				cooperative***		

Note : collection point at Karavansaray, ** 5 Silo points, *** sunflower oil mill also.
: too far, so not used.

The farm economy survey results reveal that 40% of interviewed farmers sell their cereals to TMO while 23% of them rely on merchant who visit villages. More than half of them sell their products to brokers, implying that they serve widely to market local farm commodities in rural areas. Processing mills collect their material products from producers at the rate of more than a third, or around three fourths of industrial crop producers. 27% of them sell their cash crops by themselves, for example at sale stalls in urban grocery markets or highway side, itinerant vending etc.. Many small villages do not have grocery stores and this type of vending still plays an important and useful role for the supply of basic consumer goods and foods. Sales

cooperatives do not yet develop in a significant way in the study sites and inhabitants have not fully utilized them even if they are established. Various reasons of this failure in cooperative development are conceivable, for instance lack of functional structure, of management ability, inhabitant's behavior more inclined to individualism than acting in a coherent way, difficulty in getting rid of traditional or conventional influence of long-standing partnership with middlemen, though many of inhabitants recognize merit of cooperatives. The economy survey as referred to above indicates that 92 % of the interviewed positively agreed the necessity of sales cooperatives. Cooperative movement is found in the collection of cow's milk in project sites in western provinces although it is still in an embryonic stage.

Table 1.3.9 Farmers' Marketing Channels in the Studied Sites

Channel	Sampled	T.M.O.			Broker / middlemen										
Crop	household	Wheat	Barley	all grain	all comm.	fruit	cereals	cotton	hemp	livestock	sunflower	bean	vegetable	nuts	olive
HACILAR	16	2	8	5							10				
URUNLU	7	1	0	6							1	2			
KALESEKISI	11					11									
Karavensarai	10	0	0	2			7								
KOZLUK	19													15	
KUSKARA	7	1	0	0	1		1		4					1	
OZDENK	9	0	0	9			1			2		1			
ASLANLAR	15				6	2	3	4	4						2
ILYASKOY	11	0	1	1	3	1	4						1		
K KARISTIR-	10	10	0	0			1				1				
10 Pr Village	115	14	9	23	10	14	16	4	8	2	12	3	1		2

Channel	processing mills					Cooperative						Self - vending			
Crop	sugarbeet	paddy	grape	hazelnut	hemp	milk	sugarbeet	cereal	cotton	grape'nut	sunflower	milk	vegetable	Fruit	Others
HACILAR													5		
URUNLU	7														
KALESEKISI														8	
Karavensarai	9						1	2							
KOZLUK		4	1	1											
KUSKARA										1			1		2
OZDENK	6	1			1	1							5		
ASLANLAR		1	2						3	2			1	1	
ILYASKOY	2												6	1	
K KARISTIR-	6										10	1			
10 Prjct Villa	30	6	3	1	1	1	1	2	3	3	10	1	18	10	2

note : in the column of paddy, 1 in Ozdenk gives cereals, another in Aslanlar does hemp.
source : Farm Economy Survey by the study team

1.3.5 Production Values of Principal Crops

Current production values per decare (0.1 x ha, traditional unit for crop statistics) for principal crops are estimated in the following Table by applying present farm-gate prices (new unit price regime for the products and input prices prevailed in the project sites concerned). It should be taken into account that the value is higher for the products harvested in irrigated plots. The value of each crop (only for main products) is obtained as shown below :

Production values of the same products vary with areas, season, quality and cost inputs and sometimes take negative values especially for fruits harvested from immature orchards, highly labor-intensive crops that farmers want to convert into other profitable but less labor consuming ones. The following table shows these conditions and distribution of crop value by project site though livestock products are not yet summarized in it. Cereals, for which farm gate prices are supported by the state, have comparatively low values but if their by-product (straw for livestock feed that serves as an important feed stuff during winter) is counted in, the values turn out from negative to positive, or to rise to higher levels.

Table 1.3.10 Production Values of Main Crops

Unit : kg, TL, per 0.1 ha or decare

Main Crop	Average Yield per decare in kg	Unit Prices as of July 1997	Gross Crop Value in TL, July 1997	Production Cost per decare, July	Estimated Net Crop Value per decare, July
Wheat*	262	36,650	9.60	8.55	1.05
Barley*	231	24,170	5.58	5.00	0.58
Sugarbeet**	5,030	11,000	55.33	37.50	17.83
Sunflower*	87	100,000	8.70	7.13	1.57
Cotton**	275	120,000	51.12	51.04	0.08
Alfalfa**	1,818	100,000	18.18	15.90	2.28
Tomato**	2,733	50,000	136.65	102.20	34.45
Hazelnut*	156	350,000	54.60	48.00	6.60
Cherry*	669	110,000	73.59	47.50	26.09
Grape*	1,254	100,000	125.4	103.9	21.50

Note : Average of ten priority project sites, under rain-fed condition (*), and irrigated fields (**)

Farmers desire to grow higher value crops or livestock varieties, but they are all risky, often outlet can hardly be found once glut supply to the markets happens, or technically difficult to maintain trees or herds that tend to be susceptible to diseases and climatic vagary. Production values of the same products vary with areas, season, quality and cost inputs and sometimes take negative values especially for fruits harvested from immature orchards, highly labor-intensive crops that farmers want to convert into other profitable but less labor consuming ones. The following table shows these conditions and distribution of crop value by project site though livestock products are not yet summarized in it. Cereals, for which farm gate prices are supported by the state, have comparatively low values but if their by-product (straw for livestock feed that serves as an important feed stuff during winter), their values turn out to be higher.

Table 1.3.11 Production Values of Principal Crops

Crop		Wheat					Barley					Maize					Potato					Beans				
Project Site	Stage	Crop Area	Crop Value	Total PC/ha	Net Value	N.V.* Area	Crop Area	Crop Value	Total PC/ha	Net Value	N.V.* Area	Crop Area	Crop Value	Total PC/ha	Net Value	N.V.* Area	Crop Area	Crop Value	Total PC/ha	Net Value	N.V.* Area	Crop Area	Crop Value	Total PC/ha	Net Value	N.V.* Area
Ankara	W.O.P.	222	308.56	82.9	25.66	5,697	0					0					0					95	84	84	0	0
Nevşehir	With Pro.	230	212.4	101.3	111.1	25,553	0					0					0					0	0	0	0	0
	Difference					17,034																				0
Konya	W.O.P.	249	332.72	80.3	42.42	12,684	0					0					0					25	84	84	0	0
Çumra	With Pro.	240	206	103.9	153.7	36,578	0					0					0					90	303	95	958	10,064
	Difference					5,894																				10,064
Adana	W.O.P.	13	94.4	80.8	14.3	185	0					0					0					0				
Kahramanmaraş	With Pro.	0	0	0	0	0	0					0					0					0				
	Difference					-185																				
Sivas	W.O.P.	468	308.56	81	37.56	12,646	481	72.2	57.2	15	7,215	0					0					120	84	84	0	0
Kahramanmaraş	With Pro.	240	206	101.4	154.8	34,956	96	180.5	71.2	109.3	10,493	0					0					68	303	96	207	7,276
	Difference					22,310					3,278															7,276
Samsun	W.O.P.	2	94.4	81	13.4	27	39	35.01	57.2	18.61	726	144	105.5	60.5	45	6,192	28	29.2	104	-52	-1,456	0	84	84	0	0
Düzce	With Pro.	0	212.4	99.4	0	0	0	0	0	0	0	88	173.5	77.5	95	8,360	54	44.3	104	137	7,248	54	303	96	207	11,178
	Difference					-27					-7,361					1,540					8,854					3,778
Kastamonu	W.O.P.	43	308.56	81	37.56	1,585	16	64.98	57.2	7.78	124	19	75.9	60.5	15.4	293	0									
Kuşkara	With Pro.	30	212.4	99.4	113	3,390	0	0	0	0	0	30	155.25	77.5	77.75	778	0									
	Difference					2,805					-124					577										
Eskişehir	W.O.P.	45	277.44	77.9	69.54	2,085	39	108.3	65.5	42.8	2,525	0					0					3	16.8	84	67.2	-202
Orduzu	With Pro.	33	206	98.2	137.8	4,274	0	0	0	0	0	0					0					28	175	95	80	1,923
	Difference					1,988					-2,525															1,923
Izmir	W.O.P.	127	153.76	92.9	61.86	7,857	0					0					0					0				
Aydınlar	With Pro.	25	212.4	111.3	161.1	25,38	0					0					0					0				
	Difference					5,456																				
Bursa	W.O.P.	88	308.84	92.6	61.24	5,697	34	54.15	57.2	-3.05	-73	3	69	60.5	8.5	26	0					0				
Gemlik	With Pro.	31	212.4	111	101.4	3,115	0	0	0	0	0	0	0	0	0	0	0					0				
	Difference					136					73					-26										
Istanbul	W.O.P.	59	349.92	100	69.92	4,125	7	72.2	57.2	15	105	0					0					0				
Küçükçekmece	With Pro.	18	212.4	118.4	94	1,692	0	0	0	0	0	0					0					0				
	Difference					-2,433					-105															

Crop		Potato					Fruits					Sugarbeet					Tomato/Vegetable					Sunflower				
Project Site	Stage	Crop Area	Crop Value	Total PC/ha	Net Value	N.V.* Area	Crop Area	Crop Value	Total PC/ha	Net Value	N.V.* Area	Crop Area	Crop Value	Total PC/ha	Net Value	N.V.* Area	Crop Area	Crop Value	Total PC/ha	Net Value	N.V.* Area	Crop Area	Crop Value	Total PC/ha	Net Value	N.V.* Area
Ankara	W.P.	0					0					0	0	0	0	0	8	900	900	0	0	113	60	42.6	17.6	1,954
Nevşehir	With Pro.	0					0					160	812.5	277	535.5	85,680	25	1200	1040	160	4,000	77	150	69.7	80.3	6,180
	Difference															85,680					4,000					8,134
Konya	W.P.	0	0	0	0	0	0					150	591.25	277	314.25	47,138	0					0				
Çumra	With Pro.	70	875	379	496	34,720	0					140	812.5	277	535.5	74,970	0					0				
	Difference					34,720										27,832										
Adana	W.P.	0					80	252	284	-32	-13,520	0					0	0	0	0	0	0				
Kahramanmaraş	With Pro.	0					160	880	319	561	89,760	0					30	1250	1040	210	2,400	0				
	Difference						Cherry				103,280										2,400					
Sivas	W.P.	0	0	0	0	0	0	0	0	0	0	213	600	284	316	73,548	0	3000	920	0	0	0				
Kahramanmaraş	With Pro.	82	750	379	371	30,422	109	400	250	150	16,350	358	875	319	557	199,706	68	1250	1040	210	14,280	0				
	Difference					30,422	Apple and Peach				16,350					126,158					14,280					
Samsun	W.P.	37	525	334	191	7,067	254	420	167	253	48,042	0					30	950	920	30	900	0				
Düzce	With Pro.	82	750	379	371	30,750	266	900	229	671	178,718	0					130	1250	1040	210	27,300	0				
	Difference					23,683	Hazelnut				130,676										26,400					
Kastamonu	W.P.	8	625	334	291	873	0	0	0	0	0	32	562.5	277	285.5	9,136	7	1050	1040	10	70	2	80	63.2	16.8	34
Kuşkara	With Pro.	10	875	379	496	4,960	3	700	233.3	466.5	1,400	40	812.5	290	522.5	21,000	0	1250	1040	0	0	0	0	0	0	0
	Difference					4,087					1,400					12,164					-70					-34
Eskişehir	W.P.	0	0	334	0	0						17	562.5	375	187.5	3,404	0	1300	960	0	0	0				
Orduzu	With Pro.	19	875	379	496	9,424						31	750	390	360	11,470	13	1300	1040	260	5,980	0				
	Difference					9,424										12,874					5,980					
Izmir	W.P.	0					7	192	287	95	-665	0					4	1125	960	165	660	0				
Aydınlar	With Pro.	0					125	960	333	628	78,750	0					75	1375	1040	335	25,125	0				
	Difference						Table Grape				80,415										24,465					
Bursa	W.P.	0					0	0.0	0	0	0	0					4	1225	960	265	1,100	11	80	63.2	16.8	182
Gemlik	With Pro.	0					99	500	340	160	15,840	0					0	1600	1040	0	0	11	270	103.9	166.1	1,827
	Difference						Apple				15,840										1,100					87
Istanbul	W.P.	0										8	662.5	306	356.5	2,852	2	975	960	15	30	48	130	100.8	29.2	953
Küçükçekmece	With Pro.	0										36	875	305	570	20,520	24	1462.5	1040	422.5	10,140	12	250	108.9	141.1	1,693
	Difference															17,668					10,110					740

1.3.6 Agro-economy

With a view to elucidating current economic situations in ten priority project sites, a farm economy survey was conducted by interviewing farmers of the randomly selected farm households in these sites. The number of samples are determined to be equal to the square root of the existing number of households so that the results are statistically significant, however, for the sites where the number exceeds 400, the ceiling was set at 19 due to short survey period.

Table 1.3.12 Sampled Number of Farm Economy Survey

Project Name	Number of Samples in the village	Those outside it	Total by Project
HACILAR	16	2	18
URUNLU	7	2	9
KALESEKISI	19	1	20
CAMLIBEL	10	1	11
KOZLUK	9	1	10
KUSKARA	7	0	7
OZDENK	11	0	11
ASLANLAR	15	1	16
ILYASKOY	11	1	12
K.KARISTIRAN	10	1	11
Total Number	115	10	125

As a result, the above listed 125 sample households were interviewed with the formats shown in the Annex. Simultaneously, private as well as public (state/parastatal) organizations and marketing agencies that farmers often visit for selling their products and buying farm-inputs or for credit access were investigated to identify marketing channels, prices and problems, to cross-check what interviewed farmers replied to the questionnaire. The survey results are put into analysis programmes and the findings will be tried to reflect into the marketing plan and project evaluation techniques.

Analysis of the interview survey has revealed that farmers in the surveyed sites suffer from limited agricultural income from rain-fed farming in contrast to increasing expenditure of both household and farm inputs, acutely demanding improvement in farming productivity.

Farm budget in 1997 of ten priority projects are outlined in the following table. 1997 crop has so far taken advantage of favorable climatic conditions. Annual farm income in many cases outweighs annual household expense and the deficit if any should be met by credits from T.K.K., brokers and their saving deposits including livestock herd. Their annual household expenditure is averaged at around 100 million TL (equivalent to 600 US$), and this level is comparable to the production value from 16 decare. Since a farm family consists of five members in this survey, a household ought to have 80 decare (8 ha) of wheat field without fallow. It follows that 60% of households in the surveyed sites fail to feed by farming if they only rely on rain-fed wheat. Accordingly crop conversion from rain-fed grains/pulses to irrigated cash crops is essential.

Table 1.3.13 Farm Budget 1997 in Project Sites

PROJECT NAME	ANNUAL EXPENDITURE							ANNUAL INCOME					
	Rent	Wage nput Cost		Feeds	House-Hold Ex.	Others	Total Expense	Crop	Live-stock	Off-farm	Total Income	C/T.E.	T.I/T.E
HACILAR	17	65	277	52	738	0	1,149	997	181	158	1,336	0.87	1.16
URUNLU	313	208	273	0	846	0	1,640	3,187	29	86	3,302	1.94	2.01
KALESEKISI	62	111	112	52	742	0	1,079	620	55	459	1,134	0.57	1.05
Karavansarai	19	48	179	119	822	63	1,250	1,810	1,198	220	3,228	1.45	2.58
KOZLUK	8	104	96	11	828	12	1,059	1,077	0	312	1,389	1.02	1.31
KUSKARA	2	26	236	0	801	0	1,065	1,094	0	75	1,169	1.03	1.10
OZDENK	33	96	282	36	675	18	1,140	974	122	203	1,299	0.85	1.14
ASLANLAR	96	270	653	0	989	87	2,095	1,197	38	130	1,365	0.57	0.65
ILYASKOY	88	153	556	5	1,008	94	1,904	1,217	0	690	1,905	0.64	1.00
K.KARISTIRAN	76	174	640	9	850	311	2,060	2,921	0	189	3,110	1.42	1.51
10 Pr Village	62	120	314	30	808	55	1,389	1,358	152	259	1,769	0.98	1.27

note: the red figure in the column of Aslanlar might have resulted from poor gain from cotton crop the profitability of which has deteriorated by boosted hired labor wage levels, also affected from poor harvest of cotton ball. In general, the crop production costs lie in the range of 20 - 25% of gross income thereof.

Table 1.3.14 A Relief of Average Farm Household Economy (Unit: as given below)

Project	Farm Size	Family Labor	Hired Labor	Livestock Bovine	Holding Sheep	Tractor Held	Annual Farm I.	Annual Total I.	Annual Living E	Annual Total E.
	decare	person	man - day	head	head	number	Million TL	Million TL	Million TL	Million TL
Hacilar	106	4	49	0.9	0.8	0.7	1,178	1,336	481	632
Ürünlu	189	4.5	102	2.4	21.4	0.9	3,216	3,306	274	1,186
Karesekisi	14	4.7	73	0.8	0	0	675	1,134	346	844
Çamlibel	92	3.4	6	3.5	40	0.9	3,008	3,225	211	996
Kozluk	59	1.8	91	0.4	0.2	0.3	1,077	1,985	262	734
Kuskara	71	3	19	7.3	0	1.0	1,094	1,165	414	539
Özdenk	108	2.7	93	4.3	75.5	0.8	1,096	1,295	923	848
Aslanlar	64	2.7	233	1.1	1.8	0.7	1,294	1,368	714	1,645
Ilyasköy	74	2.5	83	3.0	0.5	0.8	1,286	1,906	824	1,331
K.Karistiran	171	2.8	76	0.9	0.3	0.7	1,217	3,110	464	1,846

Note : I; Income, E; Expenditure Source : Farm Economy Survey conducted in July - August 1997

Total input cost lies around 20 - 25% of total farm income reflecting good crop, but as the bold letter figures in the table shows, but crop income fails to off-set all the expense (C/TE). Adding off-farm and livestock incomes to crop income, then total annual expenditure can be met except Izmir where living expense stays higher than average (T.I./T.E.) and cotton as a major crop is now much less remunerative than other industrial crops that growers are not satisfied with. Income from livestock accounts for less than 15% of the total farm revenue, much lower rate than those reported in agricultural statistics. Hence, in the surveyed sites are concerned, animal husbandry activities seem to be inert. The survey results covering villages within ten priority project are briefed as follows:

As to land use, variable cases are observed, for instance, farmland in Kuskara is already irrigated but erosion takes place, well-off farmers in all the project sites developed individual irrigation facilities mostly by pumps, covering 31% of cropped land of the total land held by them. 6% of cultivable land in the project site in Anatolian plateau is left fallow.

