CHAPTER 6 PROJECT EVALUATION

6.1 Financial and Economic Evaluation

6.1.1 Basic Preconditions

Financial evaluation for ten individual priority projects is based on the following basic preconditions:

1. project life is set at 30 years for groundwater projects and 50 years for other priority ones, according to the longest life the facilities to be constructed by the project,
2. construction period is set at reasonable duration for normal time-spun for completing construction, i.e., one year for ground-water projects and two years for others,
3. replacement costs of the facilities are put into expense at the fixed interval during the project life, counted in the year when the life of the facility concerned has just expired,
4. operation and maintenance costs are accounted as annual expense during the whole project life,
5. expected benefits from crops and animal husbandry are estimated in line with production plan and past performance of production that can be used for estimating productivity of the phase without project, where unit costs are adjusted as of July 1997, and the project benefits are estimated as the difference between net ones of with-project and without-project phases based upon current performance as rain-fed basis and planned acreage-yield composition estimated from on-going project,
6. despite the above described condition 5., productivity of the phase without project for soil conservation is set in a way that current irrigated yields, taken as with-project basis, will be dropped as experienced by heavy erosion within the project site,
7. benefits of land consolidation includes saving effects of farming practices, especially reduction of farm labor and fuel requirement for farm machinery,
8. annual crop production and livestock management costs are subtracted from gross farm benefits, that include the value of crop by-products, where livestock benefits are confined to animal products converting from fodder crops and by products,
9. not irrigable crop acreage in the project plan due to irrigation water deficit within the project site are excluded from project cost/benefit consideration,
10. past expense for the facilities already constructed (by DSI etc.) in the project sites prior to the implementation of the priority projects is not counted in the financial evaluation.

Economic evaluation therefor is based on the same assumptions except 5, 9 and 10. of the above listed pre-conditions, while the following concept is substituted in place of these exceptions.

1. economic prices are applied to instead of current prices, calculated as fictive values by applying conversion factors to current costs / prices as mentioned below,

2. past expense for the facilities already constructed (by DSI etc.) in the project sites prior to the implementation of the priority projects is also counted in the economic evaluation as sunk cost, in so far as they are planned for use in the said project.
3. out of the cost elements, taxes, land rents and land acquisition costs, interests and subsidy component of farm inputs (applied to chemical fertilizers etc.) are eliminated as mere transfer inside domestic account for calculating construction and farm production costs.

Up-dating (as of July 1997) of the sunk costs for three ground-water projects and estimated DSI construction cost for the barrage as the cost allocated to Camlibel project is made by the official revaluation coefficients for converting past-expended costs, where estimated, depreciated portion thereof from the date of completion up till now is discounted.

For both financial and economic evaluation, effect of inflation is not taken into account, because project evaluation should be made not for certain time spun but at the fixed date.

6.1.2 Economic Benefit

As mentioned above, many of the planned farm products in the project sites represent as export market commodities, the border prices of which are derived from the mean international market prices (border prices in Turkey for representative products available for internationally traded commodities on f.o.b. basis as exporting commodities, on c. & f. basis for importing ones are taken) recorded during past five years are listed in the following table.

Strictly speaking, different prices should be estimated for each project, but in this report the same economic prices are applied, because there exist so many international ports in Turkey, and relative share of inland transportation is substantially lower judging from the location of the priority projects. Financial prices have been set at higher levels than import prices for price supported commodities, leading to cheaper economic prices, whereas those of free marketed ones tend to have higher export prices than those domestically prevailed, resulting too often to higher economic ones as compared to financial prices. Benefits by economic price are determined by crop yields and quality, production costs and international prices, out of which the former two vary with location factors and availability of irrigation. Hence, the economic benefits of the same crop may differ by project sites. Also, they may often be presented as negative values even though crop income is actually obtained since self-supplied farm labor is counted in the production cost. As glanced from this table, economic prices of price-supported commodities happen to have low economic value just because their international price levels remain low as a result of glut and chronic over-supply in the international markets, thus deteriorating their profitability.

Table 6.1.1 Comparison of Financial and Economic Prices of Major Crops

Unit: million TL per ton, and US$, * ; price supported commodities

Name of Crops	Financial Price	Financial Price	International market price	Inland trans-port cost	Estimated border price
Price Unit	Million TL	US$ equiv.	U.S.$	Million TL	U.S.$
Soft Wheat*	47.2	295	143	24	167
Barley*	36.1	226	77	24	102
Grain Maize	34.5	216	151	24	175
Rice as Paddy Equivalent	63.0	394	228	24	252
Pulses	65.0	408	340	24	364
Sugar beet*	12.5	78	29	3	32
Sunflower*	100.0	625	306	24	330
Cotton*	120.0	750	819	24	843
Cured Tobacco Leaf	95.0	594	395	24	419
Dried Onion	75.0	469	246	24	270
Potatoes	25.0	156	173	24	197
Watermelon	40.0	250	209	48	257
Dried Alfalfa	100.0	625	627	24	651
Tomatoes	27.5	172	350	48	398
Hazelnut*	350.0	2,188	927	24	951
Fresh Table Cherry	110.0	688	1,324	48	1,372
Apple	22.5	141	146	24	170
Table Grape	50.0	313	964	48	1,012
Beef Meat	312.5	1,953	3,183	48	3,231
Lamb, Sheep Meat	307.0	1,919	2,543	48	2,591

Table 6.1.2 Per ha, Per Crop Production Cost

Unit: described currency unit per ha

Name of Crops	Financial Price	Financial Price	Economic Price	Economic Price
Price Unit	Million TL	US$ equiv.	Million TL	US$ equiv.
For Rain-fed Crops				
Soft Wheat*	79.2	495	72.2	451
Barley*	83.8	524	73.9	462
Grain Maize	129.7	811	107.4	671
Sunflower*	67.4	421	60.5	378
Pulses	160.8	1,005	129.6	810
Cured Tobacco Leaf	225.9	1,412	180.3	1,126
Watermelon	220.7	1,379	192.7	1,204
Hazelnut*	243.5	1,522	171.2	1,070
Fresh Table Cherry	434.0	2,712	331.6	2,073
For Irrigated Crops				
Sugarbeet*	347.8	2,174	267.8	1,674
Cotton*	485.3	3,033	408.1	2,551
Potatoes	301.4	1,884	237.8	1,486
Watermelon	301.8	1,886	273.7	1,711
Dried Alfalfa	146.6	916	105.6	660
Tomato	588.2	3,676	468.2	2,926
Garlic	1,022.0	6,388	796.1	4,976
Apple	386.1	2,413	347.1	2,169
Table Grape	613.4	3,834	541.0	3,381
Soft Wheat*	82.9	518	71.8	449
Rice as Paddy Equivalent	683.0	4,269	545.7	3,411

Note : * price supported commodity.

Source : Official Gazettes and collection by the Study Team

6.1.3 Economic Cost

The cost estimation is performed firstly by disintegrating costs of works, materials, fuel, wage etc. into foreign and domestic currency portions. Economic prices of costs are derived from a conversion of these portions, by multiplying the former, or imported components with 1.000, the latter, or domestically procurable components with three kinds of conversion factors according to their price components, viz., 0.888 as standard conversion factor applied to pure material and engineering service, 0.836 as the factor for consumable goods, fuel and skilled labor, fuel and 0.630 for the factor of un-skilled labor wage applied to manual labor. After these factors are multiplied to the domestic currency portion of the project costs, the converted portions are again integrated to obtain cost prices as the term "economic price". The economic costs are applied to initial investment costs, replacement costs of facilities and operation/maintenance as well as crop and livestock production costs where water fee is excluded avoiding overlapping.

The estimation of crop and livestock production costs for which international cost data are not available is similarly made employing 1.000 for chemicals, the coefficient of un-skilled labor for the conversion of hired and self-supplied farm labor, that of consumer goods for seed and fertilizers, and that of standard conversion factor for machinery depreciation cost. As a result, production costs of labor intensive crops turn out to be less expensive owing to lower rate of un-skilled labor, while those with higher rate of farm machinery operation, such as cereals, tend to have higher costs. In addition, those for the crops with higher rate of chemical spray are affected by the highest conversion rate, for chemicals are mostly imported though other input materials can be domestically provided. In this regard, import tariff is omitted since it is a mere internal transfer within the country.

6.1.4 Evaluation by Economic Prices

The result of cost-benefit calculation based on economic prices for the 10 priority projects and the aggregate of these during the project life are summarized in Table 6.1.3. The unit of net values in this evaluation is expressed in US$ basis as of July 1997.