Concerning farm labor, most sites have been cultivated by 2 - 3 family members (on average 2.8 persons per household), or less than half of the total family members. Farmers hire farm labor during peak harvesting / planting seasons at the rate equivalent to 0.5 persons of

family member. Farm labor force is abundant, and number of tractors held by farmers can cover the whole farm plots in the project site if they are efficiently mobilized with lease and hire system that is widely observed among the surveyed sites. Most farmers hire neighbors for harvest and tillage paying 700 to 1,500 thousand TL per man-day. Wage rate was found highest in Aslanlar, K.Karistiran and other western sites, but cheaper in Kuskara and Kozluk and other eastern ones.

Majority of farm households hold farm machinery, for example, small pumps and a tractor at a rate of 60 - 70% of total households, followed by manure spreader, chemical sprayer and grain thresher that are diffused at a rate of 50%. Harvesters are less popular due to high unit price, held by one out of three farm households in every project site. 20% of total household do not hold any self-driven machinery, and they rely on hiring of lease machinery, or on draught animals. Except big sized farms in the sites in Anatolian plateau, individual holding of farm machinery is not economically viable judging from their farm scale.

As regards crop distribution among the sites, wheat is found almost all sites except Kalesekisi and Kozluk, the acreage of which accounts for one third of the total cropped acreage, followed by barley with cropping rate of 17%. When it comes to industrial crops and oilseeds, sunflower has a share of 16%, but cropping acreage of sugar-beet barely reaches 9% because it requires irrigation. Fruit trees cover 9% of the total cropped acreage, but this rate happens to be high because such sites with perennial crops have coincidentally been chosen as priority projects. After all, cereal crops are the most popular, accounting for more than half of the aggregated acreage occupied by ten priority projects, then more than a quarter of the acreage is cropped with industrial crops, and the rest 20% or more has been planted with tuber crops, pulses, orchard trees and vegetables, or left idle as follow land.

Table 1.3.15 Summary of Crop Acreage Composition

Project	Number of Family Member							Man-day	Livestock Holding			Farm Machinery Holding per Household									
	young		elder		children		Some	Hired	bovine	improved cow	sheep	tractor	pump	M.S.	thresher	sprayer	harvested	seeder	plow	wian power	hire system
	fem.	male	fem.	male	fem.	male	labor	labor	local		goat										
HACILAR	2.5	2.1	0.6	0.8	1.1	0.9	4.0	48.8	0.9	0.0	0.8	8.7	0.7	0.4	0.6	0.0	0.6	0.0	0.1	0.1	0.1
URUNLU	2.0	1.4	0.6	0.1	1.0	1.0	3.0	102.1	2.4	0.4	21.4	8.1	0.9	2.0	0.4	0.3	0.3	0.0	0.0	0.3	0.0
KALESEKISI	1.1	1.8	0.5	0.5	0.4	0.5	2.5	72.7	0.8	0.0	0.0	1.6	0.0	0.4	0.0	0.0	0.7	0.0	0.0	0.0	0.0
Karavansarai	2.4	2.7	0.5	0.5	1.5	1.7	3.4	4.6	6.2	0.0	40.0	11.6	0.9	1.2	0.2	0.4	0.4	0.5	0.0	0.2	0.0
KOZLUK	2.2	1.8	1.2	0.6	0.4	0.5	1.8	79.4	2.1	0.0	0.2	9.1	0.2	0.4	0.0	0.0	0.2	0.0	0.0	0.0	0.0
KUSKARA	2.1	1.7	0.9	0.9	1.6	1.0	4.6	3.6	10.7	0.0	0.0	17.0	1.0	0.6	0.1	1.0	1.0	0.4	0.0	0.0	0.0
OZDENK	1.8	1.8	0.6	0.6	0.3	0.8	2.7	92.2	3.8	1.0	62.2	5.0	0.6	0.3	0.4	0.3	0.3	0.0	0.0	0.4	0.1
ASLANLAR	1.5	1.5	0.5	0.5	0.7	0.3	2.7	237.4	1.1	0.0	1.8	5.7	0.7	1.2	0.5	0.0	0.5	0.0	0.0	0.2	0.0
ILYASKOY	1.5	1.3	0.5	0.9	0.5	1.0	2.6	83.3	3.0	1.0	0.5	3.9	0.8	0.5	0.5	0.0	0.5	0.1	0.0	0.5	0.0
K.KARISTIRAN	2.0	1.6	0.6	0.8	0.5	0.5	2.8	75.5	0.9	1.5	0.3	16.0	0.7	0.6	0.7	0.0	0.7	0.0	0.0	0.0	0.8

Source : Farm Economy Survey

Project	Major Crop Acreage per household (decare)																			
	Cereals			Pul-	Industrial Crops				Fodder Crop		Pota-	Vegetables		Cucurbita		Fruit Trees		Other	
	wheat	barley	paddy	ses	beet	s.f.	cotton	Hemp	Maize	Oats	toes	specie		specie		specie		CROPS	
HACILAR	24.9	3.7	3.3	0.3	18.5	0.0	0.0	0.0	0.0	0.0	0.0	tomato	0.4	water	0.0		5.3		0.1
URUNLU	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	0.0		0.1	melon	0.0		23.7		1.4
KALESEKISI	2.3	0.0	0.2	0.0	1.8	0.0	0.3	0.0	0.0	0.0	0.0		0.3		0.0	cherry	37.6	oasi-	0.6
Karavansarai	26.9	16.9	0.1	0.1	11.3	0.0	0.8	0.0	0.0	0.0	0.0		1.8		0.1		0.1	on	3.4
KOZLUK	20.6	17.9	0.0	0.1	1.9	0.0	30.8	0.0	0.0	0.0	0.0		0.6		2.0	sweet-	7.5		6.8
KUSKARA	25.7	5.0	0.0	0.0	0.0	1.7	8.3	0.0	0.0	0.0	0.0	brin-	6.8		0.0	root	2.3	ger-	1.0
OZDENK	33.0	12.5	0.0	0.0	0.0	11.9	0.0	0.0	0.0	4.4	0.0	jal	1.3		0.0		5.4	lic	0.0
ASLANLAR	30.8	13.7	0.7	0.5	10.6	16.4	8.1	0.6	0.3	0.8	1.9		1.1		0.5		7.8		2.6
ILYASKOY	33.9	14.5	0.6	0.4	10.7	15.5	7.5	0.0	0.0	0.8	0.0		1.1		0.6		7.4		2.5
K.KARISTIRAN	24.6	13.7	1.1	1.0	13.3	24.8	13.8	2.6	1.3	0.9	7.5		0.0		0.0		0.1		0.0

Source : Farm Economy Survey

Turkish farming always accompany livestock supplying important source of protein in food self-sufficiency. 80% of the total farm households in all project sites (except Kalesekisi)

hold small herd of livestock for the purpose of self-supplying dairy products and farmyard manure. Two remarkable facts are found in this survey as to livestock; livestock holding per farm household gives more herds in Anatolian plateau where fallow land and public pasture (mera) account for wider area, whereas the sites in western part of the country hold fewer herd but Holstein and other improved cows began to increase and specialized dairy farmers emerge. Nevertheless, livestock productivity remains so low that its rate of contributing farm income never exceeds 20% of the total. On average, herd size consists of a few heads of cow and 20 heads of sheep and goats, but in Kuskara farmers hold bigger herds per household.

Table 1.3.16 Farmers Opinion on Farm Management and Economy

Project Site	Is Any Income Increase Brought about by Irrigation ?				Necessity of Creating Sales Coop ?			Whether Satisfied or not with Supported / Offered Price				Whether there is any Profitable Livestock or not ?				
	YES	NO	don't know	how high	YES	NO	don't know	T. K. K.		BROKER		not any	cows	sheep	chicks	others
								YES	NO	YES	NO					
HACILAR	16	0	0	8	16	0	0	6	9	0	9	0	7	4	0	13
URUNLU	7	0	0	4	7	0	0	1	6	0	6	0	2	5	0	7
KALESEKISI	11	0	0	6	11	0	0	4	7	0	11	0	9	3	1	0
Karavansarai	10	1	0	3	10	0	0	2	8	0	10	0	10	4	0	10
KOZLUK	19	0	0	2	17	2	0	7	12	16	13	0	0	0	0	19
KUSKARA	7	0	0	0	4	3	0	4	3	2	0	1	6	0	0	5
OZDENK	8	0	0	1	8	2	0	7	2	2	8	0	1	8	2	9
ASLANLAR	14	1	0	0	15	0	0	2	13	1	11	0	4	4	0	15
ILYASKOY	11	0	0	0	9	2	0	3	8	2	9	0	7	0	0	7
K.KARISTIRAN	10	0	0	0	9	1	0	9	1	5	5	0	8	1	0	10
mean 10 sites	113	2	0	24	106	10	0	45	69	28	82	1	54	29	3	95
composition	98%	2%	0%	21%	92%	9%	0%	39%	60%	24%	71%	1%	47%	25%	3%	83%

source: Farm Economy Survey by the Study Team in August 1997

The survey result related to marketing was already cited in the foregoing section. Here, farm financing is focused where most households surveyed in this study obtain farm inputs through middlemen, as summarized in the following table. Major portion of their source of fund comes from self-provided cash obtained through the sale of their farm products, and in most cases bank loans are not available to them due to lack or short of mortgage. Most farmers in all the sites have experienced short term borrowing from T.K.K., but rarely utilized farm loans from banks. Also, most farmers in all the sites admit significance of joining and creating sales cooperatives, however, they don't have any concrete idea as to how they re managed properly.

Farmers gain as termed in farm economy varies with farm-gate price levels, with regard to which summarized result elucidates that farmers are not necessarily content of prices offered by brokers they often trade and negotiate with nor satisfied with gazetted procurement price by T.M.O.. Most farmers, regardless of sites, consider it lucrative to grow industrial crops, orchard trees and vegetables, while many others in western project sites are of the opinion that modern European milch cows are profitable, which is now becoming more popular than husbandry of traditional indigenous stock species.

Among farming constraints, by far the majority of the interviewed, reaching 90% of them appealed lack and shortage of irrigation water, in other words limitation of economy under rain-fed farming, followed by shortage of farming fund and high interest for credit fund accounting for over 20%, respectively. Almost no farmers interviewed recognize farm labor shortage and adverse topographic or other land conditions as constraints, though more than half of them consider small-holding as limiting factor for further development.

As for farm labor balance and mobilization in the project sites, as seen in the above table, just as machinery holding tends to become excessive to land holding size, so does farm labor supply but for peak demanding period. The outlet of surplus labor force in off-farm activities is hardly found within villages where only limited subsidiary vocational opportunities are available, such light industry as masonry, brick making, fuel preparation, honey collection and cottage works including tailor, blacksmith, transporters with pick-ups, vans and second-hand buses, quick processing of cheese and yogurt drinks. The capacity of absorbing idle population into these off-farm jobs is limited to less than a quarter of the under-employed. These side-jobs are run by individuals, not on hired or group basis.

Out of economically viable age group, less than half, distributed evenly among the sites surveyed, of the interviewed have experience of side-business. Among experienced vocation, business related to transport and delivery accounts for nearly a half, followed by livestock jobs like herdsman, slaughtering, diary processing etc. Similarly, farmers are endowed with fewer opportunities to leave villages for earning and remitting, and only 8% of the interviewed have their family members engaged in emigrated earning. On account of narrow land holding, mobilization of surplus family labor within their farms has stagnated. In general, rural surplus labor force now left idle should be mobilized into agro-related chain industries like livestock, inland fishery etc. located inside villages. However, animal husbandry has remained in slack, producing not more than the quantity for home consumption in the sites studies, on account of limited remunerative species. At any rate, two most serious issues farmers face to, i.e., shortage of farm investment fund and irrigation water, hinder inner-village mobilization of available labor.

Table 1.3.17 Constraints and Off-Farm Activities

Project Site	Constraints on Farm Improvement					Land Holding Size			Family Off-farm Activity			
	Fund shortage	High price	Farm labor	Water short	Slope Tech.	Suffi-cient	Short	Present	Industry	Const-truction	Proces-sing	P.S
HACILAR	2	2	0	16	0	5	11	105	1	0	2	3
URUNLU	4	1	0	5	0	1	4	168	0	0	0	0
KALESEKISI	5	6	0	10	0	4	4	16	0	0	0	0
Karavansarai	1	0	0	10	1	4	6	89	2	3	0	0
KOZLUK	0	0	0	19	0	18	1	29	5	4	1	0
KUSKARA	1	1	0	1	1	6	1	67	1	0	3	0
OZDENK	1	0	0	9	1	3	6	108	4	0	1	0
ASLANLAR	7	8	11	14	0	8	7	37	0	0	2	0
ILYASKOY	1	2	0	11	0	5	6	56	2	0	2	0
K.KARISTIRAN	4	3	0	0	0	1	8	162	1	0	1	0
aggri-	26	23	11	95	3	55	54	81	16	7	12	3
gate	23%	20%	10%	83%	3%	48%	47%		14%	6%	10%	3%

Project Site	Expansion of Machinery Holding			Labor Supply		LABOR USE			PROCESSING		
	neces-sary	not needed	desirable machinery	not enough	suffi-cient	Off-Farm	Cottage	Others	YES	NO	Activ engaged
HACILAR	11	4	Harvester	7	11	2	1	0	0	15	0
URUNLU	1	1	Tractor	2	6	1	0	0	0	7	0
KALESEKISI	9	2		0	11	0	0	0	0	11	0
Karavansarai	10	0	Beet Harvest.	8	8	2	0	0	3	6	3
KOZLUK	9	9	Tractor	0	18	2	0	17	3	14	3
KUSKARA	4	3	Beet Harvest.	3	3	1	0	6	1	5	1
OZDENK	9	1	Tractor	5	3	0	0	8	5	6	2
ASLANLAR	11	4		5	10	3	0	12	3	12	4
ILYASKOY	3	6	Harvester	2	9	1	1	8	1	10	0
K.KARISTIRAN	9	1	Harvester	2	8	0	0	2	1	9	0
aggrigate	76	31		34	87	12	2	53	17	95	13
composition	66%	27%		30%	76%	10%	2%	46%	15%	83%	11%

1.3.7 Agricultural Support Services

GDRS and extension offices in provinces and regions are conducting the active guidance to farmers in villages on the irrigation methods, control of weeds and new techniques for crop cultivation. However, these guidance are not sufficient on detail for the farmers in the villages which differed the soil and climate conditions by site. So, some cooperatives such as sugar beet and water use cooperative have some role on the guidance of crops and water management.

On the cultivation techniques of sugar beet, sugar beet factories and their cooperatives are going on the active guidance to the farmers joining to the cooperatives and cultivating sugar beet with the distribution of seeds and some materials for the cultivation such as fertilizers and agricultural chemicals. The cooperatives have detailed data on the fertility of soil which are joining to the cooperatives and teach the farmers how much fertilizers are required on sugar beet cultivation by soil data. The cooperatives grasp the cultivation area by the distribution of seeds and also adjust the harvesting time to avoid the concentration of the sugar manufacturing works.

On the irrigation techniques of field crops, irrigation cooperatives have also positive role on the guidance to irrigation techniques of field crops such as maize, potatoes, alfalfa and vegetables. The cooperatives also collect the fee of electric pumps paralleling with the working hours of pump.

Agricultural credit cooperatives (Tarim Kredi Kooperatif) in the districts and villages have also big role on the development of agriculture. The cooperatives supply many kinds of farming materials such as fertilizers, agricultural chemicals, machines and irrigation apparatuses by credit to the joining farmers.

The purchase prices of these farming materials are quite same in all country under the control of the government.

1.4 Irrigation and Drainage

1.4.1 Past Work Implemented

There are projects, a part of which or related part of which have been already constructed. These are three groundwater projects, land conservation project in Kuskara, land consolidation project in Camlibel, and sprinkler irrigation project in Hacilar. Other four projects such as Kalesekis, Kozluk, Ozdenk and Ilyaskoy, have not any related part of works already implemented.

This Study undertakes three groundwater projects, the wells of which had been already opened by DSI. Table 1.4.1 below summarizes the groundwater-related-works done by DSI:

Table 1.4.1 Groundwater related Past Work done by DSI

Project	Region	Year	No. of well	Q, m^3/s	Dia., inch	Dep., m	Pump	Remarks
Urunlu	Konya	1996&97	5+3=8	50	12 & 10	150	Sub & Shaft	Total Q = 400
Aslanlar	Izmir	1993&94	2+5=7	10 - 50	12 & 10	100	Submergible	Total Q = 200
K. Karistiran	Istanbul	1993	4	30	12 & 10	200	Submergible	Total Q = 120

Those wells were constructed between 1993 and 1997, and already equipped with pumps. The farmers, therefore, already started irrigating their farms despite the fact that the irrigation system has not yet been completed. The pumps are submergible type with exception of some pumps in Urunlu project. All groundwater projects were originally designed with gravity irrigation system accompanied with open canals. However, since these projects are now to be designed with sprinkler system, the pumps should be replaced or otherwise additional boosting pump(s) should be employed.

Kusukara project is land conservation, with which soil erosion in the fields could be reduced. The soil erosion has occurred due mainly to irrigation water brought from two wells. The irrigation systems, including the wells, were constructed by GDRS in 1993. The depth of the wells is about 10m only and the discharges are 50 and 45 l/s, irrigating about 80ha in total. The irrigation system is composed of the wells, pipeline connecting the sources and a discharge box, and open gravity concrete canals.

Camlibel project is land consolidation, accompanying irrigation system which takes water from a DSI dam project. The dam, named Guzelce, is constructed in Fineze river which joins into Cernik river on the north of Camlibel town, and then Cernik river flows into other rivers in the downstream and forms Cekerek river. The dam project is to irrigate total land of 4337 ha, and is now under implementation and expected to complete in 1999. As long as it concerns to GDRS work, any part has not yet been realized.

Hacilar project takes water from a dam named Kapulukaya that currently serves for hydro-power and domestic water. This dam was constructed by DSI and started the operation in 1989. The dam height is 61m, and the reservoir's total capacity is 282 MCM, of which 137 MCM is the useable volume. The mean annual flow into the dam is 2700 MCM.