Table 6.1.3 Evaluation Result by Economic Price

unit of benefits: 1,000 US$

Project	Life spun	Mean annual B.	Net Benefit/year	B/C ratio	E.I.R.R.
Hacilar	50	582.7	1.12	2.67	41.4%
Urunlu	30	553.7	1.19	3.17	36.7%
Kalesekisi	50	1,452.7	6.92	4.13	55.6%
Camlibel	50	3,672.0	2.69	5.07	30.6%
Kozluk	50	1,347.8	2.45	1.84	43.8%
Kuskara	30	83.9	0.72	2.15	26.5%
Ozdenk	50	555.5	4.40	3.64	15.7%
Aslanlar	30	1,480.6	5.92	2.29	50.4%
Ilyaskoy	50	101.6	0.94	1.94	18.5%
Kucuk Karistiran	30	420.3	3.50	2.49	52.6%
aggregated	-	-	2.99	2.86	34.9%

Note : B stands for benefit, C for cost, E.I.R.R. for economic internal rate of return

On the whole, as shown in this table, considerably high project benefits are estimated, among which three projects with orchard as major crops have marked rates above 50%, higher than other ones, reflecting higher level of international market prices of fruits. However, these projects accompany with longer embryonic periods, leading to rather conservative range of B/C ratio not larger than 5 because of sluggish benefit appearance. In contrast, indicators of Ilyaskoy and Ozdenk show poor values by the reasons that not only the initial cost is prohibitive but they have higher rate of crop acreage the supply of which in the world market has been affluent. I.R.R. for the projects with higher rate of grains among irrigated crops show intermediate levels.

Table 6.1.4 Project Cost Levels of Priority Projects (Unit: trillion TL million TL/ha)

Project	Total cost	Initial C.	Replace	O.M.	Produc-tion	D.O. Per ha equivalent				Produc-tion	Per ha Benefit
*sum of 30 years	Amount during project life					Total cost	Initial C.	Replace	O.M.		
Hacilar	16,009	490	556	3,674	5,251	30.66	0.94	2.25	7.04	11.24	41.91
Urunlu*	1,749	190	291	308	1,749	3.76	0.41	0.87	0.66	3.76	8.16
Kalesekisi	2,883	268	396	263	2,004	26.20	2.44	3.16	2.39	18.22	41.88
Camlibel	6,963	303	0	35	12,361	5.10	0.22	0	0.03	9.04	23.28
Kozluk	9,882	276	0	27	6,661	17.97	0.50	0	0.05	12.11	5.31
Kuskara*	334	56	23	54	202	2.85	0.48	0.20	0.46	1.73	4.55
Ozdenk	1,970	413	43	43	1,429	15.63	3.28	0.34	0.34	11.34	5.20
Aslanlar*	3,637	239	447	163	2,486	14.55	0.96	1.79	0.65	9.94	8.45
Ilyaskoy	1,425	278	396	69	682	11.87	2.32	3.30	0.57	5.68	3.42
K. Karistiran*	1,285	70	96	106	1,013	10.71	0.58	0.80	0.88	8.44	7.34

Table 6.1.5 Sensitivity Analysis by Economic Price

Case of variation	Increment of Initial, Replacement and Operation/Maintenance Costs				Case of Degraded Benefits from Crop and Livestock Performance				Co-incidence of both variations	
Range of variation	20%		30%		20%		30%		30% rise + 30% drop	
Indicators	B/C	E.I.R.R	B/C	E.I.R.R	B/C	E.I.R.R	B/C	E.I.R.R	B/C	E.I.R.R
Hacilar	2.51	35.7%	2.44	33.4%	2.14	31.6%	1.87	26.1%	1.71	20.2%
Urunlu	2.85	31.0%	2.71	28.7%	2.53	28.4%	2.22	23.9%	1.90	17.8%
Kalesekisi	3.94	48.4%	3.85	45.6%	3.31	41.5%	2.89	34.3%	2.69	28.0%
Camlibel	4.92	27.3%	4.85	25.9%	4.06	25.6%	3.55	22.7%	3.39	19.0%
Kozluk	1.72	35.6%	1.66	32.2%	1.47	27.1%	1.29	18.0%	1.20	11.9%
Kuskara	2.04	22.5%	1.99	20.9%	1.72	18.4%	1.50	14.0%	1.39	10.2%
Ozdenk	3.36	13.4%	3.24	12.4%	2.91	12.3%	2.55	10.5%	2.27	8.1%
Aslanlar	2.20	43.9%	2.15	41.2%	1.83	35.6%	1.60	27.7%	1.51	21.9%
Ilyaskoy	1.86	15.6%	1.82	14.4%	1.55	12.2%	1.36	8.8%	1.27	6.2%
K.Karistiran	2.40	46.2%	2.37	43.6%	1.99	38.1%	1.74	30.3%	1.66	24.7%
10PROJECTS	2.72	30.0%	2.66	28.0%	2.59	25.9%	2.00	20.9%	1.86	16.2%

The sensitivity analysis shown above shows that no project happens to cut into cost by the increment up to 30% of the total project cost including initial cost, replacement and O/M, nor by the failure of attaining target benefit by 30%. In the case that both of these occasions happen the return for two projects, Ilyaskoy and Ozdenk as already stated drops into one-digit order, but still benefit can offset cost. In two other project sites, Kuskara and Kozluk, B/C ratio stays below 1.5. In all the projects crop production cost accounts for by far larger portion of the total coat, in other words increment thereof may affect more seriously than that of construction cost or of other cost components. In the projects where the acreage rate of orchard keep higher level, initial cost can be recovered in earlier years in spite of longer embryonic period, thus having more cost-effective background against variations of project cost and benefit performance.

6.1.5 Evaluation by Financial Price

The result of financial cost-benefit calculation during project life-span for each of ten priority projects and the aggregate project is given in Table 6.1.6. The evaluation is also described in US$ but converted figures into million Turkish Lira as of July 1997 are attached thereto.

Table 6.1.6 Evaluation Result by Financial Price

Unit: trillion TL million Tl/ha (figures in brackets in trillion TL)

Project	Life span	Mean annual B.	Net Benefit /year	B/C ratio	F.I.R.R.
Hacilar	50	1,250 (200)	2.4 (0.38)	1.90	18.7%
Urunlu	30	449 (72)	1.0 (0.16)	2.32	33.3%
Kalesekisi	50	604 (97)	2.9 (0.46)	2.71	25.3%
Camlibel	50	1,367 (219)	1.0 (0.16)	1.87	33.8%
Kozluk	50	365 (58)	0.7 (0.11)	1.42	17.7%
Kuskara	30	111 (18)	1.0 (0.15)	2.59	28.2%
Ozdenk	50	82 (13)	0.7 (0.10)	1.39	4.4%
Aslanlar	30	440 (70)	1.8 (0.28)	1.63	25.7%
Ilyaskoy	50	51 (8)	0.5 (0.08)	1.36	4.2%
Kucuk Karistiran	30	183 (29)	1.5 (0.25)	1.70	28.6%
Aggregate Project	42	601 (96)	1.6 (0.25)	2.10	26.9%

Contrary to evaluation by economic price, the cost in financial analysis includes land acquisition cost but it neglects any past expense paid to deep wells and others that are planned to utilize in the proposed projects. This leads to higher apparent cost-effectiveness of Camlibel that accompanies with DSI water source allocation, three projects with ground-water source and already irrigated Kuskara where only the cost for newly built supplemental water source is counted but past payment is omitted as sunk cost.

What differs most from evaluation result by economic price lies in the point that the rate of contribution by industrial crops keeps high levels, hence higher cost-effectiveness is observed in the project sites where acreage covering rate of such crops remains high. Two projects planned with dams as water source except for Hacilar has lower cost-effectiveness where benefit can barely offset cost. Likewise, in two others with weirs serving water source operation costs for water pumps stay at a prohibitive level affecting project return, leading to lower rte of return. In the case of Camlibel, though it does not have much lucrative crops in its crop composition, but economy of scale comes into effect in a way to bring higher rate of return. Yet, the size of benefits derived from saving in machine fuel, farm labor brought about by land consolidation do not account for much as compared to yield and diversification benefits.

No project has such higher rate of return above 50% as observed in the evaluation by economic price, since horticultural produce does not contribute so much as done in the case of economic price to benefit output. Similar to the case of evaluation by economic price, length of project life does not affect any of evaluation indicators, rather, projects with their water source relying on ground-water have higher return despite shorter life span.

Table 6.1.7 Sensitivity Analysis by Financial Price

Case of variation	Increment of Initial, Replacement and Operation/Maintenance Costs				Case of Degraded Benefits from Crop and Livestock Performance				Co-incidence of both variations	
Range of variation	20%		30%		20%		30%		30% rise + 30% drop	
Indicators	B/C	F.I.R.R	B/C	F.I.R.R	B/C	F.I.R.R	B/C	F.I.R.R	B/C	F.I.R.R
Hacilar	1.80	15.6%	1.75	14.3%	1.52	12.4%	1.33	8.8%	1.22	5.7%
Urunlu	1.97	27.1%	1.88	24.9%	1.73	18.1%	1.52	23.3%	1.31	11.6%
Kalesekisi	2.45	16.2%	2.38	15.3%	2.08	13.4%	1.82	10.9%	1.67	8.7%
Camlibel	1.86	30.3%	1.83	28.9%	1.50	21.8%	1.31	15.1%	1.30	12.9%
Kozluk	1.41	15.5%	1.40	14.1%	1.14	7.4%	0.99	-	0.98	-
Kuskara	2.40	23.8%	2.32	22.0%	2.07	20.8%	1.82	16.8%	1.62	12.4%
Ozdenk	1.24	3.1%	1.21	2.6%	1.05	0.8%	0.92	-	0.85	-
Aslanlar	1.41	19.4%	1.37	17.6%	1.20	12.2%	1.05	4.1%	0.96	-
Ilyaskoy	0.99	-	0.94	-	0.66	-	0.87	-	0.66	-
K.Karistiran	1.60	24.3%	1.56	22.6%	1.33	16.5%	1.15	9.6%	1.08	5.6%
Aggregate project	2.04	23.2%	2.01	21.7%	1.68	18.6%	1.47	14.0%	1.40	10.7%

The result of sensitivity analysis implies that two projects with water source dependent on dams have lower rates of return. In particular, initial cost stays so dear for smaller beneficial areas in Ilyaskoy that an increment of the investment by less than 20% makes B/C ratio drop below 1, implying a critical situation. As to other projects, Kozluk and Ozdenk come to cut into break-even point when their facility costs increase by 30%, while Aslanlar fails to keep B/C ratio above 1 if a 30% increase of its facility cost coincides with a failure of realizing target benefit by 30%. On the contrary, Hacilar and Camlibel still keep high return rates above 20% even these overlapped burdens may take place.

Kalesekisi has a similar vulnerability in towards variable benefit, so do two ground-water projects, i.e., Aslanlar and K.Karistiran. Two other ground-water based ones (of which one is registered as soil conservation) have rather high and stable return, attributable to less biased crop composition and relatively inexpensive construction as well as O.M. costs.

Although a structural inflation with the annual rate as high as 80% has continued for years in Turkey, it's not at all necessary to comply the levels of project return with the price escalation rate by inflation, because price levels of agricultural products has proportionally risen to this rate year after year.

What is assessed above draws a conclusion that the plans for ten priority projects are proved economically feasible for their implementation though some differences in cost-effectiveness do exist among themselves. In addition to tangible evaluation presented above, a impact of implementing irrigation projects as means of rural development can be counted for an intangible effect. This is attributable to so-called a chain reaction triggered by an expansion of cropped acreage, fostering more opportunities for farm labor, augmenting demand for mobilizing family labor as well as hired one. It follows in such a way that increased farm products accelerate expansion of processing and transport to markets, thus leading to improved income for rural households and subsequent fortified purchasing power. Finally, all these innovation will result in the promotion of the whole rural enterprises related to agriculture, including both downstream and upstream sides of chain goods/service flow, coupled with a catalyzed effects of expansion in rural investment and off-farm employment. These developments surely serve for limiting population exodus from rural communities and activate rural industrial or commercial activities.

6.2 Environmental Impact

(1) Impact to Natural and Social Environment

The environmental impact in the project areas was shown in Table 6.2.1. The following could be pointed out from this Table.

- The socio-economic conditions in the project areas will improve, and increase of population is expected
- The project will result in an increase of employment in the areas, and the income levels of the local population are expected to rise
- There is no problem on the Ramsar Convention because there is no call sites for migrating birds in the projects area
- Improved farming practices using modern irrigation techniques will result in a higher productivity and better quality agricultural products
- The residual matters of agricultural products is utilized for compound agriculture with stock raising which will enable sustainable land use
- On the other hand, the projects will induce increasing fertilizer application for crop production, but there might be fear of salinity and salt accumulation to surface layer
- Increase of used agrochemicals might cause soil pollution by remained toxicity

(2) Mitigation Measures

The following mitigation measures are proposed to reduce the negative effects of the development on the project area (refer to ANNEX G.).

1) Soil erosion

The soil erosion classes in project area are from 1 to 3 (slight to severe). The erosion is mainly water erosion, and dispersed soil particles are washed to downhill or downstream. This kind of erosion results in not only increased loss of topsoil but also loss of water and nutrient holding capacity.

For the prevent of soil erosion, mitigation measures are as follows.

- Contour farming
- Strip cropping
- Terracing
- Cover with permanent vegetation

2) Soil salinity

Soil salinity refers to the surface or near-surface accumulation of salts, mainly chlorides, sulfates and carbonate of sodium, calcium and magnesium. Such salt accumulation reduces the soil pores and the ability to hold air and nutrients. And, high salt concentration could be toxic to many crops.

For the prevent of soil salinity, mitigation measures are as follows.

- Selection of suitable crops and establishment of cropping pattern
- Suitable fertilizer control corresponding to the demand amount of crops
- Introduction of irrigation method to fit property of soil physical and chemicals
- Suitable drainage control by leaching water

3) Soil and soil layer improvement

The irrigation project is proposed which will lead to higher agricultural productivity. For the maintenance of soil fertility, it should be needed to improve soil physical, chemical, and biological conditions. This result connects to increase and continuance of soil fertility.

For the soil and soil layer improvement, mitigation measures are as follows.

- Return compost and manure to the soil for soil fertility and soil buffer action
- Removal gravel from soil layer for agricultural management

4) Agrochemicals

Agrochemicals for insecticide, acaricide, and herbicide are widely used in the project areas. Large quantity of input of agrochemicals might remain as residue to the soil which may cause accumulation to human body. The agrochemicals which are banned by an advance country should be carefully dealt with.

The following point should be given the attention in case of using agrochemicals.

- Prohibition of agrochemicals of strong toxicity
- Minimum application in the growth period and prohibition in the harvest time
- Development of ecological control by using the insects etc.

Table 6.2.1 Environmental Impact in the Priority Project Areas

Environmental Item	Priority Project Area									
	1	2	3	4	5	6	7	8	9	10
1. Planned residential settlement	○	○	○	○	○	○	○	○	○	○
2. Involuntary resettlement	○	○	○	○	○	○	○	○	○	○
3. Substantial changes in the way of life	○	△	△	○	○	○	○	○	○	○
4. Conflict among communities and people	○	△	△	○	○	○	△	○	○	○
5. Impact on native people	○	○	△	○	○	○		○	○	○
6. Population increase	△	△	△	△	○	○	△	○	○	○
7. Drastic change in population composition	○	○	○	○	○	○	△	○	○	○
8. Changes in bases of economic activities	○	○	○	○	○	○	○	○	○	○
9. Occupational change and loss of job opportunities	○	○	○	○	△	○	○	○	○	○
10. Increase in income disparities	○	○	○	○	○	○	○	○	○	○
11. Adjustment & regulation of water or fishing rights		△	○	○	○	○	○		○	
12. Changes in social and institutional structures	○	○	△	○	○	○	○	○	○	○
13. Changes in existing institutions and customs	○	○	○	○	○	○	○	○	○	○
14. Increased use of agrochemicals	○	△	△	△	○	○	△	●	●	△
15. Outbreak of endemic diseases	○	○	○	○	○	○	○	○	○	○
16. Spreading of endemic diseases	○	○	○	○	○	○	○	○	○	○
17. Residual toxicity of agrochemicals	○	△	△	△	○	○	○	○	○	○
18. Increase in domestic and other human wastes	○	○	○	○	○	○	△	○	○	○
19. Impairment of historic remains and cultura assets	○	○	○	○	○	○	○			
20. Damage to aesthetic sites	○	○	○	○	○	○	○	○	○	○
21. Impairment of buried assets	○	○	○	○	○	○	△	○	○	○
22. Changes in vegetation	○	○	○	○	○	○	○	○	○	○
23. Negative impact on important fauna and flora	○	○	○	○	○	○	○	○	○	○
24. Degradation of ecosystems with biological diversity	○	○	○	○	○	○	○	○	○	○
25. Proliferation of exotic and/or hazardous species	○	△	△	○	○	○	○	○	○	○
26. Destruction of wetlands and peat lands	○	○	○	○	○	○	○	○	○	○
27. Decrease of tropical rain forest and wild lands					○	○				
28. Destruction or degradation of mangrove forests					○	○				
29. Degradation of coral reefs					○	○				
30. Soil erosion	○	○	○	○	○	○	○	○	○	○
31. Soil salinization	○	○	○	○	○	○	○	○	○	○
32. Deterioration of soil fertility	○	○	○	○	○	○	○	○	○	○
33. Soil contamination by agrochemicals and others	○	△	△	△	○	○	○	○	○	○
34. Devastation or desertification of land	○	○	○	○	○	○	○	○	○	○
35. Devastation of hinterland	○	○	○	○	○	○	○	○	○	○
36. Ground subsidence	○	○	○	○	○	○	○	○	○	○
37. Change in surface water hydrology	○	○	○	△	○	○	○	○	○	○
38. Change in ground water hydrology	○	○	○	△	○	○	○	○	○	△
39. Inundation and flooding	○	○	○	○	○	○	○	○	○	○
40. Sedimentation	○			○	○	○	○	○	○	○
41. Riverbed degradation	○			○	○	○	○	○	○	○
42. Impediment of inland navigation				○	○	○				
43. Water contamination and deterioration of water quality	○	○	○	○	○	○	○	○	○	○
44. Water eutrophication	○			○	○	○	○	○	○	○
45. Sea water intrusion				○	○	○				
46. Change in temperature of water	○	○	○	○	○	○	○	○	△	○
47. Air pollution	○	○	○	○	○	○	○			

Note: 1. Significant Environmental Impact(SEI) classes are shown as follows.