1.4.2 Present Irrigation Practice

Although the irrigation systems have not yet been realized, irrigation is now practiced in some project areas with a mean of already opened well, existing spring, private pump, etc. Table 1.4.2 below gives the brief explanation of those already practiced irrigation:

Table 1.4.2 Explanation of Present Irrigation Practice

Village	Source	Irrigation	Irrigated Crops	Remarks
Hacilar	Kopupukaya Dam	Pump + surface	Sunflower, vegetables	
Urunlu	DSI well	Open canal + surface	Sugar beet	
Kalesekisi	Spring	Pump + hose	Cherry	Very small area
Camlibel	DSI well	Open canal + surface	Sugar beet, Maize, Potato	
Kozluk	Nil			Rain-fed only
Kuskara	GDRS well	Open canal + surface	Garlic, Maize, Onion, Potato	Whole Project area
Ozdenk	Private well	PVC Pipe + sprinkler	Sugar beet	
Aslanlar	DSI well	Open canal + surface	Vineyard, apple, vegetables	
Ilyaskoy	Kara river	Pump + surface	Sunflower	Very small area
K. Karistiran	DSI well	Poly. Pipe + sprinkler	Sugar beet, sunflower	

Most irrigation, currently practiced, is of very primitive except those in Camlibeli, Kozluk, Ozdenk, and K. Karistiran. Both Camlibeli and Kuskara projects have irrigation system completed with open canal. Though the on-farm application is surface (flood) type, the villagers are already accustomed to irrigated agriculture.

The table above informs that there are two villages that are practicing sprinkler irrigation though the both areas are small. In Ozdenk village, some villagers have made wells, about 5m depth and 10cm diameter, from which the groundwater is pumped up by a diesel engine driven suction-pump. They practice sprinkler irrigation with hand-move type. Villagers in K. Karistan once stores the groundwater, pumped from DSI constructed wells, into a depletion, and then operate sprinkler by an additional booster pump placed besides the depletion. The sprinkler is also hand-move type.

1.4.3 Water Resources and Quality

Water quality tests had been conducted during Phase II field survey for the prospective irrigation waters. The results are shown in Table 1.4.3 with the sources of the irrigation waters. The pH value varies from 7.19 to 8.63, showing slightly alkaline water. Conductivity ranges between 0.242 and 1.510 mS/cm, and the highest is at Hacilar project. Also, the conductivity of Urunlu project's water shows slightly high conductivity of 1.280 mS/cm. In relation to the conductivities, salinity levels, indicated as Nacl, of Hacilar and Urunlu projects' irrigation waters are slightly to moderately high, showing such values of 0.07 (700ppm) and 0.05 (500ppm) respectively.

Dissolved oxygen is between 0.56 and 10.22 mg/l, and low values show up with the waters of Ilyaskoy, Ozdenk, and K. Karistiran projects. Since the rivers for Ilyaskoy and Ozdenk projects were not flowing well, the tests provably showed low dissolved oxygen. Some of samples showed relatively low water temperature, such as 11.9°C in Kuskara project, 13.3°C in Kalesekisi, and 14.0°C in Urunlu. Both water sources of Kuskara and Urunlu are groundwater, and the Kalesekisi's is spring coming from Karst formation.

Looking into the water qualities above, concerns relating to crop growing are 1) salinity level for Hacilar and Urunlu projects, and 2) water temperature for Kuskara, Kalesekisi and Urunlu projects. Also, saturated extract Electric Conductivities (ECe) for such projects as Urunlu, Aslanlar and K. Karistiran are incorporated in the table, which tests were done by GDRS-related-institutes. Those ECes are very low, indicating very little amount of salinity in the soils.

Table 1.4.3 Water Quality of the Irrigation Water and Saturated Electric Conductivity of the Soils

Name of Project	HACILAR	URUNLU	KALESEKISI	CAMLIBEL	KOZLUK	KUSKARA	OZDENK	ASLANLAR	ILYASKOY	K. KARIS.
Location (Province)	KIRIKKALE	KONYA	ADANA	TOKAT	SAMSUN	KASTAMONU	ESKISEHIR	IZMIR	YALOVA	KIRKLARELI
Type of Irrigation water	Dam Water	Ground water	River water	Dam Water	River water	Ground water	River water	Ground water	River water	Ground water
Name of the water source	Kop'ya Dam	DSI well	Kirkok River	Dervis'n Dam	Akcay River	GDRS well	Ozdenk River	DSI well	Kara River	DSI well
Date	24, Jul.	11, Aug.	13, Aug.	31, Jul.	29, Jul.	28, Jul.	9, Aug.	6, Aug.	5, Aug.	4, Aug.
Time of measurement	14:00	15:30	11:30	15:00	11:30	15:30	10:00	13:00	12:00	16:00
pH	8.02	7.68	8.20	8.09	8.63	6.83	7.55	7.19	6.94	8.04
Conductivity (mS/cm)	1.510	1.260	0.495	0.520	0.242	0.743	0.452	0.920	0.455	0.298
Dissolved Oxygen (mg/l)	8.48	8.22	9.00	7.24	10.22	6.40	3.82	7.15	0.56	1.95
Water Temperature (°C)	23.3	14.0	13.3	25.0	27.7	11.9	17.2	23.1	18.5	20.9
Salinity (Indicate as NaCl)※	0.07	0.05	0.02	0.01	0.00	0.03	0.01	0.04	0.01	0.01
ECe ※(0-30cm), μS/cm	---	1.34	---	---	---	---	---	1.32	---	3.60
ECe (30-60cm), μS/cm	---	1.39	---	---	---	---	---	1.60	---	3.53
ECe (60cm<), μS/cm	---	1.66	---	---	---	---	---	1.51	---	3.15

Note: The measurement was done by JICA Study Team in 1997, except saturated extract Electric Conductivity (ECe). Datas of ECe are from GDRS.

※ The measured results of all substances whose conductivity are indicated as salinity.

※ ECe means saturated extract Electric Conductivity in the soil and indicates as average.

1.5 Social Status in Rural Area

The rural survey was carried out not only to collect information on the agriculture practice but also to provide the qualitative understanding of village life and problem they are facing now. In addition, the villagers' opinion on the project was sought. An interview with village chief, head of irrigation cooperatives and farmers about social services, quality of life and conditions of cooperatives was conducted.

The following Table 1.5.1 shows the number of interview survey conducted in 10 project areas.

Table 1.5.1 Sample Number for 10 Projects Covered by Interview Survey

Project Name	Total Farm Household	Phase I Village Survey	Sample Household
Hacilar	550	did	9
Urunlu	65	did	10
Saimbeyli	270	did	10
Camlibel	158	No	10
Kozluk	700	did	15
Kuskara	35	did	6
Ozdenk	126	did	10
Aslanlar	400	did	9
Ilyaskoy	150	did	10
K.Karistiram	170	did	9
Total	2,624		98

1.5.1 Village Formation

Turkey is one of the oldest continually inhabited region in the world, and it has repeatedly served as battleground for foreign powers. Village in Turkey has been formed as result of these situation.

(1) Hacilar Project

Municipality Hacilar, Province Kirikkale is a newly developing province and it is about 60km near the capital city, Ankara. This village has been formed in the Ottoman Empire. Hacilar is an industry town and there are many establishments and stores which manufacture military tools and equipment. In this village many farmers combines farming with other side jobs. When the oil refinery started, employment opportunities for village people have expanded.

(2) Urunlu Project

In 1055 a group of Central Asiatic Turks, the SELJUK, conquered Baghdad and established a Middle Eastern and Anatolian Empire. In this period, Konya has been formed as capital city in Seljuk. This village has been formed at the same time. Konya is one of the most conservative towns in Turkey. The village is also conservative. Villagers organized mosque cooperative to construct another mosque.

(3) Kalesekisi Project

Municipality Saimbeyli is an old Armenian village. Before the War of Liberation the Armenians and Turks used to live together. The Armenians are mostly engaged in wine-making and the wine in this region was generally exported to Europe countries. However, when the War of Liberation started, the French came to this area and that was when the Armenians started to attack Turks, tortured and killed them. Saim Bey, Tufan Bey, and Dogan Bey, who was appointed to the area by Ataturk, gathered the Turks and formed an army. The French and the Armenians had to move out of the city. Saim Bey rescued this place called Saimbeyli village(meaning of people together Mr.Saim). There are also villages nearby Tufanbeyli and Doganbeyli. Karlesekisi is a farm land and no one lives there.

(4) Camlibel Project

In 1055 a group of Central Asiatic Turks conquered and established a Middle Eastern and Anatolian empire. This village has been formed at the same time .The main source of income of the villages is cattle-breeding. Guzelce village is a village where the majority of the people are Shiite, and there is no mosque in the village. Both village people has yellow skin and black hair and blue eye of Mongol type.

(5) Kozluk Project

Village Dumantepe was established as a Byzantine Greek village. The village flourished during the last years of Ottoman Empire. Samsun is the famous place where Mustafa Kemal started the Liberation war, and Dumantepe village played important role as a military center because the village is surrounded by mountains.

(6) Kuskara Project

Kastamonu region which is known as an ancient settlement area, had been the country of Kshakas in 18th century BC and then it had been ruled by Hittites. Kuska is 15kilomerter long away from Kastamonu.This village has been formed at the same time

(7) Ozdenk Project

When Phrygia's managed in the 7ed century BC, Eskischir town was formed. Ozdenk is 53kilomerter long away from Eskischir. Village Ozdenk is the center village consisting of 5 villages. There is a secondary school in the village. In the village migrated people and native people have a different way of life. The villagers call the native people Manav. Manav can be elected as village chief. Kurdish live in neighbor village which is 30km away from the village. The Kurdish come to Ozdenk to work during sowing and harvesting time of sugar beet.

(8) Aslanlar Project

Greek managed by Ottoman Empire in the 13th century started independent war in the 1821.This area has repeatedly served as a battleground for Greek powers.

Village Aslanlar (Lion's village) gets its name as the result of hard struggle and battle in the area during the War of Liberation with the Greeks. After violent fights, the Greeks have controlled the village. However with the resistance of the villagers the Greeks lost after one month. In honor of the courage of the villagers, Ataturk gave the name ASLANLAR to this village.

(9) Ilyaskoy Project

In the 2 century BC, Bursa town was established by the order of Carthage's general. Ilyaskoy is 70kilomerter away from Bursa. The Ottoman Empire period, Bursa has been formed as capital city in Ottoman Empire. Ilyaskoy has been formed at the same time.

(10) K' karistiran project

Village K' karistiran takes its name after a battle during the Ottoman Empire. There was a big fight between one of the Ottoman Empire Rulers (Sultans) and his son over the Sultanate. In the end the son withdraw to the Kucuk Karistiran area and his father went to the Buyuk karistiran area. The local people (native) of this village are called Gacal and the others who

migrated here from other provinces and the Muslim refugees who migrated from Bulgaria are called Angacal. Sometimes the villagers are described as Gacal or Angacal according to the type of work they do.

1.5.2 Family Structure

(1) Family Composition

In turkey family's genealogy and Family's property are succeeded to from father to son. and the power concentrate on father. Family composition in the study area was classified into three categories.

a = Conjugal family system (don't live with any married child)
b = Stem family system (live with one married child)
c = Joint family system (live with any married child)

The following Table 1.5.2 shows the existing family composition obtained from ten study area.

Table 1.5.2 Family Composition

		a	b	c	Sample
1	Hacilar	5	3	1	9
2	Urumlu	4	6	0	10
3	Saimbeyli	5	4	1	10
4	Camlibel	2	4	4	10
5	Kozluk	6	6	3	15
6	Kuskara	2	2	2	6
7	Ozdenk	2	4	4	10
8	Aslanlar	2	5	2	9
9	Ilyaskoy	2	7	1	10
10	K.Karistiram	1	7	1	9
Total		31	48	19	98

(2) Family Function

Village life is pious in Islamic religion. They put the most importance on keeping family name, genealogy and property. The ground rule of family function under patriarchal family system.

(3) Labor Division of Family Members

According to interview survey in the villagers, both men and women are engaged in farm practices for major crop husbandry including wheat and sugarbeet products, and animal husbandry. In case of female labor, they consist of two main cases, one is chiefly oriented to household jobs and the other covers both household labor and cultivation practice. The types of family labor division observed in the priority project sites are categorized as follows.:

1) Farming supported mainly by family labor

Where men are chiefly engaged in farming while women are also involved in farming and house keeping.

There are typical in the area: Camlibel, Kuskara

2) Farming by family labor but oriented to mechanized operation and off farm engagement

Where men carry major farming practices but mechanization is proceeding and farming moves toward off farm oriented activities.

There are typical in the area: Hacilar, K.Karistiran

3) Farming with hired and seasonal wage labor as major labor source.

Where men are key person to sustain farming but hired or seasonally migrant laborers constitute major labor force for farming, while woman are increasingly specialized in house keeping.

There are typical in the area: Urunlu, Saimbeyli, Aslanlar

4) Farming mainly sustained by female labor (due to difficulty in farm mechanization)

Where men have left for urban wage earning or emigrated as seasonal labor force, and women are principally responsible for farm practice.

There are typical in the area: Kozluk, Ozdenk, Ilyaskoy

1.5.3 Farmers Organization

There are three type of farmers organization existing in the ten study area.. Table 1.5.3.shows the list of existing three type of farmers organization in the ten study areas.

Table 1.5.3 Three Type of Farmers Organization in the Ten Study Areas

	Hacilar	Urunlu	Kalesekisi	Camlibel	Kozluk	Kuskara	Ozdenk	Aslanlar	Ilyak	K.Karist
a	No	Exist	Exist	Exist	No	Exist	No	Exist	No	Exist
b	No	No	No	No	No	No	No	No	No	No
c	No	No	No	No	No	No	No	No	No	No

A = Irrigation cooperative b = Village development cooperative c = Water products cooperatives

There are 5 irrigation cooperatives in the study area, the details of which are as follows.

(1) Urunlu Irrigation Cooperative

In 1989 Urunlu irrigation cooperative was established and consist of 15 household members.

The committee is to be composed 6 members, and consists of chairman, vice chairman, treasurer, and 3 members. A list of income and expense of this cooperative are shown below.

Member:	55 households
Planted area:	5000 decar
No of well:	8 wells

Last year expense:

Income		Expense	
	1,500,000,000	Electric fee	1,250,000,000
		Repair fee	100,000,000
		Salary	50,000,000
(Water fee: 300,000 Tl/hour)		Management fee	100,000,000
		Total	1,500,000,000

The general meeting is held 20 times in a year. Committee arranged the irrigation schedule from priority crops.

(2) Kalesekisi Irrigation Cooperative

In 1997 Kalesekisi irrigation cooperative was established and consist of 15 household members.

No data was available in this cooperative. The committee is to be composed 5 members, and consists of chairman, vice chairman, treasurer, and 2menbers.

(3) Kuskara Irrigation Cooperative

This cooperative was established in 1990. and activity has been started since 1994.

The committee is to be composed 7 members, and consists of chairman, vice chairman, treasurer, and 4menbers. Committee hire pump operator. A list of income and expense of this cooperative are shown below.

Member: 34 households
Planted area: 1,000 decar
No. of well: 2 wells
Last year expense:

Income		Expense	
	500,000,000	Electric fee	470,000,000
		Repair fee	10,000,000
		Salary	20,000,000
(Water fee: 56,500 Tl/hour)		Management fee	0
		Total	500,000,000

The general meeting is held once in a year. Committee arranged the irrigation schedule from priority crops.

(4) Aslanla Irrigation cooperative

This cooperative was established in 1974 and activity has been started since 1983.

The committee is to be composed 6 members, and consists of chairman, vice chairman, treasurer, and 3menbers. Committee hire two pump operator.

A list of income and expense of this cooperative are shown below.

Member: 120 households
Planted area: 2,500 decar

No. of well: 9 wells
Last year expense:

Income	Expense	
1,500,000,000	Electric fee	970,000,000
	Repair fee	280,000,000
	Salary	250,000,000
(Water fee: 225,000 TL/hour)	Management fee	0
	Total	1,500,000,000

(5) K'karistiran Irrigation Cooperative

This cooperative was established. in 1993.

The committee is to be composed 6 members, and consists of chairman, vice chairman, treasurer and 3menbers. A list of income and expense of this cooperative are shown below.

Member: 87 households
Planted area: 2,300 decar
No. of wells: 4 wells
Last year expense:

Income	Expense	
765,000,000	Electric fee	480,000,000
	Repair fee	150,000,000
	Salary	135,000,000
(Water fee: 400,000 TL/hour)	Management fee	0
	Total	765,000,000

The general meeting is held once in a year. Committee arranged the irrigation schedule from priority crops.

1.5.4 Social Services

Social services infrastructure in study area are generally well. The details are as follows;

(1) Health

There is no village hospital or health center in 4 villages (Urunlu village, Guzelce village, Kuskara village, Ozdenk village) in the study area. But these villages rely on district for medical services. There are health centers in the study area, the details of which are shown in Table 1.5.5 as below.

Table 1.5.4 Health

	Hacilar	Urunlu	Kalesekisi	Camlibel	Kozluk	Kuskara	Ozdenk	Aslanla	Ilyas	K.Karist
Hospital	0	0	0	0	0	0	0	0	0	0
Health center	1	0	1	1	3	0	0	1	1	1
Doctor	1	0	3	0	0	0	0	0	1	0
Nurse	0	0	6	0	0	0	0	0	0	0
Midwife	2	0	6	1	3	0	0	1	1	1

(2) Education

Every village in study area has primary school. 4 villages (Hacilar, Kozuk, Ozdenk, Karasekis) in the study area has junior high school. The following table shows the ratio of school attendance in the study area.