●: The subject SEI is unquestionably induced by the Project.

△: The subject SEI is likely to be induced or not fully known by the Project.

○: There is no possibility that the subject SEI is likely to be induced by the Project.

Blank: Excluded environmental item.

2. Number of project area is shown name of project as follows.

1. Hacilar Project	6. Kuskara Project
2. Urunlu Project	7. Ozdenk Project
3. Kalesekisi Project	8. Aslanlar Project
4. Camlibel Project	9. Ilyaskoy Project
5. Kozluk Project	10. K. Karistiran Project

CHAPTER 7 GUIDELINE FOR PROJECT PLANNING

7.1 Guideline for Planning

7.1.1 Land Use and Cropping Pattern

(1) Land Use Plan

Land use plan contains following two matters, these are (a) Definition of project area and (b) Dividing the land by the utilization.

On the definition of project area, outline of the project area can be defined at first, considering the soil characteristics, topography, existing land use, demand of land area for plan and so on. Then adjusting with other plans such as water use plan, irrigation plan, agricultural production plan and facility constructing plan, the project area and border should be defined. On the definition of project are, following data and materials are requested; soil characteristics, land classification map, topography map, existing agricultural land use map, data on land ownership, water resources and quantity of water, boundary map of the villages and so forth.

On the dividing the land by use, put the roughly line on project area map at first, considering the existing land use, natural and social conditions of the area, demand of crops by market and the topography of the area. Then the land use must be defined adjusting with other plans such as water use plan, agricultural production plan.

(2) Cropping System and Agricultural Production Plan

Agricultural production plan means to find the ways for maximum agricultural production under the limited land and water resources. It contains following items; (a) Selection of promising crops and definite their area, (b) Irrigation and cropping plan, (c) Crop production and supporting services plan (d) Livestock production plan (e) Shipping, marketing and farming plan.

These plans are relating each other, so, it should be defined with adjusting mutually with other plans. Suitable and promising crops should be selected considering the cropping season, adaptability to irrigation, demand of market, water resources, natural and social conditions in the area and farmer's willingness and experiences, etc. Then make the cropping plan and target yield. On the irrigation, quantity of water used for irrigation, natural condition of the area and crop characteristics must be considered on the definition of irrigation methods. Irrigation affect also to the cultivation methods of crops, so, it is necessary to make the manuals for crop cultivation and agricultural supporting service system. Livestock production plan must be proposed basing on the existing breeding system. Artificial insemination, selection of high productive strains and forage production plan should also be included in the livestock production plan.

Many data on crop and livestock production in the area are requested to make the cropping system and agricultural production plan.

7.1.2 Water Source

(1) Water Source

Probable water sources are either surface runoff or groundwater. Surface runoff shall firstly be examined in preparing any irrigation project, and then the possibility of depending on groundwater shall be followed. As long as continuous flow can be expected over a year, no storage facilities such as dam or pond will be required. However, in case that the flow shows up periodically, storage mean shall be considered and a site at which storage can be made shall be searched with a help of topographic maps and filed observations.

(2) Estimation of Available Water

Existing runoff data, concerning the project area or its vicinity, shall firstly be collected as long period as possible, say usually at least more than 10 years. The runoff data shall be analyzed in such terms of annual, monthly, wet season, dry season, average, dry year, wet year as well as with probabilities of P50, P80 and P90%. Also, checked is progress of related works in the same project area, which have been put into implementation program.

In case that no runoff measurement has been done or otherwise existing data cannot be well applied to the project concerned, runoff measurement shall be programmed and conducted prior to the discharge of feasibility-level-study. The measurement will be carried out at the place from which water is to be taken, but shall be free from unregulating back-water, unstable river bed movement and intake by other facilities. Though the better the measurement period is long, the more accurate the estimation of available water can be made, at least two (2) years continuous measurements shall be executed.

In case of groundwater project, hydrogeological investigation shall be carried out, based on which geological formation of the foundation including fissures and faults shall be grasped. The source of the groundwater shall also be identified. Pumping test shall be carried out in all wells, and the yields shall be referred to in designing the project.

An empirical method is sometimes employed in estimating runoff discharge based on rainfall. Empirical method shall, in principal, be used in such way of supplementing insufficient runoff measurements. Most commonly used in Turkey is M. Turc. This method is quite practical to use. However, the deviations, emerging when the parameters of the formula apply to the catchment area, deteriorate the reliability of the method.

When M. Turc formula is used, the catchment area's geological characteristics must be taken into consideration. The results can be extremely misleading especially in cavernous areas such as Karst formation or characterized with great number of faults.

Occasionally there may be a continuous flow in a catchment area irrelevant to rainfall. The source of the flow shall be searched with a mean of hydrogeological investigation, which give an additional amount of water to the existing water productivity to be calculated by M. Turc formula. M. Turc method was developed based on the observations he had made on 254 present catchment areas (basins) under all climatic conditions over the world. The formula is presented below:

$$D = P / (0.9 + (P/L)^2)^{0.5}$$

$$L = A + 25\,T + 0.05\,T^3$$

Where D = annual average loss in the catchment area, mm
P = annual average precipitation in the catchment area, mm
A = Coefficient (depending upon basin)
T = annual average temperature, Celsius degree

Coefficient of "A" have been already determined for the 26 main catchment areas in Turkey (can be referred to in REZERVUAR HIDROLOJISI SEMINER NOTLARI, Table 2 in page 8), and practical limit in use is minimum of zero (0) and maximum of 300.

"T", annual average temperature, is determined with the temperatures recorded by the climatic station which is recognized as the station representing the catchment area, and by making latitude and altitude adjustments. This adjustment is based on the assumption that when an 1°, that is 60', movement is made to the north, the temperature will decrease by 1°C, and when the altitude increases by 200m, the temperature will decrease by 1°C.

It is very important to estimate the average precipitation in M. Turc method accurately. Therefore, such points must be taken into consideration as, 1) the average spot height and the direction of the catchment area important in selecting the climatic station representing the catchment area, and 2) average precipitation over a large catchment area, to be estimated based on several climatic stations.

As shown above, annual average loss "D" is calculated by placing the L parameter that is calculated according to the precipitation and temperature. Then annual flow discharge "H" and catchment area water productivity are calculated as follows:

$$H = P - D$$

$$V = CA \times H \times 10^3$$

Where H = annual flow discharge, mm
P = annual rainfall, mm
D = annual average loss in M. Turk formula, mm
V = water productivity, m^3/year
CA=catchment area, km^2

The reliability of the water productivity above shall be verified with the flow observations to be made during winter and spring, information to be obtained from the local people, water potential of the similar or adjacent catchment areas, and precipitation - discharge analysis of a dam if any.

(3) Water Qualities

The typical problems, caused in relation to water quality, are 1) salinity, 2) water infiltration rate, 3) specific ion toxicity, and 4) other miscellaneous problems. FAO Irrigation and Drainage Paper No. 29 (Rev. 1) gives a guideline of water quality for agricultural usage. Following table refers to the guideline values, giving suggestions for potential irrigation problems:

Table 7.1.1 Guideline of Water Quality for Agricultural Usage

Problems	Unit	Degree of Restriction on Use		
		None	Slight to Moderate	Severe
Salinity				
EC_w	dS/m	<0.7	0.7 - 3.0	>3.0
TDS	mg/l	<450	450 - 2000	>2000
Infiltration				
SAR = 0-3 & EC_w =		>0.7	0.7 - 0.2	<0.2
SAR = 3-6 & EC_w =		>1.2	1.2 - 0.3	<0.3
SAR = 6-12 & EC_w =		>1.9	1.9 - 0.5	<0.5
SAR = 12-20 & EC_w =		>2.9	2.9 - 1.3	<1.3
SAR = 20-40 & EC_w =		>5.0	5.0 - 2.9	<2.9
Specific Ion Toxicity				
Sodium (Na)				
Surface Irrigation	SAR	<3	3 - 9	>9
Sprinkler Irrigation	me/l	<3	>3	
Chloride (Cl)				
Surface Irrigation	me/l	<4	4 - 10	>10
Sprinkler Irrigation	me/l	<3	>3	
Boron (B)	mg/l	<0.7	0.7 - 3.0	>3
Miscellaneous				
Nitrogen (NO_3-N)	mg/l	<5	5 - 30	>30
Bicarbonate (HCO_3)	mg/l	<1.5	1.5 - 8.5	>8.5
pH		Normal range 6.5 - 8.4		

Source: FAO Irrigation and Drainage Paper No.29 (Rev.1) p8

1) Salinity Problem

Salinity problem most commonly shows up among the problems mentioned above. Yield reduction comes in sight as the salts accumulate in the root zone to such an extent that the crop can no longer extract water enough for sustaining sound growth. The symptoms coming from salinity problems are similar to those of drought in appearance; namely, wilting, darker and bluish-green color and sometimes thicker leaves.