Table 1.5.5 Ratio of School Attendance (Primary School)

	Population	Children of school age	Students	Ratio of enter school
The whole country	56,473,035	8,379,679	6,707,725	80%
The study area	45,072,548	6,688,038	5,043,060	75%
Hacilar	4,900	727	350	48%
Urunlu	360	53	35	66%
Kalesekisi	6,000	890	700	79%
Camlibel	1,092	162	88	54%
Kozluk	4,022	597	406	68%
Kuskara	180	27	20	75%
Ozdenk	590	88	32	37%
Aslanlar	1,700	252	84	33%
Ilyaskoy	600	89	47	53%
K.Karistiran	1,020	151	62	41%

Table 1.5.6 Ratio of School Attendance (Junior High School)

	Population	Children of school age	Students	Ratio of enter school
The whole country	56,473,035	4,055,748	2,242,875	55%
The study area	45,072,548	3,236,997	1,937,044	60%
Hacilar	4,900	352	100	28%
Urunlu	360	26	0	0%
Kalesekisi	6,000	431	414	96%
Camlibel	1,092	78	0	0%
Kozluk	4,022	289	0	0%
Kuskara	180	13	0	0%
Ozdenk	590	42	23	54%
Aslanlar	1,700	122	0	0%
Ilyaskoy	600	43	0	0%
K.Karistiran	1,020	73	0	0%

(3) Electricity

Electricity coverage is 100% in the study area. Almost 60 % villages uses wood or charcoal for cooking.

(4) Transportation

The following Table 1.5.7 shows the number of car and tractor holding in the study area.

Table 1.5.7 Number of Car and Tractor

	Population	Number of car	One car/ 100per	F.H.H	Number of tractor	One tractor/ F.H.H
Hacilar	4,900	84	1.71	550	170	0.31
Urunlu	360	42	11.67	65	70	1.08
Kalesekisi	6,000	100	1.67	270	6	0.02
Camlibel	1,092	90	8.24	158	92	0.58
Kozluk	4,022	159	3.95	700	75	0.11
Kuskara	180	15	8.33	35	20	0.57
Ozdenk	590	11	1.86	126	23	0.18
Aslanlar	1,700	50	2.94	400	140	0.35
Ilyaskoy	600	12	2.00	150	8	0.05
K.Karistiran	1,020	86	8.43	170	145	0.85

Every village has transportation services for private company, town to village

The following Table 1.5.8 shows the transportation condition in the study area.

Table 1.5.8 Transportation Condition

Village Name	Destination	Times	Fee	Others
Hacilar	Kirikkale	24times/day	Kirikkale/100,000TL	
Urunlu	Cumra	2times/day	Cumra/70,000TL	
Kalesekisi	Kozan to Adana	10times/day	Kozan /400,000TL Adana /600,000TL	Start Tufanbey
Camlibel Karvansaray	Tokat	2 times/day	Tokat/150,000TL	
Guzelce	Karvansaray	1 times/day	Tokat/200,000TL	
Kozluk Akcay	Terme to Samsun	10 times/day	Samsun/300,000TL	
Kozluk	Terme	2 times/day	Terme/100,000TL	
Dumantepe	Terme	2 times/day	Terme/100,000TL	
Kuskara	Kastamonu	2 times/day	Kastamonu /200,000TL	
Ozdenk	Alpu to Eskisehir	2 times/day	Alpu /100,000TL Eski. /200,000TL	
Aslanlar	Torbali to Izmir	7 times/day	Torbali /70,000TL Izmir /180,000TL	
Ilyaskoy	Taskopr to Yalova	6times/day	Taskopr. /150,000TL Yalova /300,000TL	
K.Karistiran	Luleburgaz	2times/day	Luleburgaz/150,000TL	

(5) Communication

There are 5 Post and Telephone and Telegram offices in the study area. The following Table 1.5.9 shows the distribution of telephone in the study area.

Table 1.5.9 The Distribution of Telephone

	Hacilar	Urunlu	Kalesekisi	Camlibel	Kozluk	Kuska	Ozdenk	Aslanlar	Ilyak	K.Karist
Distribution Ratio	90%	100%	90%	100%	100%	100%	100%	40%	100%	100%

(6) Television/Newspaper

The following Table 1.5.9 shows the distribution of television and newspaper in the study area.

Table 1.5.10 The Distribution of Television

	Hacilar	Urunlu	Kalesekisi	Camlibel	Kozluk	Kuska	Ozdenk	Aslanlar	Ilyak	K.Karist
Television	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Newspaper	30%	1%	20%	0%	30%	1%	1%	10%	1%	10%

One hundred percent of household in the study area now have television. Television is one of the best way to get information in the village .Muhtar and teacher take a newspaper everyday in the village.

(7) Bank

One bank is existing in Kalesekisi. Village.

(8) Public Safety

The government(ministry defense) appointed Gendarme in two villages. Another village employed private guard in the villages.

CHAPTER 2 FORMULATION OF BASIC DEVELOPMENT PLAN

2.1 Agriculture Development Plan

2.1.1 Land Use Plan

(1) Land Use and Selection of Suitable Crops

The seventh-five year development plan on Turkish economy explains that the increasing of the irrigation and land consolidation areas, expanding of double cropping system in warm regions, decreasing of fallow and control of soil erosion are the fundamental ways for the agricultural land use. Because the land are now decreasing by the conversion to non-agricultural use and soil erosion under nearly marginal limits of agricultural land use.

Irrigation and land consolidation projects comply with upper policy and it convert the land use to more intensive one. The projects are planned to increase the irrigation area by calculated and systematic irrigation and water saved irrigation under the limited water resource and to decrease the fallow by the introduction of beneficial crops. Agricultural land use in the project areas are also increased by the green manure crops which are introduced as the second crops.

On the crop production, Turkish government emphasizes that the production of basic provisions including cereals and animal products should be increased to supply the nutritive food stably to nation as the population of Turkey are estimated to increase to 69.7 millions in 2000 from 61.2 millions in 1994 (Statistical Indicator, Institute of Statistics). On the other hand, the government are also emphasizing to introduce the high benefit and high-yielding crop varieties and new cultivation techniques to raise the revenues of farmers and to decrease the income difference between farmers and the municipal peoples. And it is useful to lift up the agricultural growth rate to 2.8-3.7 % per year because the rate are relatively low compared with those of industrial production (6.0-7.8 % per year).

Implementation of project will make it possible to introduce the more adaptive and more profitable crops in the regions. The crops are decided with the discussion on crop adaptability in the regions, profitability on irrigation. The planted area are also decided by the amounts of water resources, labor force and willingness of farmers in the area and so on. However, the biggest changes on crop cultivation by projects are the conversion from the winter cereals such as wheat and barley to summer industrial and beneficial crops.

Winter cereals have high tolerant to drought and high adaptability in semi-arid area. They are main crops in existing cropping system. On the other hand, summer crops such as maize, rice, sugar beet and fruit vegetables require the water for their growth, but have high profitability under irrigated condition. So, these summer crops will increase their planting area in project areas, and some winter crops as barley and oats will be cultivated in non-irrigated areas.

(2) Selection of Staple Crops in the Area

Paralleling with the cropping plan and selection of crops in irrigation projects, it is very important to find some staple crops which are suitable in the area, characterize the village and

make the village active. Such staple crops are already selected in some areas. These are cherry in Kalesekisi, hazelnut in Kozluk, garlic in Kuskara, Grape in Aslanlar, Fruit trees (apple and peach) in Ilyaskoy, sugar beet in Hacilar, Urunlu and Ozdenk and fruit vegetables in K.Karistiran. These staple crops are increased their planted area and developed their production to make the area active by the projects.

2.1.2 Proposed Cropping Pattern

(1) Proposed Cultivation Area

Cropping plans are proposed according with upper directions. As a total, the planted area of wheat are proposed to decrease from 33% of existing area to 17.7% of proposed area and the area of other winter cereals such as barley and oats are decreased from 15.1% to 2.5% and planned to be cultivated in no-irrigated area because of their high tolerance to drought. On the other hand, planted area of sugar beet are increased from 10.1% to 19.9%, area of alfalfa are also increased to 5 times to develop the livestock production. Planted area of summer fruit vegetables are increased from 3.0% to 17.1% and fruit tress are increased their area to 768 ha, 2.5 times. Fallow are also reduced their area from 515 hectare to zero.

These cropping plans are shown in Table 2.1.1 in contrasting to existing and proposed planted area.

Table 2.1.1 Cropping Plan in the Project Area (Unit: ha)

Crops	Wheat	Other Winter	Summer Crops	Pulses	Indust. Crops	Oil Seeds	Tuber Seeds	Alfalfa	Vegeta bles	Fruit trees	Fallo w	Total Area	Cut Area
Existing	1,365	626	188	260	544	172	20	26	121	303	515	4,140	
Proposed	678	96	147	234	762	100	264	131	654	768	0	3,834	306

Proposed land use plan in each project areas are shown in Table 2.1.2 by hectare and in Table 2.1.3 by percentage of planted area of each crop in the total benefit area. As is shown in Table 2.1.1, by the implementation of the projects, total benefit area will be decreased about 7.4% for the construction of irrigation channel and farm road. However, benefits will increase by the introduction of promising and suitable crops which change the land use to more intensive ones and the reduction of fallow.

Proposed cropping pattern in each study area are shown in Fig.C-7-1 to Fig.C-7-10 by the percentage of the proposed planted area. The figures also show the existing cropping pattern to make easy understanding of the changes of land use and planted areas with and without projects.

(2) Cropping Intensity

Existing cropping intensity (rate of the planted area to total area) is 87.6% as a whole in the study area, because the areas contain some fallow and bush area. In the project, fallow are reduced and changes to planted area, and bush area changes to fruit trees area. Green manure crops such as soy bean, maize and cow vetches are also proposed to introduce into the field as a second crop after harvesting the main crops to improve the soil fertility and to supply green fodder to livestock. By these plans, cropping intensity in the total study area will be increased from existing 0.876 to proposed 1.051 as a whole.

Table 2.1.2 Proposed Area of Each Crop in the Ten Study Area (Unit: ha)

Project Name	Hacilar	Urunlu	Kalesek	Camlib	Kozluk	Kuskar	Ozdenk	Aslanla	Ilyasko	K.Karis	Total
Province	Kirikkale	Konya	Adana	Tokat	Samsun	Kastamon	Eskisehi	Izmir	Yalova	Kirklareli	
Study Area(ha	580	490	233	1,438	610	130	140	263	130	126	4,140
NetBenefitArea	522	465	210	1,366	550	117	126	250	108	120	3,834
Wheat	210	93		260		30	31	25	11	18	678
Barley, Oats				96							96
Maize				(27)	83	10					(27) 93
Rice					54						54
Dry bean		93*		68	54		19				234
Cow Vetch(2nd crop)				(146)							(146)
Soy Bean(2nd crop)						(24)					(24)
Sugar beet	160	140		355		40	31			36	762
Sunflower	77								11	12	100
Potatoes		70		82	83	10	19				264
Alfalfa				109		3	13			6	131
Water Melon		35						25		12	72
Melon		34								12	46
Egg plant								25		8	33
Pepper					55			10		8	73
Tomatoes	25		10	68	55		13	40		8	219
Garlic						24					24
Dry Onion	50			137							187
Hazelnuts					166						166
Cherry			160								160
Grape			40					125			165
Apple				30					43		73
Peaches				79					43		122
Poplar				82							82
TOTAL	522	465	210	1,366	550	117	126	250	108	120	3,834

Notes : * Dry Pea, tolerant variety to alkalic soil and alkalic irrigation water.

Table 2.1.3 Percentage of Proposed Cultivation Area in Ten Study Area (Unit: %)

Project Name	Hacilar	Urunlu	Kalesek	Camlib	Kozluk	Kuskar	Ozdenk	Aslanla	Ilyasko	K.Karis	Total
Province	Kirikkale	Konya	Adana	Tokat	Samsun	Kastamon	Eskisehi	Izmir	Yalova	Kirklareli	
Wheat	40.2	20.0		19.0		25.6	24.6	10.0	10.2	15.0	17.7
Barley, Oats				7.0							2.5
Maize				(1.9)	15.1	8.5					(0.7) 2.4
Rice					9.8						1.4
Dry bean		20.0		5.0	9.8		15.1				6.1
Cow Vetch(2nd crop)				(10.7)							(3.8)
Soy Bean(2nd crop)						(20.5)					(0.6)
Sugar beet	30.7	30.1		26.0		34.2	24.6			30.0	19.9
Sunflower	14.8								10.2	10.0	2.6
Potatoes		15.1		6.0	15.1	8.5	15.1				6.9
Alfalfa				8.0		2.6	10.3			5.0	3.4
Water Melon		7.5						10.0		10.0	1.9
Melon		7.3								10.0	1.2
Egg plant								10.0		6.7	0.9
Pepper					10.0			4.0		6.7	1.9
Tomatoes	4.8		4.8	5.0	10.0		10.3	16.0		6.7	5.7
Garlic						20.5					0.6
Dry Onion	9.6			10.0							4.9
Hazelnuts					30.2						4.3
Cherry			76.2								4.2
Grape			19.0					50.0			4.3
Apple				2.2					39.8		1.9
Peaches				5.8					39.8		3.2
Poplar				6.0							2.1
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Notes : The areas shown by ( ) are the areas of 2nd crops after harvesting the 1st crops.

2.1.3 Crop Production Plan

(1) Improvement of Cultivation Techniques

Crop production can not be increased only by irrigation. Intensive management such as fertilization, control of weeds, control of insects and diseases, improvement of soil fertility will also be requested with implementation of the irrigation projects.

Among such improved techniques, fertilization plan in this projects are referred to the results of soil analysis by the study team and the study by the Tokat GDRS Institute on fertilization by soil condition (Table C-30 and C-31). Existing amount of fertilizers for crops were already shown in Table 1.3.4. Fertilizers were higher in industrial crops, fruit vegetables and fruit trees (N3-45kg/10a) than winter cereals and pulses (0-13kg/10a), and phosphate are also low in almost all of crops. So, in this project, amount of fertilizers are calculated according with the target yields both in nitrogen and phosphate referring to upper study. They are little higher as the target yields of crops are higher in irrigated condition than non-irrigated condition. Irrigation methods are referred to the plans proposed by the quantity of water resources and facility preparation plans in each project area. Sowing methods are also referred to the existing methods in the area and sowing rate are calculated from the proper densities of each crop.

The outlines of crop production plans in the ten project areas proposed by upper plans are shown as follows:

1) Hacilar Project Area (Dam Water, Pipeline Sprinkler)

Sugar beet is the main crop in the area and occupies a large planted area. The area is located near to Kirikkale and Ankara cities, but is insufficient in young labor. So, some vegetables such as tomatoes and dry onion are planned to have more little area than sugar beet, and irrigation will also limited to dry onion by the shortage of irrigation water.

Table 2.1.4 Cropping Plan in Hacilar Project Area

Crops	Proposed Area(ha)	Cropping Season	Ridge & Hill Distance	Sowing Rate	Fertilization (kg/dec)	Irrigation Methods	Target Yield(kg/dec)
Wheat	210	Oct.~July	25cm Drill	10~12kg	N14, P12	Sprinkler	450
Sugar beet	160	Mar.~Nov.	75×25cm	250~300g	N40, P25	Sprinkler	7,000
Sunflower	77	Apr.~Sep.	75×25cm	1.5~2kg	N12, P8, K8	Sprinkler	150
Tomatoes	25	Apr. ~Sep.	75×40cm	3,300 plants	N20, P12, K10	Furrow	4,000
Dry Onion	50	Mar.~Aug.	30×12cm	28,000 plants	N12,P15	No-irrig	2,500
Total Area	522 ha						

Notes : dec is the apostrophe of decare, 1 dec = 10 are, and so forth.

2) Urunlu Project Area (Ground Water, Pipeline Sprinkler)

Water resources, topography, cultivation area in a farm household and labor forces are very abundant in the area. So, dry pea (tolerant variety to alkalic water), sugar beet are proposed to be main crops in the area and the potatoes, fruit vegetables such as water melon and melon are also proposed to introduce in the area. The harvesting time of these fruit vegetables are earlier than sugar beet and will be effective to avoid the competitions of labor forces in harvesting season.

Table 2.1.5 Cropping Plan in Urunlu Project Area

Crops	Proposed Area(ha)	Cropping Season	Ridge & Hill Distance	Sowing Rate	Fertilization (kg/dec)	Irrigation Methods	Target Yield(kg/dec)
Wheat	93	Oct.~July	25cm Drill	10~12kg	N14,P12	Sprinkler	450
Dry Pea	93	Mar.-Apr.~Sep.	60×20cm	5~7kg	N8, P12	Sprinkler	250
Sugar beet	140	Mar.-Apr.~Nov.	75×25cm	250~300g	N40, P25	Sprinkler	6,500
Potatoes	70	Mar.~Aug.	60×25cm	200~270kg	N12, P9, K5	Sprinkler	3,500
Water Melon	35	Apr.~Aug-Sep.	150×120cm	555 plants	N15, P10	Furrow	4,000
Melon	34	Apr.~Aug-Sep.	150×100cm	670 plants	N14, P10	Furrow	2,000
Total Area	465 ha						

3) Kalesekisi Project Area (River Water, Pipeline Drip)

The area is located in steep mountain side which have sterile soil to yield the crops and are covered by bushes now. So, cherry and small area of grape are selected to introduce in the area. The cherry are staple tree adapting in the soil and climate in the area, and are now growing in some area of steep mountain side without irrigation. Some vegetables such as tomatoes are introduced in lower and gentle slope of the mountain.

Table 2.1.6 Cropping Plan in Kalesekisi Project Area

Crops	Proposed Area (ha)	Cropping Season	Ridge & Hill Distance	Sowing Rate	Fertilization (kg/dec)	Irrigation Methods	Target Yield (kg/dec)
Tomatoes	10	Apr.~Sep.	75x40cm	3,300 plants	N22, P14, K7	Furrow	5,000
Cherry	160	Harvesting in June	5mx4m	50 trees	NPK15 each	Drip	800
Grape	40	Harvesting in Sep.	8mx2m	63 trees	NPK14 each	Drip	2,000
Total Area	210 ha						

4) Camlibel Project Area (Dam Water, Canal Furrow)

The component of the project is land consolidation project intending to heighten the land and labor productivity and irrigation are projected after land consolidation. As the project area are so wide that many kinds of crops are introduced in the area. Among these crops, sugar beet, alfalfa and potatoes are the main crops in the area. Barley is also cultivated in the area without irrigation. Some soiling crops such as maize and cow vetches are intended to introduce as the second crops after harvesting the winter cereals. The products will be used for forage crops of livestock in the area Crop cultivation will become more efficient by the land consolidation.