Most commonly practiced is leaching in order to avert salinity problems. Leaching controls salinity level building up in the soil and over time salt removal by leaching must be equal or exceed the salt additions from the irrigation water applied. The leaching requirement depends on the water quality and the salinity tolerance of the crop. FAO Irrigation and Drainage Paper No. 29 (Rev. 1) gives the way to estimate how much leaching amount shall be taken into consideration. The amount of leaching water is calculated in order to allow desalination of a given root zone and groundwater. Also, leaching requirement is explained as the minimum amount of irrigation water supplied that must be drained through the root zone to control soil salinity at the given specific level.

To estimate the leaching requirement, both the irrigation water salinity (ECw) and the crop tolerance to soil salinity (ECe) have to be known. The water salinity can be obtained from either laboratory analysis or field measurement. While, crop tolerance to soil salinity (ECe) should be estimated from appropriate crop tolerance data. FAO Paper No.24 and No.29 (Rev. 1) provide these crop tolerance data.

Following equations are given to calculate the required leaching amount (FAO Paper No.24):

LR = ECw / (5ECe - ECw) (1) in case of surface and sprinklers, not frequent irrigation
LR = ECw / 2Max(ECe) (2) in case of drip and high frequent sprinkler, nearly daily

Where: LR= the minimum leaching requirement needed to control salt within the tolerance (ECe) of the crop
Ecw= electrical conductivity of the irrigation water, mmhos/cm
Ece= electrical conductivity of the soil saturation extract for a given crop, refer to Table 36 in FAO paper No. 24
Max(ECe)=maximum tolerable electrical conductivity of the soil saturation extract for a given crop

AW = ET / (1 -- LR)

Where: AW= depth of applied water (mm/year)
ET= total annual crop water requirement (mm/year)
LR= leaching requirement

It also may be known that a part of irrigation losses contribute to leaching. Seepage may be regarded as leaching, however it is very difficult to estimate how much percentage of the field irrigation losses evaporate and how much percentage percolate into the ground (this could be a part of leaching). This may be the reason why any part of field losses is not usually undertaken in estimating the leaching amount. However, such practice, for which a part of losses contributes to leaching, may be accepted under critical water availability if it carried out in connection with monitoring.

Another influential factor to salinity problem is shallow groundwater table. Salts accumulate in this groundwater and become additional source of salt which moves upward into the crop root zone. Therefore, keeping groundwater table low, with a mean of drainage facilities, enough not affecting crop root zone is essential to cope with salinity problems in combination with leaching. In brief, salinity problem could be overcome by both introducing leaching and draining the additional water in order not to get the groundwater table risen.

2) Infiltration Problem

Infiltration problem comes up when the irrigation water does not enter the soil easily enough to replenish the soil during a normal irrigation cycle. Infiltration problem often causes soil erosion as well especially when irrigation is done on a relatively steep land. An infiltration rate as low as 3mm/hour is considered low while a rate above 12mm/hour can be said relatively high.

Two factors are well known to influence infiltration rate, which are the salinity of irrigation water (total saline quantity in the water) and its sodium content relative to the calcium and magnesium content. A low salinity water or a water with a high sodium to calcium will decrease infiltration rate. Low salinity water, less than 0.5dS/m and especially below 0.2dS/m, is corrosive and tends to leach surface soils free of soluble minerals and salts, especially calcium. This contributes to reducing that strong stabilizing influence on soil aggregates and soil structure. Excessive sodium in irrigation water also urges soil dispersion and its structural breakdown but only if sodium exceeds calcium by more than a ratio of approximately 3:1. Relatively high sodium content to calcium often results in a severe water infiltration problem because of soil dispersion and then sealing the surface pores, in much the same way as does very low salinity water.

Control of infiltration can be done either chemically or physically. Chemical practice is usually done by adding a chemical amendment to either the soil or the water. Such amendments, when added to soil or water, will increase the calcium concentration, thus reducing the sodium to calcium ratio. Gypsum is the most commonly used and widely available amendment. Also, acids or acid-forming amendments furnish calcium to soils, however lime has to be present in the soil. Sulphur and sulphuric acid are both practiced extensively.

Physical methods keep the soil open by mechanical means. These include cultural practices that can be expected to improve or maintain infiltration rates during periods of irrigation or rainfall. The most common physical methods are cultivation and deep tillage, both of which are effective but usually short-lived. Organic residues, crop residue and other organic matter, left in farming land will also improve soil permeability. An organic application in the range of 10 to 30% by soil volume in the upper 15cm may be needed to be effective.

3) Specific Ion Toxicity and Miscellaneous Problem

The ions, which give some toxicity to crop, are chloride, sodium and boron. Damage often occurs at relatively low ion concentrations for sensitive crops. It is usually observed with marginal leaf burn and interveinal chlorosis, leading to yield reduction. Those toxicity can be mitigated with a mean of leaching in a manner similar to that for salinity control, cultural practices such as land grading, profile modification and artificial drainage, and also selecting more tolerable crop to toxicity.

Other miscellaneous problems are those of 1) excessive nutrients which reduces yield or quality, 2) ugly deposits on fruits, reducing marketability, 3) excessive corrosion of equipment, requiring cost of maintenance and repairing, 4) and others.

7.1.3 Irrigation

(1) Crop Water Requirement

On condition that such climatic data are available as temperature, humidity, wind and sunshine duration, Modified Penman method usually gives the most satisfactory results in estimating reference crop evapotranspiration (ETo) and is recommended to apply in this guideline. The equation is presented below, and can be calculated easily by using a program such as Cropwat, already available in GDRS, developed by FAO:

$$ETo = C \, [\, W \times Rn + (1-W) \times f(u) \times (ea-ed) \,]$$

Where:
- ETo = reference crop evapotranspiration, mm/day
- W = temperature related weighting factor
- Rn = net radiation in an equivalent evaporation, mm/day
- f(u) = wind related function
- (ea-ed) = difference between the saturation vapour pressure and the mean actual vapour pressure, mbar
- C = adjustment factor for day/night weather condition

This Study produced every provincial based reference crop evapotranspiration (see ANNEX E-5), and those can be referred to in survey level studies.

Crop evapotranspiration (ETcrop) is calculated as below. Crop coefficient (Kc) is the factor presenting effect of the crop characteristics. Values of Kc vary with the crop to be planted, its stage of growth, growing season and the prevailing weather conditions. Kc values can be taken from such publishments as 'TURKIYE'DE SULANAN BITKILERIN SU TUKETIMLERI REHBERI, Ankara 1982' and FAO Irrigation and Drainage paper No. 24.

$$ETcrop = Kc \times ETo$$

Where: ETcrop = crop evapotranspiration, mm/day
Kc = crop coefficient
ETo = reference crop evapotranspiration, mm/day

(2) Effective Rainfall

Rainfall, consumed by crops, is called effective rainfall. There are several methods estimating effective rainfall, among which following USBR method is very conventional and recommended in this guideline:

$$RFeff = RF \times (125 - 0.25 \cdot RF) / 125$$ .... RF less than or equal to 250mm

Where: RFeff = effective rainfall, mm
RF = rainfall, mm

Probability shall be taken into consideration. Meteorological data usually tends to have a bias in its distribution, therefore Log-Pearson Type III Distribution is recommended though normal distribution has so far been applied in Turkey in many cases.

The probability shall be estimated in such cases as 50% (once in every 2 years), 80% (once in every 5 years), and 90% (once in 10 years). When planing and designing irrigation system, 80% or 90% probability is to be considered. Probability of 90% is recommended in many cases, for the irrigation requirement is the amount subtracting P 90% effective rainfall from the gross irrigation water to be needed. Probability 80% may be put into practice under the condition of shortage of available water. This would cause irrigation water shortage once in every 5 years, leading to a water-related-dispute. Therefore, the planing and designing with probability 80% shall be informed to the beneficiaries in advance, and better water management shall also be oriented to the farmers during operation stage. Probability 50% is the case of calculating average annual operational costs such as fuel, lubricant and electricity.

(3) Irrigation Application Method

The choice of appropriate irrigation system is very important from the viewpoint of not only making efficient use of irrigation water but also having economical irrigation facilities. In choosing the systems, consideration should be given to the type of crops, type of soils, topographic condition, operating labor requirement, available energy, farm size, investment and O&M costs, domestic marketability, and familiarity to the farmers.

There are irrigation schemes such as flood, furrow, sprinkler, and drip. Flood and furrow, categorized into gravity or surface irrigation, requires less initial investment and yet less effective in term of water application. Furrow irrigation be planned as far as possible and the irrigation practice shall be oriented. When planning cash crops or market-oriented fruits, sprinkler and drip irrigation must be taken into consideration. In such cases that gravitational pressure can be used in terms of topographic condition, sprinkler or drip irrigation shall be given priority.

There are such sprinkler systems as hand-move sprinkler called half-fixed sprinkler, hose-pull sprinkler, fixed sprinkler, side roll, center pivot and liner move. In planning small-scale irrigation projects, hand-move sprinkler is firstly recommended. This system can be applied in a wide variety of soils and crops, and capital investment is the least in most cases. Though somewhat high labor forces are required, this can be managed by family work or by employing temporary workers.

(4) Irrigation Efficiency

Irrigation efficiency should be accounted in calculating the gross irrigation water requirement. The efficiency is normally sub-divided into three stages as 1) conveyance efficiency (Ec), 2) Field distribution efficiency (Ed) and 3) Field application efficiency (Ea). Then the overall irrigation efficiency is calculated by multiplying the aforementioned three efficiencies as Ec x Ed x Ea. The sub-divided efficiencies were detailed in Part I MASTER PLAN STUDY "5.2.3 Irrigation Efficiency". The overall irrigation efficiency, corresponding to the project type (water conveyance type) and the irrigation application method, is presented below:

Table 7.1.2 Summary of Overall Irrigation Efficiencies

Project Scheme	Basin	Furrow	Sprinkler	Drip	Remarks
Surface/Dam	0.49	0.53	0.64	0.73	Open Canal
Surface/Dam			0.68	0.77	Closed Pipeline
Groundwater	0.51	0.56	0.71	0.81	

(5) Conveyance Method

There are several water conveyance methods such as 1) open gravity, 2) closed gravity, 3) with-distribution-tank, 4) pump-direct, and 5) with-pressure-tank. Open gravity method accompanies open canal, while closed gravity is defined as a pipeline distribution system without pumped pressure. With-distribution-tank system provides a regulating tank with which demand and supply for the irrigation water can be regulated. This is usually constructed at outlet place of a pumping system, and can also have a role of night storage regulating pond. Pump-direct method is commonly employed in groundwater irrigation project equipped with sprinkler and drip. With-pressure-tank method is usually employed in a closed pipeline system for which no place is found for distribution tank because of the flat topographic condition.

In designing regulating tank, the regulating volume is calculated as follows, and the regulating hours shall refer to the present farming practices, for which farmers usually work on farm between 8 to as long as 22 hours a day.

$$V = ETcrop / (Ed \times Ea) \times 10 \times A \times RH/24$$

Where: V = capacity of regulating tank (or reservoir), cum

ETcrop = crop water requirement, mm/day

Ed = field distribution efficiency, 0.90 to 0.95

Ea = field irrigation efficiency, 0.55 to 0.90

A = command area of storage reservoir, ha

RH = regulating hours (usually 2 to 8 hours)

(6) Drainage Design

Drainage should be, at first, open-typed and buried pipe drainage system may later be planned in order to get water table well lowered. There also may be a case for which water clogging problem appears associated with excessive seepage water incurred by irrigation, requiring not only open type drainage but also buried pipe drainage system.

Open type drainage should be constructed in a form of unlined trench enough for draining excessive groundwater, and have enough section discharging not only drainage water but also excessive irrigation water which will be discharged into drain specially during night time. The amount of excessive irrigation water, which is discharged into drainage canal, is to designed to be about 20% of the total irrigation water.

In designing piped system, steady state flow equation can be applied:

$$q = (8 \cdot K \cdot d \cdot h)/S/S + (4 \cdot K \cdot h \cdot h)/S/S$$

Where: q = discharge rate per unit surface area, m/day
h = hydraulic head above drain level midway between the drains, m
K = hydraulic conductivity, m/day
S = drain spacing
d = thickness of the so-called Hooghoudt's equivalent layer

In practical application, a limitation should be imposed on maximum and minimum drain spacing despite the theoretical spacing. A minimum spacing of 20-30m and a maximum of 50-60m are recommended in a practical limit.

Concerning drain depth, groundwater table should be kept below certain depth in order to keep aeration to the root zone. FAO Irrigation and Drainage Paper No.38 suggests the following water table depth in meter below ground surface:

Field Crops:	1.0 m
Vegetables:	1.0 m
Tree Crops:	1.2 m

Drain depth is calculated by summing the design water table above, half the water table rise by the maximum individual recharge, and a residual hydraulic head of 0.1m. Assuming that the water table rise is 0.50m, following drainage depths are worked out, and these can be referred to as a reference:

Field Crops:	1.0 + 0.25 + 0.1 = 1.35 m
Vegetables:	1.0 + 0.25 + 0.1 = 1.35 m
Tree Crops:	1.2 + 0.25 + 0.1 = 1.55 m

Collector drains are usually constructed with plain concrete pipes for inside diameters varying between 15cm and 40cm, and with reinforced concrete pipes for diameters of more than 40cm. In deciding the drainable area in accordance with the pipe diameter and slope, Wesseling worked out following equation taking into consideration 25% reduction in the pipe section's area in order to allow for light sedimentation in the pipe (FAO Irrigation and Drainage Paper No. 9):

$$A = (1.91/q \times d)^{2.714} \times S^{0.57}$$

Where: A = drainable area under effective transport (ha)
q = discharge rate per unit surface area, mm/day
d = pipe inner diameter, cm
S = slope, %

7.1.4 Farm Economy

The following needs arise from sustainable and well-balanced farming in semi-arid zones:

(1) continue observance of cropping practices based on rational rotation patterns,

(2) establish farms in which crop production is combined with animal husbandry in a co-existent way, either within the same farm or inner-village division,

(3) desirably provide agro-related or livestock-linked industries like processing, storage and transport of agricultural products where surplus rural labor force can be mobilized, so that more value can be added to local produce and rural economy may become viable.

At the same time, as a long term target, it is relevant that village farmers groups participate in the creation of outlet and marketing channels through their direct investment. Such channels serve as a terminal chain of marketing flow of perishables etc., meeting consumer demand in urban agglomerates. This type of farmers' involvement is worthwhile not only to allocate wealth equitably and rationally in healthier development of national economy, but to strengthen purchasing and bargaining power of rural population in a state-wide scale. Irrigation projects can contribute to the fulfillment of well-balanced distribution of wealth, since they can provide water and benefits homogeneously throughout farmland existing within the designed tracts, irrespective of whether land is owned by the poor or by well-off stratum.

Possible changes envisaged in implementing irrigation projects include:

- more intensive land use, less fallow land or rain-fed acreage within a range of available water quantity for irrigation,
- in irrigated plots, higher cropping intensity of industrial and other cash-crops rather than that of self-consumed ones,
- linked with the above-cited development, higher amount of input payment per farm household follows,
- labor-intensive and more lucrative crops are more readily employed, entailing in increased hiring labor demand on farm practices during labor-peak season,
- eventual more frequent farm employment opportunities in contrast to declining investment and labor input into less remunerative and labor-consuming livestock sector.

Along the above mentioned sequence of development, small holders can enhance their gain from their irrigated plots in one hand, simultaneously they can receive more farm labor wage or transfer from well-off neighbors who can afford to hire them on the other, thus eventually more equitable distribution of transferable goods will be realized.

In terms of farm economy, as a return to augmented management cost in the form of individual burden for water fee after the implementation of an irrigation project, how to maximize the relative profit envisaged from irrigated crops in comparison to that from hither-to rain-fed ones holds a key issue. As a matter of course, cases arise in such a way that only crop yields have to be raised without converting part of crops such as already planted perennial tree crops. Choice of relevant crops to irrigated systems depends wholly upon farmers' own preference, however, general criteria for crop selection are employed by farmers to determine crop composition:

- taking account of current cropping techniques and risk levels, avoiding risky alternatives that require higher technology and investment in a renovative way,
- trying to identify remunerative crops by comparing production cost and net gain per hectare or decare,
- selecting crops for sale as irrigated ones as far as possible, instead of those for home consumption,
- trying to mobilize owned land and idle family labor as much as possible, where current cropping pattern is served as a base of comparison,
- establishing and faithfully observing a suitable rotation system in order to make farming fully sustainable,
- in the case that methods of irrigation has already been decided, suitable crops and their combination of rotation for the employed irrigation system should be selected.

The relative rate of irrigation cost in the total production cost depends variably on crops, conditions of farming, type of water source and responsible entity for implementation, but an indicative range stays at 20 - 30% and an estimation using this range would lead a result without any substantial divergence from detailed cost estimation. While crop profitability varies considerably from a region to another, dependent upon yield levels, unit price and production cost (generally, the higher level the unit cost of a crop takes, the higher rate of production cost to gross profit). Sales channels or outlets should be secured in converting current crops into those for sale or marketing including vegetables and fruits, otherwise a general policy can be pursued to desirably limit per household acreage allocated to these cash crops less than 0.5 hectare or 10% of currently managed acreage for minimizing unpredictable risk of sales failure.