Table 2.1.7 Cropping Plan in Camlibel Project Area

Crops	Proposed Area (ha)	Cropping Season	Ridge & Hill Distance	Sowing Rate	Fertilization (kg/dec)	Irrigation Methods	Target Yield (kg/dec)
Wheat	260	Oct.~July	25cm Drill	10~12kg	N14, P12	Sprinkler	450
Barley	96	Feb.~Jun.~July	25cm Drill	10~12kg	N12, P10	No-Irrigation	80
Dry Bean	68	Mar.~Sep.	60×20cm	5~7kg	N8, P12	Sprinkler	250
Sugar beet	355	Mar.~Apr.~Nov.	75×25cm	250~300g	N40, P25	Furrow	7,000
Potatoes	82	Mar. Jul-Aug.	60×25cm	200~270kg	N13, P7, K5	Furrow	3,000
Alfalfa	109	May~Sep.	Broad casting	3~4kg	N8, P10	Sprinkler	4,000
Tomatoes	68	Apr.~May~Aug.	75×40cm	3,300 plants	N17, P10, K8	Furrow	5,000
Dry Onion	137	Mar.~Aug	30×12cm	28,000plants	N12, P12	Furrow	2,500
Apple	30	Harvest in Sep.	8m×8m	16 trees	NPK12	Drip	2,000
Peach	79	Harvest in Jun-Jul.	6m×6m	28 trees	NPK13	Drip	1,000
Poplar	82 (land use will be changed to fruit trees after cutting)						
Total Area	1,366 ha						
Maize (2nd crop)	27	Jul.~Sep.	60×10cm	5~7kg	N9, P6	Fresh Matter	2,000
Cow vetch(2nd C.)	146	Jul.~Sep.	60 cm Drill	3~6kg	N5, P7		2,000

5) Kozluk Project Area (River Water, Canal Basin & Furrow)

As the area have comparatively much rainfall in summer season, so, hazelnut which is a special and staple fruit tree in the area are planted in upper parts of the slope, and rice and dry bean are planned to introduce in lower parts of the area. Pepper and tomatoes are also introduced in the area and are cultivated rotationally with maize and dry bean. As the area have lot of livestock, so by-products of crop production will be used for feed of livestock. Cow dung and compost are returned into hazelnuts and crop field.

Table 2.1.8 Cropping Plan in Kozluk Project Area

Crops	Proposed Area (ha)	Cropping Season	Ridge & Hill Distance	Sowing Rate	Fertilization (kg/dec)	Irrigation Methods	Target Yield (kg/dec)
Maize	83	Apr.~May~Sep.	75×22cm	5~7 kg	N18, P10	Furrow	500
Rice	54	Apr.~May~Oct.	22×20cm	23,000plants	N13, P8	Basin	700
Dry Bean	54	Apr.~Sep.	60×20cm	5~7 kg	N8, P12	Furrow	250
Potatoes	83	Mar.~Aug.	60×25cm	200~270 kg	N12, P7, K5	Furrow	3,000
Pepper	55	Apr.~Aug.	75×30cm	4,500 plants	N15, P12	Furrow	1,300
Tomatoes	55	Apr.~Sep.	75×40cm	3,300 plants	N20, P12, K8	Furrow	5,000
Hazelnuts	166	Harvest in Mid. Aug.	5m×5m	40 trees	N15, P12	Basin	3,000
Total Area	550 ha						

6) Kuskara Project Area (Ground Water, Canal Furrow)

As the farmers in the area have a long experiences to cultivate the sugar beet, and garlic is a staple crop which have a stable market, so, both sugar beet and garlic are planed to increase the cultivation area. Harvesting time of garlic is July, so, soy bean are planed to cultivate after harvesting garlic as the second crop. Green soy bean will be used for fodder of livestock and will contribute to improve the soil fertility.

Table 2.1.9 Cropping Plan in Kuskara Project Area

Crops	Proposed Area (ha)	Cropping Season	Ridge & Hill Distance	Sowing Rate	Fertilization (kg/dec)	Irrigation Methods	Target Yield (kg/dec)
Wheat	30	Oct.~July	25cm Drill	10~12 kg	N14, P12	Sprinkler	450
Maize	10	Apr.~Sep.	75x22cm	5~7 kg	N17, P10	Furrow	450
Sugar beet	40	Mar.~Nov.	75x25cm	250~300 g	N40, P20	Furrow	6,500
Potatoes	10	Mar-Apr~Sep.	60x25cm	200~270 kg	N13, P7, K5	Furrow	3,500
Alfalfa	3	May~Sep.	Broadcast	3~4 kg	N8, P12	Sprinkler	3,500
Garlic	24	Mar.~July	30x10cm	160~200 kg	N12, P10, K5	Furrow	900
Total Area	117 ha						
Soy Bean(2nd crop)	24	July~Oct.	60cm Drill	6~10 kg	N6, P10	Fresh matter	2,500

7) Ozdenk Project Area (River Water, Pipeline Sprinkler & Furrow)

Sugar beet, dry bean and potatoes are selected to introduce in the project area considering the natural condition and experiences of farmers. Barley is now cultivated in many area but it is planted in non-irrigated area because of low benefit and high tolerant to drought. Alfalfa is introduced in the area as the area are breeding a large number of livestock. Tomatoes is also selected as a beneficial crop by irrigation. Fallow are converted to planted area of beneficial crops.

Table 2.1.10 Cropping Plan in Ozdenk Project Area

Crops	Proposed Area (ha)	Cropping Season	Ridge & Hill Distance	Sowing Rate	Fertilization (kg/dec)	Irrigation Methods	Target Yield (kg/dec)
Wheat	31	Oct.~July	25cm Drill	0~12kg	N14, P10	Sprinkler	500
Dry Bean	19	Apr.~Sep.	60x20cm	5~7kg	N8, P12	Sprinkler	250
Sugar beet	31	May~Nov.	75x25cm	250~300g	N40, P22	Furrow	5,500
Potatoes	19	Mar.~Aug.	60x25cm	200~270kg	N14, P10	Furrow	3,500
Alfalfa	13	May~Sep.	Broadcast	3~4kg	N8, P10	Sprinkler	4,000
Tomatoes	13	Apr-May~Sep.	75x40cm	3,330 plants	N20, P11, K5	Furrow	5,000
Total Area	126 ha						

8) Aslanlar project Area (Ground Water, Pipeline Drip)

The area have a favored natural and social condition to cultivate crops and grape. Fruit vegetables are also staple crops in the area. So, these fruit and vegetables are selected as the main crops in the project area. Wheat is also planted in the area but it will be planted without irrigation, because of the plentiful rainfall in winter and insufficient irrigation water in summer season.

Table 2.1.11 Cropping Plan in Aslanlar Project Area

Crops	Proposed Area (ha)	Cropping Season	Ridge & Hill Distance	Sowing Rate	Fertilization (kg/dec)	Irrigation Methods	Target Yield (kg/dec)
Wheat	31	Nov.~Jun.-Jul.	25cm Drill	10~12 kg	N12, P10	No-irrig.	290
Water Melon	25	Apr. Aug.-Sep.	150x120cm	560 plants	N15, P10	Drip	4,000
Egg Plants	25	Mar.-Apr.~Aug.-Sep.	100x60cm	1,670 plants	N20, P11, K7	Drip	3,000
Pepper	55	Mar.-Apr.~Aug.-Sep.	75x30cm	4,500 plants	N17, P12	Drip	1,300
Tomatoes	55	Mar.-Apr.~Aug.-Sep.	75x40cm	3,300 plants	N18, P10, K7	Drip	5,500
Grape	125	Harvest in Aug.-Sep.	8mx2m	63 trees	NPK 12 each Drip	2,000	
Total Area	250 ha						

9) Ilyaskoy Project Area (River Water, Pipeline Sprinkler & Drip)

Apple and Peach are selected to introduce in the irrigation area. These two fruit trees are special fruit trees in the area and farmers have much experiences to cultivate the trees. Small areas of wheat and sunflower are also introduced as the rotational crops in winter and summer season. Barley and oats are now planted in the area as forage crops for livestock, but they will be planted in non-irrigated area.

Cow dung and compost are used to improve the soil fertility in the area.

Table 2.1.12 Cropping Plan in Ilyaskoy Project Area

Crops	Proposed Area (ha)	Cropping Season	Ridge & Hill Distance	Sowing Rate	Fertilization (kg/dec)	Irrigation Methods	Target Yield (kg/dec)
Wheat	11	Oct.~July	25cm Drill	10~12 kg	N15, P13	Sprinkler	450
Sunflower	11	Apr.~Sep	75×25cm	1.5~2 kg	N12, P8	Sprinkler	200
Apple	43	Harvest in Sep.	8m×8m	16 trees	N15, P12, K10	Drip	2,000
Peach	43	Harvest in Jun-July	6m×6m	28 trees	N16, P10, K10	Drip	1,200
Total Area	108 ha						

10) K.Karistiran Project Area (Ground Water, Pipeline Sprinkler)

As the area have a favored natural and social condition to cultivate crops, so, the planted area of wheat and sunflower are reduced and planted areas of sugar beet and fruit vegetables are enlarged expecting the higher benefit. These crops, alfalfa and fruit vegetables will be planted under rotational cropping system.

Table 2.1.13 Cropping Plan in K.Karistiran Project Area

Crops	Proposed Area (ha)	Cropping Season	Ridge & Hill Distance	Sowing Rate	Fertilization (kg/dec)	Irrigation Methods	Target Yield (kg/dec)
Wheat	18	Oct.~July	25cm Drill	10~12 kg	N14, P12	Sprinkler	450
Sugar beet	36	Mar.~Nov.	75x25cm	250~300 g	N40, P20	Furrow	6,500
Sunflower	12	Apr.~Sep.	75x25cm	1.5~2 kg	N12, P8	Sprinkler	250
Alfalfa	6	May~Sep.	Broadcasting	3~4 kg	N8, P12	Sprinkler	4,000
Water Melon	12	Apr-May~Aug-Sep	150x120cm	555 plants	N18, P11	Furrow	4,000
Melon	12	Apr-May~Aug-Sep	150x100cm	667 plants	N17, P11	Furrow	2,000
Egg Plants	8	Apr-May~Aug-Sep	100x60cm	1,670 plants	N23, P12, K8	Furrow	3,000
Pepper	8	Apr-May~Aug-Sep	75x30cm	4,500 plants	N17, P12	Furrow	1,300
Tomatoes	8	Apr-May~Aug-Sep	75x40cm	3,300plants	N20, P12, K8	Furrow	4,500
Total Area	120 ha						

(2) Farming Types in the Area

Farming types in the project areas change by the cropping and livestock breeding plans. The biggest change is the conversion from winter cereal type to field crops type combined vegetables and fruit trees and field crops types combined livestock breeding. The farm households of winter cereal type cultivate mainly winter cereals, but the farm households of vegetables and fruit trees types cultivate summer vegetables and fruit trees under irrigated conditions joining with the cultivation of field crops. The farm households of field crops plus livestock breeding type will breed livestock combining with crop cultivation under matter cycle between crop and livestock production.

Farm size are different by the area. Farmers in Urunlu and Camlibel have comparatively large cultivation area under mechanization of farming. On the contrary, those of Ilyaskoy and

Kalesekisi have comparatively small cultivation area and the farming are more intensive ones than the former.

The main farming types in the project area is shown in Table 2.1.14.

Table 2.1.14 Main Farming Types in the Project Areas

Project Areas	% of farmers by size (%)		Main farming types
Hacilar	5~20 dec. 26%,	20~50 dec. 56%	Compound type by Cereals + Livestock
Urunlu	20~50 dec. 51%,	50~200 dec. 49%	Cereals + Livestock, Cereals + Vegetables
Kalesekisi	1~10 dec. 70%,	10~50 dec. 30%	Retail + Fruit trees types
Camlibel	1~50 dec. 38%,	50~200 dec. 62%	Cereals + Livestock, Cereals + Vegetables
Kozluk	5~20 dec. 55%,	20~200 dec. 45%	Hazelnuts, Hazelnuts + Livestock
Kuskara	20~50 dec. 14%,	50~200 dec. 86%	Cereals + Indust. Crops, Cereals + Livestock,
Ozdenk	1~50 dec. 56%,	50~200 dec. 43%	Cereals + Indust. Crops, Cereals + Livestock
Aslanlar	1~10 dec. 46%,	10~50 dec. 54%	Grape, Vegetables + Livestock
Ilyaskoy	1~10 dec. 53%,	10~50 dec. 47%	Cereals + Fruit trees, Cereals + Fruit trees +Livestock
K.Karistiran	1~10 dec. 42%,	10~100 dec. 58%	Indust. + Vegetables, Vegetables + Livestock

Notes) 1dec. is 10 are.

(3) Improvement of Soil Fertility

The results of soil analysis by the study team show that the soil in the sea coast plain are relatively rich and fertile, but the soil in the Central Anatolia and mountain side in Ilyaskoy and Kalesekisi are relatively poor on the whole.

Irrigation facilities supply water for the growth of crop, but it does not promise the high production if the soil fertility is not improved.

Supply of compost and organic matter to soil is very important and useful to improve the soil fertility in the study area. As the study area have been bred so many beef cattle and milk cow, so, farmers can produce a lot of good compost from the excrement of cattle. Soil can be fertilized by the return of compost into soil.

Some soiling crops such as soy bean and cow vetch are also very useful to improve the soil fertility. They are cultivated in the field after harvesting the main crops and also can use for soiling crops of cattle and residue can be plowed into soil to improve the soil.

On the agricultural chemicals, some kinds of insecticides and herbicides are used for many crops, though the fungicides are little used as shown in Table1.3.4. In these chemicals, some kinds of the poisonous are included, and are apprehended to have some affection to the environment. So, it is necessary to use the natural enemy, rotational cropping system and inter tillage for the controls of insects and weed.

(4) Target Yields

Target yield of each crop in each study area after projects are shown in former tables which show the cropping plan. The target yields in the table are derived mainly from the results of examinations in the Institutes of GDRS in regions and the soil and climatic conditions in the areas.

2.1.4 Livestock Breeding Plan

(1) Selection of High Productive Livestock

The demands of meat and other livestock products by people are increasing now by the advancement of life quality. Meat production in Turkey is now insufficient to satisfy the demand of people, and some of them are imported from other countries. So, the government are conducting many development plans of livestock production recognizing that the development of livestock production is one of the most important policies of agricultural development in the country.

As is shown in Table 1.3.7, many beef cattle and milk cow are bred in the study areas. They bring nutritive products and economic benefits to farmers in the areas.

However, productivity of livestock production are still in low level in general. For example, milk production by cow are only 1,000 to 1,500kg per head per year in domestic varieties, though those of improved varieties are comparatively in high level. Selection of good dairy cow by their milking ability is the first priority for livestock breeding plan. This is quite same in beef cattle. Selection of beef cattle by productivity is also important. Artificial insemination of cattle and dairy cow used high productive bull are effective means for the improvement of ability of cattle.

Improvement of productivity of dairy cow and beef cattle are more important than the increasing of the heads of cattle.

(2) Concentration of Livestock Breeding Pen

Most of the livestock are bred in the yard of individual farm household, cow dung and dirty litter are piled in the yard of individual farm house. Breeding in the individual farm house is convenient for farmers to manage the cattle. However, it is not good way to treat the excrement of cattle and is not healthful for both people and cattle.

In the project, one model will be shown in Camlibel project area (Tokat province). This is the movement of breeding pen of dairy cow and beef cattle from the individual farm households and concentration of livestock breeding pen to the outside of living houses (In the project, only yard for concentrated pen will be prepared).

The movement and concentration of breeding pen from the individual farm household have following effects both people and cattle.

(a) Sanitary condition in the farm house by the excrement of cattle are improved.

(b) It become easy to treat the excrement, and compost made from excrement will be turn to field increasingly.

(c) It become easy to collect and sell the milk.

(d) It become easy to feed and also become easy to provide the concentrated feed.

(e) It become easy to grasp the milk productivity and the gains of weight of cattle.

Milk productivity in the study areas are proposed to increase as shown in Table 2.1.15 by upper plans such as the selection of cow, diffusion of artificial insemination and concentration of breeding pen.

Table 2.1.15 Milk Production Plan in the Seven Project Area (Unit: kg/head/year)

Project Area	Hacilar	Canlibel	Kozluk	Kuskara	Aslanlar	Ilyaskoy	K.Karistiran
No. of milk cow	500	200	300	200	250	250	455
Existing Production	4,000	1,500	3,000	1,000	3,300	3,150	4,200 (1,000)
Proposed Production	4,800	4,000	4,500	4,000	4,500	4,500	4,800

(3) Forage Production Plan

Both dairy cow and beef cattle require 2.5-3% of dry matter of their body weight to support their life and produce the milk and meat with other nutrients such as total digestive nutrients (TDN) and digestive crude protein (DCP). Supplying 2% of dry matter of their body weight from forage, it is necessary to supply about 3,000kg of forage per year per head. However, production of forage crops are not sufficient to satisfy the demand of cattle in the area as shown in Table C-29.

It is necessary to increase the production of forage crops, but more beneficial crops are planned to introduce in the irrigation area except alfalfa. Therefore, production plans of forage crops are proposed in non-irrigated area in the villages.

Table 2.1.16 shows the yield, breeding capacity and areas of forage crops necessary to the cattle. Forage production in the areas should be planned with reference to this table.

Table 2.1.16 Yield, Breeding Capacity and Areas of Forage Crops Necessary to the Cattle

Crops & parts	Yield (kg/ha)	Breeding Capacity (head/ha)	Area for a head (ha)
Wheat straw	2,000	0.67	1.50
Whole crop of barley	5,000	1.67	0.60
Maize leaf & stem	4,000	1.33	0.75
Rice straw	4,000	1.33	0.75
Pulses leaves & stem	1,500	0.50	2.00
Sugar beet leaves	2,000	0.67	1.50
Sugar beet lees	8,000	2.67	0.375
Alfalfa (hay)	8,000	2.67	0.375

Production of forage crops for beef cattle and dairy cow are not sufficiently supplied especially in winter. Therefore, with the forage crops production plans, plans for utilization of by-products of crop production should be prepared. Some by-products such as straw of wheat, stem of maize and leaves of sugar beet are good roughage for cattle. These roughage must be collected and stored for feed especially in winter.

(4) Utilization of Excrement of Livestock

The excrement of livestock are piled in the outside of the cottage and living house in many area. These piles pollute neighboring circumstances. The excrement of livestock and cow dung of each cottage should be piled apart from living house, and be concentrated in one excrement treating cottage to make neighboring circumstance healthy and to make good compost.

Making the concentrated excrement treating cottage needs the financial support. So, in the project, constructing the concrete frame and collecting pond of urine and dirty water are proposed. It makes pollution problem solve and make easy to utilize the compost and good organic matter which are made from excrement of livestock for the improvement of soil fertility of the field.