Table shown below summarizes profitability and input requirement per hectare, as a base figures for linear programming analysis. In obtaining the best combination of crops and their acreage composition from which maximum profit can be envisaged in a way that basic rotation cycle is pursued and the total water requirement at the peak month can be met within the suppliable range, this table can be used for the application of Churns method for estimating the maximum benefit expected from the plan of priority projects. The result is presented in Annex.

Table 7.1.3 Profitability and Input Requirement by Project and by Crop

(Unit: million TL per unit; 1,000 cum)

RO No.	MONTH PROJECT SITE	CROP NET PROFIT PER FACTOR AS LISTED BELOW: UNIT COST	LABOR INPUT	PEAK W.CN.	TOTAL W.CN.	per Hectare	Input Fund Requirement	per ha water consumption
1	HACILAR							1.94
	WHEAT	1.10	74.0	1.29	0.17	121	101	0.41
	SUGARBEET	1.58	28.1	1.35	0.38	438	277	3.22
	SUNFLOWER	0.56	31.8	0.18	0.11	68	96	3.05
	TOMATO	0.15	6.3	0.52	0.17	160	1,040	3.04
	DRY ONION	0.72	7.5	not required	not required	165	229	0.00
2	URUNLU							1.87
	WHEAT	1.29	88.7	1.87	0.22	133	103	0.31
	SUGAR BEET	1.34	26.3	0.72	0.33	410	305	2.55
	DRY PEA	0.20	4.5	0.13	0.04	108	125	1.90
	VEGETABLES	1.44	18.2	1.94	0.62	472	328	7.59
	POTATO	0.48	31.1	1.54	0.48	283	592	1.81
3	KALESEKISI							1.93
	VEGETABLE	0.20	8.1	0.72	0.26	210	1,040	2.90
	CHERRY	0.29	5.3	0.49	0.17	94	319	1.91
	GRAPE	2.24	34.6	3.82	1.25	691	309	1.78
4	CAMLIBEL							2.63
	WHEAT	1.34	90.0	0.61	0.13	135	101	0.63
	DRY BEAN/VETCH	0.01	0.2	0.00	0.00	107	106	2.65
	SUGARBEET	1.42	29.0	1.25	0.33	452	318	3.56
	POTATO	0.29	18.5	0.66	0.21	168	582	2.54
	TOMATO	0.20	8.2	0.62	0.20	210	1,040	3.38
	ALFALFA	2.44	83.5	2.08	0.55	568	233	2.72
	APPLE	1.00	13.6	1.06	0.30	390	390	2.04
	PEACH	0.97	12.7	1.03	0.36	380	390	3.40
	BARLEY,OATS	1.54	90.8	not required	not required	109	71	0.00
5	KOZLUK							1.84
	DRY BEAN	1.00	22.7	0.92	0.34	125	125	1.15
	PADDY	0.45	6.6	0.21	0.06	137	304	6.20
	MAIZE	1.11	20.8	0.62	0.24	52	71	1.07
	POTATO	0.29	18.5	1.33	0.47	168	582	1.05
	TOMATO+PEPPER	0.20	8.1	1.08	0.35	210	1,040	1.75
	HAZELNUT	2.96	27.8	3.99	1.86	673	227	1.48
6	KUSKARA							1.42
	WHEAT	1.14	75.3	2.45	0.22	113	99	0.27
	MAIZE	0.46	16.3	0.34	0.13	62	71	1.30
	SUGARBEET	0.80	14.4	0.86	0.27	225	280	2.70
	POTATO	0.48	31.1	1.60	0.60	283	592	1.90
	ALFALFA	2.01	68.8	2.44	0.78	468	233	2.33
	GARLIC	0.55	12.6	2.45	1.09	352	638	0.46
7	OZDENK							2.05
	WHEAT	1.41	92.0	1.76	0.20	138	98	0.52
	SUGARBEET	0.59	14.4	0.74	0.21	225	380	3.00
	POTATO	0.48	31.1	1.31	0.42	283	592	2.11
	ALFALFA	2.44	83.5	2.46	0.68	568	233	2.31
	VEGETABLES	0.44	17.7	1.59	0.52	460	1,040	2.85
	DRY BEAN	0.20	4.5	0.11	0.03	144	125	2.21
8	ASLANLAR							2.24
	WHEAT	0.91	67.3	not required	not required	101	111	0.00
	VEGETABLES	0.44	14.4	1.32	0.41	375	1,040	2.83
	GRAPE	0.18	2.9	0.33	0.08	733	322	1.77
9	ILYASKOY							1.56
	WHEAT	0.91	67.3	2.06	0.20	101	111	0.18
	SUNFLOWER	0.92	56.5	0.43	0.30	96	104	2.18
	PEACH	0.31	4.0	0.91	0.27	120	390	1.26
	APPLE	0.28	3.8	0.52	0.16	110	390	2.07
10	K.KARISTIRAN							2.02
	WHEAT	0.80	62.7	1.72	0.18	94	118	0.22
	SUGARBEET	1.34	26.3	1.62	0.46	410	325	2.44
	SUNFLOWER	1.29	82.9	0.59	0.40	141	109	2.33
	VEGETABLES	0.55	16.9	1.84	0.58	439	1,040	2.31
	ALFALFA	1.73	83.5	3.02	0.86	568	323	1.83

Note : W.CN. ; water consumption, area average in top column

7.1.5 Project Evaluation

Small scale irrigation projects are more oriented to public service and their major objective lies in the promotion of rural development. In this context, an evaluation based on broader stance is desirable, not confining their benefits to crop production increase but they also include possible contribution to development of the entire local communities concerned. This is never more true now when population is increasingly concentrated into urban areas as observed in recent Turkey, causing less efficiency in local public investment as a result of demographic dilution on one hand, while needs of new public facilities acutely arise in urban and peri-urban quarters in a proportional way to immigrated population size. This outcome evidently leads to wastage of state investment. In order to make use of already invested local facilities like tap-water supply and sewage, electric distribution networks, as well to serve them in a rational way to state industries and dwelling, much more efforts should be oriented to the prevention of exodus and fostering maintenance or expansion of current size of rural population. The role played by small scale irrigation projects to this end is surely great, hence it is desirable to utilize indicators by which higher appraisal marks are given to such projects that can cover as many beneficiary households as possible within shortest construction period and with cheapest construction cost. For instance, a comparison as shown in the following table is possible to give relative priority.

Table 7.1.4 Project Cost and Benefit per Beneficiary Household

Unit : million TL per beneficiary household

Project Name	Initial investment	Annual O.M cost	Total project cost*	Annual benefits	Annual gross gain	Additional employer
Hacllar	900.0	20.4	2,867.2	18,183/50y	172.7	0.55p
Urunlu	2,925.1	163.6	12,139.8	31,583/30y	1,106.5	0.75p
Kalesekisi	993.9	19.9	3,457.4	28,393/50y	358.1	0.80p
Camlibel	1,916.4	4.6	2,132.6	148,744/50y	1,384.1	0.75p
Kozluk	393.7	0.8	431.9	14,117/50y	83.4	0.30p
Kuskara	1,586.7	51.8	3,787.7	24,761/30y	507.1	0.35p
Ozdenk	3,279.6	7.2	4,287.5	3,967/50y	104.0	0.25p
Aslanlar	598.1	14.1	2,122.9	13,618/30y	176.0	0.75p
Ilyaskoy	1,854.9	95.7	3,079.2	10,362/50y	54.7	0.40p
KucukKaristiran	411.1	21.4	1,425.3	12,564/30y	172.6	0.75p
Aggregate10	879.2	74.7	3,269.9	33,759/42y	439.9**	0.75p

Note : * including replacement cost

** mean irrigated acreage for ten projects comes to 1.46ha, 301 million TL per hectare

7.2 Guideline for Operation and Maintenance

7.2.1 Operation and Maintenance for Facilities

(1) Rules and Regulation for Management and Maintenance

1) Preparation of Rules & Regulation for Management

The facilities to be constructed under this project are dam reservoir, pump station, headworks (weir), and canal networks. The staff in-charge of the management of the facilities shall be responsible in maintaining the expected operational function of each facility, and to ensure that the facilities are always in proper operation to meet the project objective. It will be necessary to prepare the rules and regulation for management, which will elaborate the management structure and the scope of management, and they are as follows;

① Objective of management and corresponding facilities.

② Organizational structure for management, responsible areas of management and the related costs.

③ Means of management and control.

④ Management task under ordinary condition.
   i. Management and conservation of the facilities.
   ii. Observation / investigation of facilities.
   iii. Management records.

⑤ Management task extraordinary condition.
   i. Management setup and provisions during flood.
   ii. Management setup and provision during drought.

⑥ Inspection and maintenance.

2) Preparation of Operation Rules and Regulation.