An example of the quantity of compost made from cow dung and litter is shown in Table 2.1.17.

Table 2.1.17 Quantity of Compost Made from Cow Dung and Litter (kg/head/year)

Livestock	Body	Wt. Dung	Urine	Litter	Water added	Fresh compost	Fermented compost
Cattle	350	8,000	3,100	1,900	3,800	16,600	7,500 - 11,200
Calf	225	4,500	1,400	1,100	2,200	9,300	4,500 - 6,000

Notes) Source : Agricultural Cyclopedia, Japan 1983.

(5) Development of Sustainable Agriculture

By the irrigation projects, yields of crops will increase largely. However, to sustain the high yields for long years under irrigated condition is very difficult, because crops absorb soil nutrients, and the rate of absorption are higher in higher yielding crops. It is necessary to supply the nutrients into soil to sustain the higher yield under irrigated conditions. Utilization fermented compost which are made from the excrement of livestock are very useful and inexpensive ways to supply the nutrients to crops and to improve the soil fertility.

Figure of the sustainable agriculture based on the matter cycle between crop and livestock production is shown in Fig. 2.1.1. This is also said to have a big role to solve the saline problem which may occur in irrigation field. The sustainable agriculture based on the matter cycle is the most recommendable ways in irrigated agriculture.

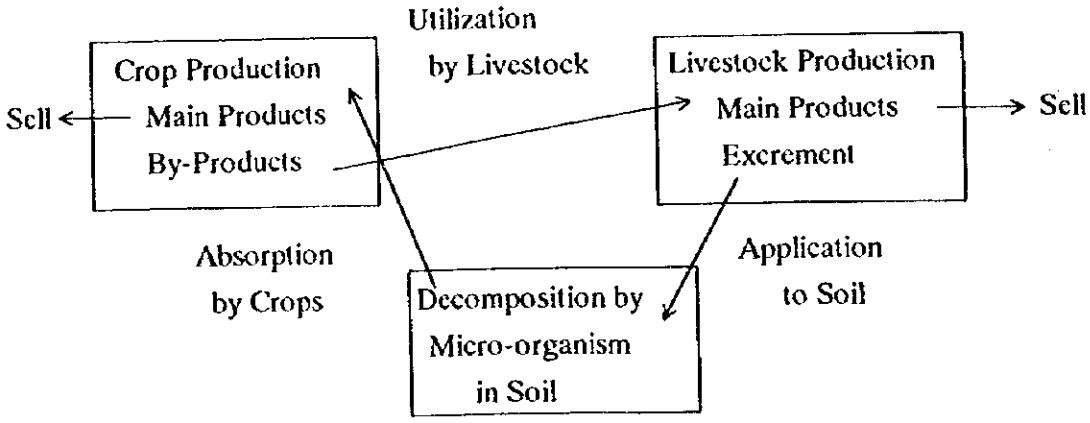


Figure 2.1.1 Abstracted Figure of Sustainable Agriculture Based on the Matter Cycle between Crop and Livestock Production

2.1.5 Marketing Plan

The principle of marketing agricultural products lies in supply response to demand, hence the production plan should always consider firm output channels available or accessible to producers. One should keep in mind that the products for which market outlets are guaranteed

by stable demand from processing factories or by state purchase through the price supporting system, though price levels and behavior of payment are not necessarily satisfiable to farmers. Cash crops like vegetables and fruits seem to be more profitable, but their prices are highly volatile and their outlet is not always promised, whereas production costs are expensive. To avoid these risks, crop diversification is useful but in turn it is detrimental to the pursuit of scale merit of production. Marketing includes not only mere sale, but also packaging, storage and processing of farm products that have very important aspects for planning future marketing plan.

At the same time, just as the result of farm interview survey shows, majority of interviewed farmers think it necessary and worthwhile to create their own sales cooperative to get free from vicious circle of borrowing fund from brokers and selling cheap to them. Such organization can help strengthen farmers' bargaining power towards free markets, though it requires to secure trustful trading partners in urban marketing centers. It is another matter that Turkish farmers are not used to such group formation and sustaining group activities harmoniously for years, for in one of the project sites a sales cooperative was once established but it could not last long because enough amount of milk was not collected to it against middlemen's cleverer way of collection.

Radical innovation for marketing systems and channels needs a long time where fragmental reform would not be valid but a state-wide revolutionary improvement can meet its modernization. This is equal to say that gradual, phased development is required to change current systems into rational and efficient channels with relevant investment to logistic facilities like storage houses, auction yards, marketing intelligence centers and packaging, transporting and other systems. Trying to improve producers' bargaining capacity for their advantageous sale of produced commodities, the following can be suggested, and a project-wise marketing plan for major products is tabulated as below.

- To make more use of Tarım Kredi Koop. for buying inputs,
- To sell more products to TMO and other public or parastatal marketing agencies,
- To reduce sale to middlemen, or to casually visiting brokers,
- To save a part of sales profit for establishing public grading and packaging centers in the case of perishable commodity production.

Table 2.1.18 Proposed Marketing Plan by Project

	Cereals	Sugarbeet	Vegetables	Fruits	Potatoes etc.
Hacilar	Wheat 950TtoT.M.O	11,200T to nearby mill	3,200T to urban mart.		
Ürünlu	Wheat 630TtoT.M.O	9,100T to nearby mill		melon 600T to cities	2,450T urban delivery
Karesekisi	not produced		500T sold to brokers		
Çamlibel	chiefly self-consumed	24,850T to nearby mill	3,400T to urban mart	grape 1,880T, brokers	2,460T urban delivery
Kozluk	chiefly self-consumed		4,400T to urban mart.	nut 500T to pro coop.	
Kuskara	chiefly self-consumed	2,600T to nearby mill			2,400T urban delivery
Özdenk	chiefly self-consumed	1,700T to mill in Bursa	650T to urban mart.		670T for urban mart.
Aslanlar	chiefly self-consumed		2,480T to urban mart.	grape 2,500T to cities	watermelon 1,000T*
Ilyaskōy	chiefly self-consumed			peach 1,380T to cities	
K.Karistiran	chiefly self-consumed	2,340T to nearby mill	720T to urban mart	watermelon 960T d.o.	

Note : as to urban marketing, project sites as indicated above are located in peri-urban areas, products in Hacilar can be delivered to Akara, Urunlu to Konya, Kozluk to Samsun, Ozdenk to Bursa, Aslanlar to Izmir, K.Karistiran to Istanbul, within one- or two-hours reach from the loading points to urban mart (=markets). * ; to urban mart.

Following tables indicate per capita consumption of the products planned to supply from the priority project sites to urban marketing centers, and per-cent share of envisaged supply on the total estimated consumption in 2005, or maturing stage of production in the projects. As to supply of sugar-beet, the planned supply conforms with the currently pursued policy of national food security and export demand.

Table 2.1.19 Estimated Per Capita Food Consumption and Share of Supply from the Projects

unit : kg/capita/year, 1,000 ton and %

Kind of Foods	1984	1992	1996	2005 Proj.	increment	inc. domestic d.	inc. export d.	share of supply
Grains and Pulses	211.5	296.3	272.9	349.8	+51.2	3,502	7	-
Wheat	200.0	281.4	246.0	312.8	+40.2	3,096	7	0.03%
Rice	3.6	6.9	2.2	4.2	0.0	38	0	0
Pulses	7.9	8.0	24.9	32.8	+11.0	368	0	-
Total Fruits*	104.5	176.4	121.1	177.7	+36.3	1,229	90	0.66%
Citrus	18.4	28.9	24.2	32.8	+5.1	331	0	0
Grapes	25.1	67.3	49.2	69.3	+24.0	783	0	0.28%
Nuts and others	61.0	80.2	67.7	75.6	+7.2	115	90	0.38%
Vegetables*	132.0	155.5	179.7	244.5	+59.9	551	225	1.98%
Total Meat	21.8	24.8	23.6	25.6	+1.3	241	0	0
Milk	123.4	146.5	129.4	145.1	+6.9	1,363	0	0
Eggs	5.4	7.6	8.0	10.5	+2.0	108	0	0
Fishery Products	8.8	7.6	7.0	5.9	-1.4	36	0	0
Crude Sugar	25.9	32.2	34.9	41.8	+6.1	769	96	0.90%

Note : inc. = increment d. = demand, perishables include marketing loss. population growth rate assumed at 1.68%. Left columns up to increment have kg/person as unit.

Source : General statistics by MARA, but estimation was made by the Study Team.

As indicated in these tables, planned quantities to be supplied from the proposed projects never exceeds 2% of the total estimated increment in additional demand attributable to population growth, expanded consumption (induced by the improved living standard) and export promotion forecast in 2005, the year of project maturity. This projection is provided assuming the uniform rate of population growth, 1.68%, but the rates for target market areas stay higher expansion, as shown in the following table.

In this context, population tends to concentrate into urban centers including six major cities where perishable farm products are sold. The share of supply from the proposed projects remains at less than 2 % of the projected consumption within these urban areas. It follows that the proposed marketing quantities lie in proper ranges suitable for ensuring outlet and avoiding excess or glut supply to the markets.

Table 2.1.20 Consumption Projected in Urban Areas and Supply Share of the Proposed Projects

unit : thousand person, thousand ton and %

	Census Data		Projected population		Consumption forecast in 2005 in urban center			Proposed supply from proposed projects			Percentage share of supply in %		
city	1985	1990	1995	2005	veget-ables	fruits	tubers	veget-ables	fruits	tuber	veget-ables	fruits	tuber
Ankara	2,910	3,236	3,649	4,576	897	664	220	6.6	7.9	2.5	0.7	1.2	1.1
Konya	1,560	1,752	2,015	2,603	510	377	125	0.0	1.1	2.5	0	0.3	2.0
Samsun	1,106	1,161	1,294	1,514	297	220	73	4.4	0.5	0.0	1.5	0.2	0
Bursa	1,324	1,596	2,016	3,070	602	445	147	0.0	0.0	2.4	0	0	1.6
Izmir	2,318	2,695	3,170	4,335	850	629	208	0.0	0.0	3.5	0	0	1.7
Istanbul	5,843	7,196	8,688	12,859	2,520	1,865	617	0.7	2.3	0.0	0.03	0.12	0

Source : the same as described in the foregoing table.

2.1.6 Plan of Strengthening Agricultural Supporting System

In parallel with the implementation of the proposed projects, necessity arises in mobilizing existing framework of farmers supporting system for efficient use of newly consolidated facilities. Hence, a plan is proposed herewith to support farmers, making use of already existing MARA extension system because GDRS does not have its own technical diffusion system, starting from analysis of current situation and issues, to the trial to solve these. In addition, as far as improvement in technical level of irrigation practices, it is proposed to establish a unit inside GDRS responsible for technical diffusion of advanced irrigation practices, and a plan of extension activities is suggested in liaison and contact with operation and maintenance task force.

(1) Better Mobilization of Existing System

Currently existing extension system by MARA consists of GDDAP as headquarters and its subordinate networks, provincial unit for farmers training belonging to agricultural department, extension centers of districts (TYM) and village technicians (VGT). These networks have remained mostly idle due to insufficient budget for mobilization and visiting, reluctant attitude of farmers to learn something new, while many farmers were found in Farm Economy Survey who do not know the extension systems or even extension officers. Apart from MARA system, another extension system has been run by the cooperatives responsible for the production and collection of price-supported commodities, engaged in diffusing essential techniques in cropping such commodities. In this connection, staff of cooperatives are assigned to extension business within their assigned territories and a mandate is given to them to solve any issues arising from cropping in their territories. They have kept close contact with their beneficiary farmers pursuing their task because they have a target and norm of collecting target quantities of the commodity concerned. Accordingly, those who are employed in charge of this task should identify firstly current status and details of project design, then settle targets to instruct beneficiaries and finally choose the best way and means of extending appropriate techniques among beneficiaries to the end of diffusion.

(2) Closer Link among Extension Media

On-going system has a transfer system in a way that any practical techniques exploited in research institutes can be transferred to grass-root farmers through provincial liaison committees. However, most probable performance has been limited within well-off farmers who are aware of issues related to their owned equipment and facilities. Radical solution of these problems requires to elevate farmer's awareness towards farming techniques and background knowledge, in other words to start from farming curriculum. Judging from present situation in which well-off as well as poor farmers must follow a rotation system with annually different crops, it is proposed as the best way that MARA extension staff and technicians in charge of the production of market-oriented price-supported commodities are coordinately extend diffusion activities in the same plots at the same time and date.

(3) Process and Means of Extension Activity

With a view to promoting extension of techniques in small scale irrigation projects, it is advised to establish a liaison committee between the provincial extension units and provincial GDRS office where the project details are presented and debating is repeated until a set of concrete targets and tactics of technical diffusion are decided. From this stage, technicians of cooperatives in charge of price-supported commodities should participate in the provision of

extension curriculum, reviewing how to deploy means of diffusion, from the selection of representative farmers who cooperate the extension program, installment of demo-farms, to on-the-site training programs for beneficiary farmers. Where water source for running demo-farms becomes available to the program prior to the completion of the project, it is desirable to make use of it to transfer needed techniques to the beneficiaries. In regions where illiteracy accounts for considerable rate, it is advised to take account thereof when provision is made for extension programs, such as use of colored brochure manuals now GDRS employs.

(4) Creation of a Workshop inside GDRS

It is proposed to create an extension service unit for better irrigation farming in GDRS, that offers a set of programs for improving irrigated agriculture through provincial GDRS offices, in liaison with other organization campaigns among farmers. The programs aim at diffusion of techniques directly linked to irrigation techniques, for example how to properly use, repair and maintain on-farm equipment for irrigation, how to realize an efficient and equitable use of irrigation networks, application of relevant irrigation methods by crop, how to utilize irrigation water in multi-purpose way and so on, while they should accompany with basic lecture of farming know-how, including soil physics and crop-moisture physiology. These curricula can be incorporated into the training course provided in the above section 2) as a component of extension course. In the established demo-farm, advanced equipment and facilities for auto-irrigated farming are displayed for demonstrative purpose, where major target crops and varieties specified to irrigation can be raised for the observation among trainers from beneficiaries, and they are mobilized to participate measurement of irrigation effect, irrigation efficiency and controlling measures of irrigation practices during their training course.

2.2 Irrigation and Drainage Plan

2.2.1 Water Requirement

Modified Penman method gives reference crop evapotranspirations (ETo) as shown in Table 2.2.1 below. The meteorological data referred to in calculating the ETo are summarized in Part II "1.1.2 Meteorology and Hydrology". The table shows that maximum daily ETo shows up in July, ranging between 4.07mm in Kozluk and 6.28mm in Aslanlar, and annual ETo amounts to from 725mm in Kuskara to 1195mm in Aslanlar.

Table 2.2.1 Crop Reference Evapotranspiration ETo, mm

Project	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Remarks
Hacilar	0.65	0.93	1.65	2.66	3.76	5.06	5.88	5.30	3.63	2.00	1.00	0.64	1013	
Urunlu	0.51	0.82	1.42	2.46	3.41	4.32	4.77	3.97	2.67	1.46	0.75	0.47	825	
Kalesekisi	0.53	0.79	1.43	2.57	3.53	5.03	5.87	5.12	3.57	1.95	0.96	0.56	975	
Camlibel	0.94	1.37	2.17	3.17	3.85	4.72	5.01	4.83	3.61	2.06	1.20	0.90	1032	
Kozluk	1.08	1.24	1.49	2.06	2.85	3.91	4.07	3.69	2.69	1.70	1.26	1.13	829	
Kuskara	0.44	0.73	1.27	2.11	3.09	3.79	4.15	3.56	2.30	1.24	0.64	0.41	725	
Ozdenk	0.66	1.01	1.71	2.73	3.73	4.72	5.40	4.73	3.20	1.76	1.01	0.66	956	
Aslanlar	1.19	1.65	2.23	3.18	4.51	5.89	6.28	5.38	4.00	2.32	1.43	1.13	1195	
Ilyaskoy	0.90	0.96	1.57	2.32	3.33	4.36	4.59	4.17	2.93	1.74	1.08	0.96	883	
K. Karistiran	0.60	0.90	1.47	2.51	3.60	4.67	5.09	4.47	3.01	1.67	0.85	0.56	898	

Note: Figures in months are in mm/day, and total's in mm.

Table 2.2.2 describes the crop coefficients (Kc) correspondent to the crops to be introduced in the projects. These figures are from those such as "TURKIYE'DE SULANAN

BITKILERIN SU TUKETIMLERI REHBERI, Ankara 1982", experimental data practiced by GDRS related institutes, and FAO Irrigation and Drainage Paper No.24.

Table 2.2.2 Crop Coefficient Kc

Crops	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	Remarks
Wheat	0.37	0.85	0.94	1.20	1.21	1.25	1.38	1.45	1.05	0.36	Starting at October
Maize	0.56	0.80	0.91	0.92	0.68						
Paddy	2.11	2.35	2.87	2.61	2.14						
Sugarbeet	0.44	0.48	1.35	1.25	1.25	1.22	1.00				
Sunflower	0.30	0.31	0.38	1.19	0.43	0.32					
Vegetables	0.27	1.16	1.24	1.19	0.98	0.67					
Dry Bean	0.68	1.09	0.94	0.70	0.61						
Fresh bean	0.62	0.70	0.81	0.88	0.79	0.65					
Soy Bean	0.60	0.98	0.80	0.65							As second crop
Cow Vetch	0.75	0.94	0.64								As second crop
Potato	0.37	0.61	0.91	0.92	0.90	0.70					
Garlic	0.46	0.77	0.82	0.87	0.76						
Cherry	0.60	0.67	0.79	0.80	0.80	0.51	0.28				Starting at April
Apple	1.05	0.98	0.98	1.28	1.09	0.85	0.48				Starting at April
Peach	0.85	0.80	0.80	0.84	0.82	0.37	0.27				Starting at April
Hazelnut	0.42	0.70	0.95	1.08	0.65	0.60					Starting at April
Vineyard	0.30	0.55	0.75	0.90	0.75	0.70	0.40				Starting at March
Alfalfa	0.87	0.96	0.96	0.94	0.78	0.62					Starting at May

In estimating net water requirement, this Study considers effective rainfall that can be consumed by crops. The following three tables show effective rainfalls calculated based on USBR method, with different probabilities of P50%, P80% and P90%. The probabilities were estimated by Log-Pearson Type III distribution, and the P90% effective rainfall is to be taken in designing the irrigation system capacity:

Table 2.2.3 Effective Rainfall by USBR Method under Probability 50%

Project	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Remarks
Hacilar	41	35	34	44	45	26	9	6	15	26	33	47	360	
Urunlu	30	27	26	31	31	17	4	2	6	22	25	32	253	
Kalesekisi	94	79	84	87	70	32	6	11	19	46	69	100	699	
Camlibel	36	32	39	48	52	39	5	4	15	22	29	43	363	
Kozluk	80	75	71	60	46	57	58	75	68	94	98	96	877	
Kuskara	28	27	30	44	61	57	27	25	23	32	28	30	412	
Ozdenk	40	32	35	36	37	23	11	11	12	28	30	42	335	
Aslanlar	96	72	61	41	29	9	3	1	11	37	70	103	533	
Ilyaskoy	72	62	56	44	36	34	22	22	44	65	67	86	610	
K. Karistiran	56	44	45	40	41	41	23	15	24	47	65	63	505	

Table 2.2.4 Effective Rainfall by USBR Method under Probability 80%

Project	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Remarks
Hacilar	36	30	30	38	39	23	8	5	13	23	29	41	315	
Urunlu	24	22	21	25	25	14	3	2	5	18	21	26	205	
Kalesekisi	81	68	72	74	59	27	5	9	16	38	58	87	594	
Camlibel	30	27	33	41	45	33	4	3	13	18	24	36	308	
Kozluk	71	66	63	52	40	50	50	66	60	84	89	86	777	
Kuskara	24	23	25	38	53	49	24	21	19	27	24	26	355	
Ozdenk	34	28	30	31	32	19	9	9	10	24	26	36	290	
Aslanlar	84	61	51	34	24	7	2	1	9	31	59	90	454	
Ilyaskoy	63	54	49	38	31	29	19	19	38	57	58	76	532	
K. Karistiran	48	38	38	33	35	35	20	12	21	40	55	54	430	

Table 2.2.5 Effective Rainfall by USBR Method under Probability 90%

Project	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Remarks
Hacilar	33	28	28	36	37	26	9	5	12	21	27	39	295	
Urunlu	22	20	20	23	23	12	3	2	4	17	19	24	188	
Kalesekisi	74	61	66	68	54	24	5	8	14	34	53	80	540	
Camlibel	27	25	30	37	40	30	4	3	11	16	22	33	279	
Kozluk	67	62	58	49	37	46	47	62	56	79	83	81	726	
Kuskara	22	21	23	35	49	46	22	20	18	25	22	24	329	
Ozdenk	32	26	28	29	29	18	8	8	9	23	24	34	268	
Aslanlar	77	56	47	31	22	7	2	1	8	28	54	84	418	
Ilyaskoy	59	50	46	36	29	27	18	18	35	53	55	72	497	
K. Karistiran	44	35	35	31	32	32	18	11	19	37	51	50	396	

Gross water requirements are the amounts that are required for the projects. Those are estimated taking into consideration project irrigation efficiencies. The efficiencies, to be applied to the projects, are proposed as below with reference to the ones mentioned in PART I "5.2.3 Irrigation Efficiencies":

Table 2.2.6 Project Irrigation Efficiencies

Project	System	Efficiency	Remarks
Hacilar	Pump→Pipeline→Sprinkler	0.68	P.R.: 0.70
Urunlu	Well→Pipeline→Sprinkler	0.71	
Kalesekisi	Pump→Pipeline/open→Drip	0.73	
Camlibel	Dam→Canal→Furrow	0.53	
Kozluk	Weir→Canal→Basin & Furrow	0.49 or 0.53	0.49 for Paddy
Kuskara	Well→Canal→Furrow	0.53	
Ozdenk	Dam→Pipeline→Sprinkler & Furrow	0.68 or 0.59	0.59 for Furrow
Aslanlar	Well→Pipeline→Drip	0.81	
Ilyaskoy	Dam→Pipeline→Sprinkler & Drip	0.68 or 0.77	
K. Karistiran	Well→Pipeline→Sprinkler	0.71	

Table 2.2.7 below shows the crop water requirements with which the projects are to be designed; G. Area means gross project area, N.I. Area means net irrigation area calculated with reference to the Ratio of N/G, G. Req. means gross requirement for a project shown in litter per second under 24 hours irrigation, Unit Req. means amount required per net irrigation area under 24 hours irrigation, A. Req. means annual water requirement shown in MCM. Notified is that irrigation areas for Ozdenk and Ilyaskoy projects are the original ones proposed by GDRS, and to be revised in accordance with the reservoir operation study carried out in this latter part.

Table 2.2.7 Summary of Crop Water Requirement

Project	G. Area, ha	N.I. Area, ha	Ratio of N/G	G. Req., l/s/24hr	Unit Req., l/s/N.A.	A. Req., MCM (P90%)	Remarks
Hacilar	580	522	0.90	356	0.682	3.706	
Urunlu	490	465	0.95	347	0.747	3.308	Modified Cropping Pattern
Kalesekisi	233	210	0.90	153	0.729	1.213	
Camlibel	1438	1366	0.95	1041	0.762	12.164	
Kozluk	610	550	0.90	420	0.764	3.182	
Kuskara	130	117	0.90	71	0.607	0.718	
Ozdenk	*170*	*153*	*0.90*	*126*	*0.823*	*1.257*	*Tentative*
Aslanlar	263	250	0.95	192	0.767	1.778	
Ilyaskoy	*138*	*124*	*0.90*	*77*	*0.617*	*0.666*	*Tentative*
K. Karistiran	126	120	0.95	95	0.794	0.852	

Note: Irrigation areas for Ozdenk and Ilyaskoy are to be revised with reference to the reservoir operation study.

The calculated amounts are compared, as shown below, to those referred in GDRS Planning Report. From the table, following are pointed out:

- Newly calculated gross requirement (G. Req.) in l/s and unit requirement (Unit Req.) in l/s/N.A. are smaller than those in GDRS report except Aslanlar project. These are because of: 1) the newly calculated ones are based on 24 hours operation while GDRS ones are based on 16 to 22 hours operation, 2) introduction of sprinkler and drip irrigation, 3) undertaking of effective rainfall (P90%), and 4) weighted unit requirement (irrigation module) considering crops with less water requirement, and
- Both dam projects, Ozdenk and Ilyaskoy, require more water than those estimated in GDRS report. Particulary, Ozdenk dam requires about 1.63 times of the originally planned by GDRS.

Table 2.2.8 Summary of Crop Water Requirement

Project	G. Req., l/s/24hr	GDRS P.R.	Unit Req., l/s/N.A.	GDRS P.R.	A. Req., MCM(P90%)	GDRS P.R.	Remarks
Hacilar	356	-	0.682	-	3.706	-	Pump
Ururlu	347	400	0.747	0.80	3.308	3.54	Groundwater
Kalesekisi	153	210	0.729	1.00	1.213	N.A.	Pump
Camlibel	1041	N.A.	0.764	N.A.	12.164	N.A.	Land consolidation
Kozluk	420	650	0.764	1.18	3.182	N.A.	Weir
Kuskara	71	N.A.	0.607	N.A.	0.718	N.A.	Land Conservation
Ozdenk	126	N.A.	0.823	N.A.	1.257	0.77	Dam
Aslanlar	192	200	0.767	0.80	1.778	1.61	Groundwater
Ilyaskoy	77	156	0.617	1.13	0.666	0.61	Dam
K. Karistiran	95	120	0.794	1.00	0.852	0.81	Groundwater

Taking above results into consideration, following measures are to be undertaken in this Study:

- Along with introducing farm pond (regulating pond), 24 hours operation for main supply system can be realized, thus the newly calculated unit requirements are to be undertaken as long as it is possible to introduce farm pond,
- For the groundwater projects, no change of the irrigation area is made since the projects had already formed Irrigation Cooperative and they already started or are to start soon the amortization concerning DSI construction work. Although newly calculated requirements are smaller than those originally planned, the application to the farm would be almost same as GDRS ones under the condition of 18 to 20 hours operation (basically no farm pond is to be introduced in groundwater project),
- For Kalesekisi project, though there is a possibility of enlarging irrigation area, same area of net 210ha is undertaken with 153l/s design gross requirement instead of 210l/s applied in GDRS report. This is because no river runoff measurement has been done, thus this makes some safety factor, and
- For the dam projects, either irrigation area or reservoir capacity or the both shall be changed (most probably irrigation area to be reduced). This is particularly required for Ozdenk dam.

2.2.2 Water Resources

(1) Hacilar Project (Pump Irrigation)

The water source is Kapulukaya dam that was opened in 1989 for the original purpose of hydro-power and domestic water. The mean annual flow into the dam is 2700 MCM. The

reservoir's total capacity is 282 MCM, and now the allocated water amount for GDRS irrigation projects including this Hacilar project is 25 MCM annually. The water requirement for Hacilar project was estimated at 3.7 MCM with probability 90%, and this constitutes about 15% of the total allocated 25 MCM.

(2) Urunlu Project (Groundwater)

The water source of Urunlu project is 8 wells, which were opened by DSI in 1996 and 1997. The well characteristics are: yield of 50l/s each, depth of 150m each, average static level of 10m, and average dynamic level of 20m. The villagers had started the irrigation already, and there has not been noticeable groundwater table getting down so far.

(3) Kalesekisi Project (Pump Irrigation)

This project takes water from Kirkok River by means of pump. No flow measurement has been conducted, and the original design intake volume of 210l/sec was decided on basis of physical observation and hearings to the villagers. New design intake is now 153l/s based on the study above, and the flow apparently surpasses the design volume even during dry season since it comes from Karst geological formation that gives relatively stable discharge. While, maximum discharge usually shows up in April, flowing with a depth of 0.7 to 1.0m according to the villagers. Though the design volume could be secured with reference to the observation, runoff measurement should be done before the detail design has started.

(4) Camlibel Project (Land Consolidation)

The water source of this project is Guzelce dam, and is to irrigate total land of 4337ha. The dam is now under implementation and expected to complete in 1999. The reservoir capacity is 34.68 MCM, of which 33.24 MCM is the usable (available) volume. The catchment area of this dam is 102.50 km^2 and the annual average runoff was estimated at 23.62 MCM.

(5) Kozluk Project (Weir Irrigation)

Found are several rivers, located nearby the project area, such as Akcay, Kuru, Findikpinar, Hai, Unal, and Elmolik. Only Akcay River flows throughout year among these rivers. The river had been conducted runoff measurement by GDRS between 1978 and 1992 as described in PART II "1.1.2 Meteorology and Hydrology". The original project design intake volume is 650l/s. This was decided with reference to the flows observed in July which requires peak irrigation water. The minimum runoff in July was 850l/s, and after taking 650l/s for the project, the balance of 200l/s was to be released to downstream with reference to the original GDRS design. While, referring to the study above, the design intake could be 496l/s under the condition of 24hours operation for main system and with the cropping pattern proposed in this study.

(6) Kuskara Project (Land Conservation)

There are two wells which are the source of the irrigation water. Those yields are 50l/s and 45l/s, both of which irrigate about 80ha present farm to which land conservation project is to be introduced. The wells are located just beside a river flowing near the village. The depth of the wells is about 10m only and the groundwater comes from the river deposit.

(7) Ozdenk Project (Dam)

1) Probable Runoff Yield

Three stations' rainfall data, such as Mihaliccik, Alpu, and Gokcekaya, can be referred in deciding prospective reservoir capacity. Employing M. Turc method in estimating runoff from rainfall, following Table 2.2.9 shows the probable runoffs calculated with Log-Pearson distribution for the first two stations and normal distribution for Gokcekaya (Gokcekaya results taken from GDRS Supplemental Hydrological Report in 1996). With reference to the probability P80% and P90%, Mihaliccik data could yield 0.8 to 0.9 MCM annually, Alpu data 0.2 to 0.3 MCM only, and Gokcekaya data 0.3 to 0.4 MCM. With the probability of P50%, 1.3, 0.5, 0.7 MCM annually could be yielded respectively:

Table 2.2.9 Summary of Runoff Discharge for Three Stations (C.A.=8,612sqkm)

Station	Dist'nc	Eleva.	Pro.%	Rain,mm	Percol'n	Runoff, mm	Runoff	Remarks
Mihaliccik	40km	1325m	50	526.3	373.1	148.3	1.277 MCM	Log-distribution
			80	456.7	348.2	108.5	0.935 MCM	
			90	425.2	335.0	90.2	0.777 MCM	
Alpu	23km	765m	50	364.7	305.7	59.0	0.508 MCM	Log-distribution
			80	312.2	275.6	36.6	0.315 MCM	
			90	287.5	259.7	27.8	0.239 MCM	
Gokcekaya	9km	352m	50	414.0	329.9	84.1	0.724 MCM	From 1996 GDRS report.
			80	341.9	293.2	48.7	0.419 MCM	
			90	304.2	270.6	33.6	0.289 MCM	
Dam Site	0km	1349m						Average Height

Note: "L" in M. Turc formula is 504.1.

There is one runoff measurement done between November of 1995 and May of 1996. The runoff was 808,000m^3, and comparing the results above indicates that the year was probably wet year or at least could say wetter than probability 80% dry year according to the Table 2.2.10 below. The table shows the rainfall at Alpu station recorded in 1995/96 and in the period, during which the runoff measurement was conducted, and the probabilities calculated (Mihaliccik station was closed in 1993).

Table 2.2.10 Rainfall Probability at Alpu Statoin

	Rain in 1995/96	P50%	P80%	P90%	Remarks
July - June	389.3	354.8	297.4	273.2	Throughout year
Nov. - May	242.4	265.8	216.0	193.8	Rainy season only

GDRS Supplemental Hydrological Report indicates that Mihaliccik rainfall data could be employed with reference to the topographic condition. Taking above into consideration, this Study proposes 0.8 MCM/year as the reservoir capacity, and with the capacity, irrigable area is to be decided in this latter section.

Although there is a possibility to divert water from another catchment area of 2.91km^2, bordering on eastern side of the main catchment area, this Study does not deal with the diversion. Since the runoff discharge estimated based on Mihaliccik station's rainfall leaves possibility of overestimation, the diversion runoff should be left at this planning stage and be undertaken in case that runoff shortage of the main catchment area arose.

2) Reservoir Operation

The original irrigation area is 170ha, which was defined in the Planing Report of GDRS. As aforementioned in "Section 2.2.1 Water Requirement", the 170ha will not be able to be irrigated wholly. To confirm this, an operation is conducted with an exceptional condition that all runoffs, estimated based on Mihaliccik station, are stored in the dam and no spilled-discharge takes place:

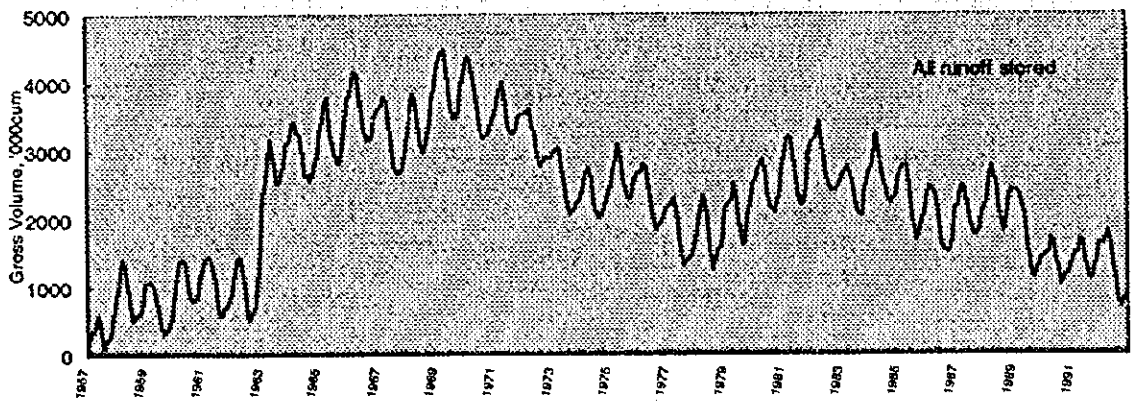


Figure 2.2.1 Reservoir Operation Curve with All Runoff Stored (IA=170ha)

Figure 2.2.1 shows that after reaching the peak in 1969 thanks to the flood in the preceding several years, the reservoir volume almost continuously becomes less and less, suggesting difficulty to irrigate all the170ha over many years.

Some case operations shall be done in order to decide irrigable area with 800,000cum reservoir capacity. Following shows how many years water shortage had occurred with respect to such irrigation areas of 130, 135, 140, 145, and 150ha during the operation period of 36 years between 1957 and 1992:

Table 2.2.11 Operation Results with 800,000 cum Reservoir

Irrigable area	Years of Shortage	Remarks
130 ha	2 (2/36)	
135 ha	5 (5/36)	
140 ha (Net126)	7 (7/36)	To undertake
145 ha	8 (8/36)	
150 ha	8 (8/36)	

This Study proposes 140ha (net:140x0.9=126ha) irrigation area with the reservoir capacity of 800,000CUM (including evaporation and seepage losses), and the dam operation is shown below. With this design capacity, about 7 times water shortages could probably show up in every 36 years.

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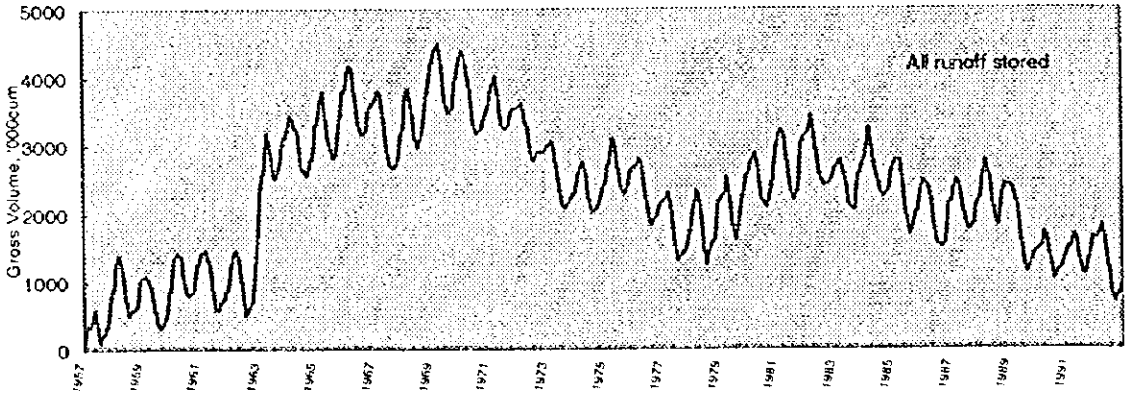

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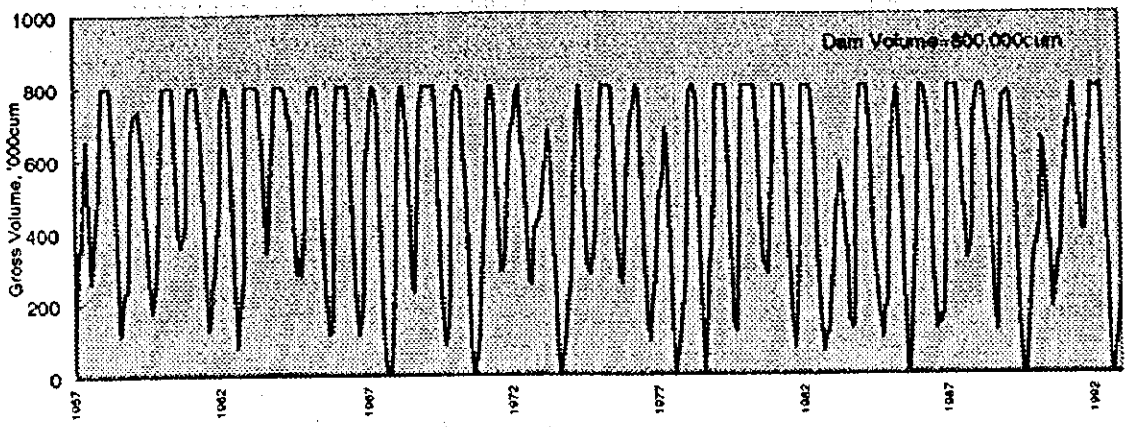

Figure 2.2.2 Reservoir Operation Curve with 140ha Irrigation Area

(8) Aslanlar Project (Groundwater)

Aslanlar project has 7 wells which are the source and were opened in 1993 and 1994, and the pumps of which were installed in 1994. Those wells are all located in north-western area of the irrigation area and the yield was provided for each well such as: 20l/s for No.1 (45746), 20l/s for No.2 (45745-B), 30l/s for No.3 (35493), 10l/s for No.4 (45749), 50l/s for No. 5 (45748), 30l/s for No. 6 (26907), and 40l/s for No. 7 (45747). The depth of the wells is 100m. Those wells make the total yield of 200 l/s. The villagers had started the irrigation already, and no noticeable groundwater table getting down has occurred so far. However, a groundwater project area named Pamukyazi, located downstream from Aslanlar village, is now experiencing groundwater table down. The pumps of Pamukyazi project are to be replaced from the vertical shaft to submergible type. Groundwater monitoring should be carried out in order to maintain sound groundwater table.

(9) Ilyaskoy Project (Dam)

The water source is Oracik river, and has no runoff discharge measurement. With the latest rainfall data at Yaloba station (No.660), the probable runoffs, calculated by M. Turc method with Log-Pearson distribution for rainfall, are as follows:

Table 2.2.12 Summary of Runoff Discharge Based on Yaloba Stations (C.A.=4.3sqkm)

Station	Dist'nc	Eleva.	Pro.%	Rain,mm	Percol'n	Runoff, mm	Runoff	Remarks
Yaloba	17km	2 m	50	711.8	524.7	187.1	0.805 MCM	Log-distribution
			80	606.2	482.0	124.2	0.534 MCM	-do-
			90	561.0	460.5	100.5	0.432 MCM	-do-
Dam Site	0km	280 m						Average height

Note: "L" in M. Turc formula is 734.034.

According to practical application in Turkey, probability 80% runoff is usually taken into consideration under such climatic condition under which Ilyaskoy is located. The latest information given by GDRS was that the dam capacity was to be 0.61 MCM, larger than P80% runoff, with irrigable area of 138ha. This Study carries out number of dam operations with probable runoffs (reservoir capacities) and irrigable areas. Table 2.2.13 below shows the results for which how many years of water shortage had occurred against the operation period of 38 years between 1957 to 1994:

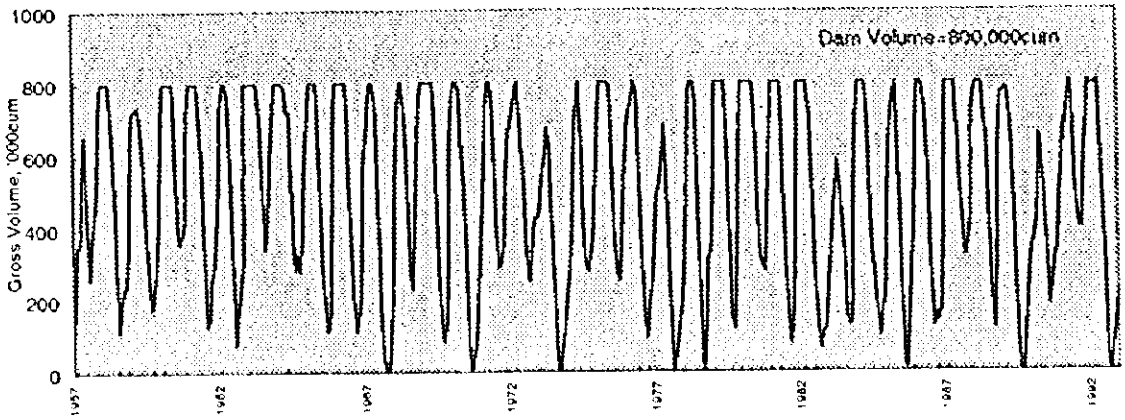

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Table 2.2.13 Operation Result (Operation Period: 38 years from 1957 to 1994)

Irrigable Area	0.50 MCM	0.56 MCM	0.60 MCM	0.65MCM	0.70 MCM	0.80 MCM	Remarks
110ha	7/38	3/38	3/38	3/38	2/38	1/38	
115ha	11/38	4/38	3/38	3/38	3/38	1/38	
120ha	12/38	7/38	5/38	3/38	3/38	3/38	Net:108ha
125ha	16/38	9/38	7/38	4/38	4/38	3/38	
130ha	19/38	12/38	9/38	7/38	4/38	3/38	
135ha	21/38	15/38	12/38	12/38	6/38	4/38	
140ha	23/38	18/38	14/38	11/38	8/38	6/38	

Note: Water shortage occurred in the first year of 1957 omitted.

With the table above, this Study referrers to the case of reservoir capacity of 0.56 MCM with irrigable area of 120ha (net: 120x0.9=108ha). And taking into the suggestion given by GDRS, another 10ha area is additionally considered for future usage. Therefore, this Study undertakes gross area of 130ha and net area of 108ha. The 0.56 MCM of reservoir capacity, including evaporation and seepage losses, makes up total 0.60 MCM accompanied with 0.40 MCM for the sedimentation and some fishery reserve. This design would give about 7 times water shortages in every 38 years, and the operation is graphically shown below:

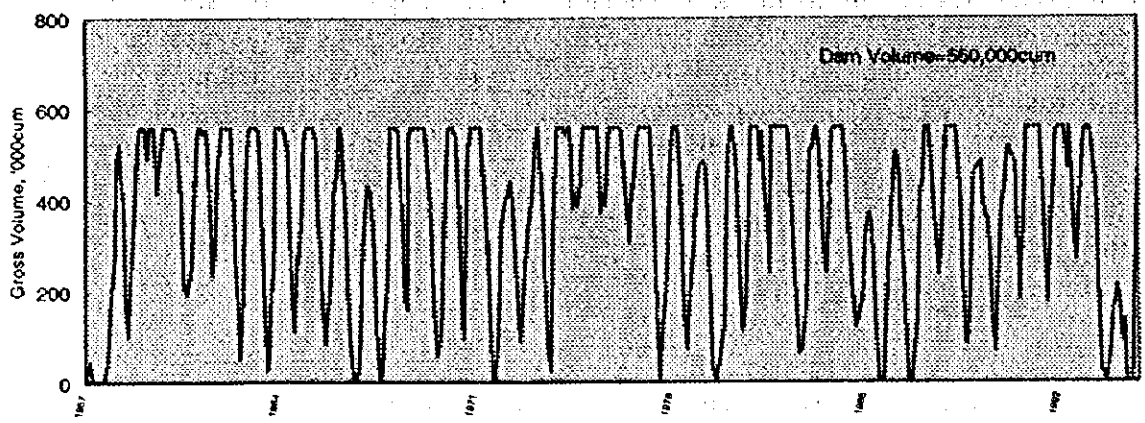

Figure 2.2.3 Reservoir Operation Curve with Net 108ha (Gross:130) Irrigable Area

(10) K. Karistiran Project (Groundwater)

The water source is four wells already opened in 1993. The well characteristics are: yield of 30 l/s each, depth of 200m each, average static level of 45m. The villagers had started the irrigation already, and no noticeable groundwater table getting down has occurred so far.

2.2.3 Water Conveyance System

There are three groundwater projects, and the wells of the projects command 20 to as large as 50 ha each. The command area is not so large, therefore pump direct conveyance system applies to the projects except Aslanlar project in Izmir. Wells in Aslanlar project are closely located each other, and the wells, which command eastern part of the project area, should provide the irrigation water collectively. The wells, therefore, could interfere each other if direct supply to the main pipeline was made. To avoid this, either distribution tank or pressure tank should be provided. The former method, distribution tank method, applies to the system

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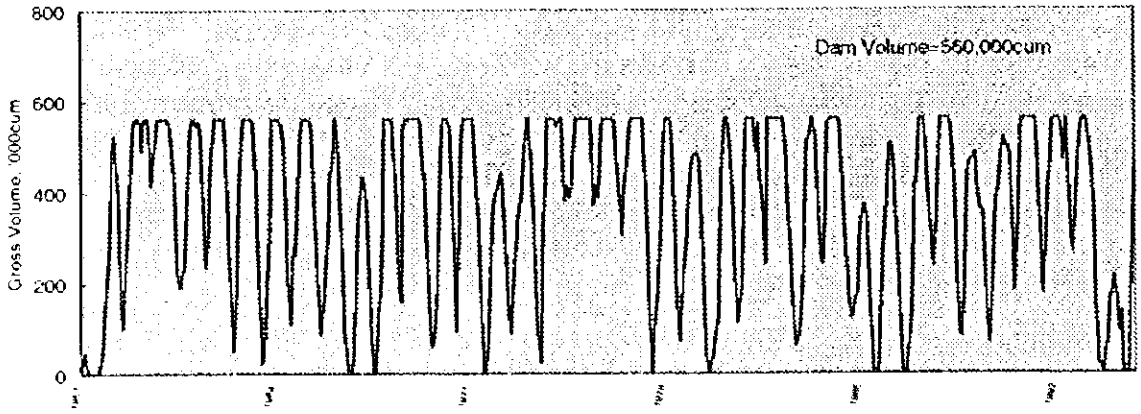

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since there is a hill at which distribution tank can be constructed, and from which closed gravity distribution can be made.

Distribution tank is also to be provided in such projects as Hacilar, Kalesekisi, and Ilyaskoy. These projects are provided with pumping system, and recommended to have regulating tank to which the irrigation water is once pumped up and then from which the water is gravity distributed. The conveyance system after the tank is to be gravity-pressure-pipeline.

Ozdenk project takes the irrigation water from the reservoir and provides it through gravity-pressure-pipeline system. The pipeline is to be directly connected to the dam. The on-farm irrigation system is to be composed of two schemes such as surface (furrow) irrigation and pressure (sprinkler) irrigation. Surface irrigation is to be done in upstream side where not enough pressure can be secured for sprinkler while downstream side will have sprinkler system.

Kozluk project will realize paddy irrigation to which gravity flood irrigation is to be introduced. Open gravity conveyance is to be employed which is the most conventional system. No supplemental or new conveyance system is provided to Camlibel and Kuskara projects. These projects are to use the existing or the same already planned.

Table 2.2.14 Water Conveyance System

Project	Type	O. Gravity	G. Pressure	Dis. Tank	Pump Direct	Remarks
Hacilar	Pump		O*	O		*After the Tank
Urunlu	G. Water				O	
Kalesekisi	Pump		O*	O		*After the Tank
Camlibel	L. Consoli.	O				
Kozluk	Weir	O				
Kuskara	S. Conser.	O				Wells-Outlet: G. Press.
Ozdenk	Dam		O			
Aslanlar	G. water		O*	O		*After the Tank
Ilyaskoy	Dam		O*	O		*After the Tank
K. Karistiran	G. water				O	

Note: O. Gravity is Open Gravity, G. Pressure is Gravity Pressure, Dis. means distribution.

2.2.4 On-farm Irrigation Application Method

On-farm irrigation, practiced in Turkey, are such as flood, furrow, both of which are categorized in surface irrigation, and sprinkler and drip. Sprinkler and drip irrigations are becoming familiar as farmers face shortage of available water and to extend irrigation area as large as possible with the limited water source. This Study is to apply sprinkler and/or drip irrigation to the projects where possible and as long as economical conditions meet.

Such projects as Kalesekisi, Aslanlar, and Ilyakoy are to irrigate fruits trees mostly and drip irrigation can be applied. The pressure required for the drip is to be all with gravity; namely, the water is once pumped up to distribution tank located at higher place. Sprinkler irrigation is to apply to such projects as Urunlu, K. Karistiran, both of which are groundwater projects, Hacilar and downstream irrigation area of Ozdenk. The sprinkler system is to be hand-move type which requires the least capital cost. The required pressure for Urunlu and K. Karistiran will be provided from the submergible pump directly. Required pressure for Hacilar and Ozdenk can be secured with gravity. Upstream part of Ozdenk irrigation area can not have

enough pressure to operate sprinkler when the reservoir's water level is low, therefore surface irrigation (furrow irrigation) system will be provided.

Kozluk project will practice paddy irrigation, and basin irrigation suitable for paddy is introduced. Though this project area has been practicing Hazel nuts plantation, surface irrigation could be applied to the plantation as well. Irrigation applications for Camlibel and Kuskara projects are to be the same as the existing or the already planned.

Table 2.2.15 On-farm Irrigation Application

Project	Crops to be Planted	Major Crops	Irrigation	Remarks
Hacilar	Wheat, I.Crop, Oil Seed, Pulses, Vegetables	Sugar Beet, Sunflower	Sprinkler	
Urunlu	I. Crop, Wheat, Vegetables	Sugar Beet	Sprinkler	
Kalesekisi	Fruits, Vegetables	Cherry	Drip	
Camlibel	Wheat, I. Crop, Cereals, Pulses, Alfalfa	Sugar Beet	Surface	
Kozluk	Paddy, Fruits, I. Crop, Vegetables	Paddy, Hazel nuts	Surface	
Kuskara	I. Crop, Wheat, Vegetables, Vegetables	Garlic	Surface	
Ozdenk	I. Crop, Vegetables, Wheat, Tuber, Alfalfa	Sugar Beet, Fresh Bean	Sprinkler*	*+surface
Aslanlar	Vegetables, Fruits, Wheat, I. Crop	Grape, Egg Plant, Melon	Drip	
Ilyaskoy	Fruits, Wheat, Oil Seed	Apple, Peach	Drip	
K. Karistiran	I. Crop, Vegetables, Wheat, Oil Seed	Sugar Beet	Sprinkler	

Note: I. Crop means Industrial Crops such as sugar beet, sunflower, etc.

2.2.5 Drainage Plan

Since most projects are to be implemented in an area with a slope, no noticeable drainage problem, deriving from irrigation, could show up. Projects, which could expect natural drain thanks to the slope in the project area, are Hacilar, Kalesekisi, Kozluk, Kuskara, Ilyaskoy and K. Karistiran. Those projects will have no drainage system to be required for draining excessive irrigation water but have minor drain for the purpose of draining rainfall.

The irrigation area of Ozdenk project is of fairly flat, however the soil is composed of river deposits which could expect natural drainability. Also, the Ozdenk River will play a great role for collecting seepage water driving from irrigation. Thus, no drainage system will be established for the purpose of draining excessive seepage water. Only minor drainage for rainfall will be established.

Aslanlar irrigation area is relatively flat specially in its east-southern part. Seepage deriving from irrigation would gather toward in this part. However, an open drainage, already constructed in 1964 in its east-southern part, could collect this excessive seepage water, keeping groundwater table low enough for crop growing. Therefore, only minor drainage for rainfall will be planned.

Camlibel project is to have drainage system. There will be two drainage systems; namely, minor drainage for rainfall and another for lowering groundwater in southern part of the project area. Since there is a wet land along the Guzelce River, open drainage with a depth of 1.5 to 2 m will be required in order to get the high groundwater table lower. The drained water will be released into Guzelce River.

Urunlu project area may develop water-clogging problem since this area is fairly flat. Open drainage, which can drain excessive irrigation water, is to be planned in addition to the

minor drainage for rainfall. The open drainage should be put into implementation when water-clogging problem takes place.

2.3 Development Plan for Rural Infrastructure

2.3.1 Land Consolidation and Farmland Conservation Plan

In the rural districts of turkey, there are number of problem areas which require to be solved and they are itemized hereinafter. These problems are being identified in contrast to the rapid development in urban districts.

- Migration of the rural youth to urban districts.
- Dispersion of land holding, due mainly to the traditional inheritance in the country.
- Improper farm practice.
- Lack of on-farm facilities.
- Under-developed rural infrastructure.

In this respect, land consolidation schemes are now being considered to solve these problems. Mainly the following facilities will be improved and developed along with the scheme;

- Land leveling and re-parceling
- Subsoil improvement
- Irrigation canal system
- Drainage system
- Farm road
- Rural development in respect to village road, village storm drainage and improvement of residential environment, etc.

The Camlibel district in Tokat province has been selected to serve as the model district for the land consolidation scheme.

As to the implementation of the soil conservation scheme, it aims to prevent soil erosion in the sloped area and, to develop on-farm facilities. This scheme will develop terrace, irrigation canals, drain ditches, and farm road, and the Kastamonu-Kuskara district has been selected for the farm land conservation scheme.

2.3.2 Village and Farm Road Network

The land consolidation and farmland conservation schemes will be designed with road networks, whereas, for the other irrigation projects, as a principle, existing roads will be improved or remedied to serve the purpose. The operation and maintenance road will be provided along the main canal of irrigation and that of drainage, and this road could also serve as village road.