The necessary information and its collection for the operation of the facilities are elaborated, are as follows;

① Facility to be operated and its objectives.

② Control standard and operation rules.
- Collection and processing of necessary information for operation.
- Establishment of control standard and operation rules.
  • Duration of operation.
  • Operation records.
  • Report and instruction.

③ Disposition of operations staff and necessary facilities for control and management.

④ Operation of the facilities under ordinary condition.
- Operation sequence and method by each equipment/instrument.

⑤ Operation of the facilities under extraordinary condition.
- Warning measures and operation during flood.
- Management setup and operation during drought.

⑥ Inspection and maintenance.
- Observation patrol.
- Inspection.
- Maintenance.

(2) Operation Management of the Facilities

1) Principle for Operation

The operation management of the facilities should be in accordance with the rules and regulation as described under the preceding paragraphs. The operation manual will differ by the type of the facility, but the principle of management which are common to all the facilities are as follows;

- To accurately grasp the information related to management, i.e. water requirement, river discharge.
- To operation in strict compliance with the collected information.

- To adopt the automatic control mechanism, such as those in case of the 'ON&OFF' operation of the pump controlled by the water level.
- To consider the introduction of water selling system.
- To execute the maintenance and management by the beneficiaries themselves.

2) Important Points for Facilities Management

The points of importance for the management of major facilities to be constructed under the project are given hereinafter for each facility;

① Management for dam and reservoir
- To enforce management for the installed measurement devices to maintain the safety of the embankments/dam body (water leakage meter, land subsidence meter, permeability gage, etc.)
- To patrol and inspect periodically the reservoir.
- To maintain dam-reservoir water level in compliance with the dam management rules & regulation.
- To ensure that the discharge control is thoroughly understood by the dam management staff.
- To practice proper reservoir operations based on anticipated volume of inflow water to the reservoir.
- To maintain records for management.

② Management for the headworks (weir)
- To observe and inspect the structures.
  Headworks are composed of fixed portion, moveable portion, abutment, and protection of the bank.
  Thorough inspection and maintenance should be made to ensure that each portion is serving their respective function.
- Management for intake
  - Enforce intake management in accordance with water requirements.
  - Provide due consideration on water discharge to preserve the environment in the course of river.

③ Management for pump station
- To observe and inspect facilities of pump station.
  Pump station is composed of suction water basin, lifting pump, discharge pipeline and discharge tank.
  Thorough inspection and maintenance shall be made to ensure that each element functions properly.
- The management of the water source will be for the dam reservoir, river and tubewell.
  The water quality and water level should be under constant observation for conservation of water sources, and minimization of adverse environmental effect by pumping up the water.

- Management of water utilization,
  Water distribution from the discharge basin should be done in compliance with the irrigation program.
- Maintain records for operation and management.

④ Management of irrigation canal
- To observe and inspect the irrigation canals to ensure that they are in sound serviceable condition.
- Management of the open canal shall have clear division of responsibility in area and be executed in accordance with the operation & maintenance plan and the water distribution plan.
- The following points shall be considered in respect to the management of water pipeline.
  - The on-farm irrigation should be executed in coordination with overall water distribution program.
  - Initial water filling of the pipeline and the draining shall be in strict compliance with the established operation procedure.
- Maintain records for water distribution.

7.2.2 Environment

(1) Environmental Impact Survey

Environmental impact survey should be carried out to predict the positive and negative impacts on environment in and around the area resulting from project implementation. Therefore, proper measures should be considered to mitigate the negative impact on the environment.

1) Survey Items

All the regulation of Ministry of Environment and the related agencies in Turkey should be carefully checked to avoid illegal implementation of the project after collecting, the present conditions of the social and natural environment in the project area.

For the check of the initial environment examination, the "Guideline of Environmental Assessment" prepared by JICA is useful. This checklist was composed by 47 items of social and natural environment.

2) Environmental Impact Evaluation

Each check item should be graded in accordance with the impact degree. When the results show that damage to valuable plant and animal species or the implementation of the projects cause the serious impact on social or natural environment, the plan should be altered or abandoned.

In Turkey, special attention should be given to soil degradation by soil erosion, soil salinity, and excess investment of agrochemicals.

(2) Soil Environmental Survey

The soil environmental survey should be carried out to grasp present natural conditions of project area and to provide basic data for planning of the proposed project works. Before conducting the soil survey general information in and around the project area should be collected based on the information, the methodology, items and schedule on the field survey should be planned.

1) Survey Items

The procedure of survey and items are as follows.

a) Information on the site
Topography map, soil map, geological map, slope, land use and vegetation.

b) Information on the soil
Parent material, drainage condition, depth of groundwater table, presence of surface gravel, soil erosion, presence of salt and alkali substance and human influence.

c) Information on the soil profile
Depth of soil horizon, boundary of soil horizon, soil texture, gravel, humus, peat and muck, soil color, soil texture, pore space, oxidative sediment, compactness, plasticity, stickiness, ped coating, moisture and root distribution.

d) Collect of soil sample
The sample for physical analysis should be collected with stainless core samplers so as not to disturb soil.

e) Soil analysis
Physical items: Effective soil depth, presence of organic horizon, soil particle distribution, soil structure and porosity, infiltration rate, permeability, available water capacity, and soil hardness.
Chemical items: Soil acidity, total carbon and nitrogen, electrical conductivity, cation exchangeable capacity, exchangeable cation, available phosphorus, available potassium, and soluble sodium.

(3) Method of Environmental Analysis

1) Environmental Analysis by Physical Items

a) Effective soil depth: Capacity of water and nutrient retention, depth of land leveling, and design of irrigation and drainage canals.

b) Presence of organic horizon: Control of soil fertility and biological environment.

c) Soil particle distribution: Establish homogeneity of land units.

d) Soil structure and porosity: Root environment and soil water holding capacity, drainage of saline soil and amount of leaching water, leaching of excess salts, tillage and workability for seedbed and land preparation, ability of paddy field, and degree of soil erosion.

e) Infiltration rate: Intake or run-off of rainfall and irrigation, selection of irrigation method, size of furrow lengths or basin, selection of sprinkler nozzle, and degree of soil erosion.

f) Hydraulic permeability: removal of excess water and salts.

g) Available water capacity: selection of irrigation method and design.

h) Soil strength: Mechanical strength of construction works, and root penetration.

2) Environmental Analysis by Chemical Items

a) Soil reaction: Identification of alkali or acid soil, grasp of nutrient deficiencies and toxicity for crop growth.

b) Total carbon and nitrogen: Growth environment of soil microorganisms, and decide amount of nitrogen application.

c) Electrical conductivity: Situation of soluble salts concentration.

d) Cation exchangeable capacity and exchangeable cation: Nutrient holding capacity and chemical fertility status.

e) Available phosphorus and potassium: Decide of amount of phosphorus and potassium application.

f) Soluble sodium: Judgment of salinity, and leaching water requirement.

(4) Environmental Conservation Measure

In Turkey, the following items should be examined in the project design. And main conservation measures are as following.

1) Soil erosion: Contour farming, strip cropping, terracing, and cover with permanent vegetation.

2) Soil salinity: Selection of proposed crops and establishment of cropping pattern, suitable fertilizer control corresponding to the demand amount of crops, introduction of irrigation method to fit property of soil physical and chemicals, and suitable drainage control by leaching water.

3) Soil and soil layer improvement: Return compost and manure to the soil for soil fertility and soil buffer action, and removal gravel from soil layer for agricultural management.

4) Agrochemicals: Use prohibition of agrochemicals to having strong toxicity, minimum application in the growth period and use prohibition in the harvest time, development of ecological control.

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Attachment 1

Scope of Work for the Study on National Small-Scale Irrigation and Rural Development Program in the Republic of Turkey

SCOPE OF WORK
FOR
THE STUDY
ON
NATIONAL SMALL-SCALE IRRIGATION AND RURAL DEVELOPMENT PROGRAM
IN
THE REPUBLIC OF TURKEY

AGREED UPON BETWEEN
GENERAL DIRECTORATE OF RURAL SERVICES
AND
JAPAN INTERNATIONAL COOPERATION AGENCY

Ankara, 21. 08 , 1996

Mr. Mustafa Mirbey ERTUĞRUL
Deputy General Director,
General Directorate of Rural Services

Mr. Shigeaki UCHIMURA
Leader,
Japanese Preparatory Study Team,
Japan International Cooperation Agency

I. Introduction

In response to the request of the Government of the Republic of Turkey (hereinafter referred to as "the Government of Turkey"), the Government of Japan has decided to conduct the Study on National Small-Scale Irrigation and Rural Development Program(hereinafter referred to as "the Study"),in accordance with the relevant laws and regulations in force in Japan.

Accordingly, Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of technical cooperation programs of the Government of Japan, will undertake the Study in close cooperation with the authorities concerned of the Government of Turkey.

The present document sets forth the scope of work with regard to the Study.

II. Objectives of the Study

The objectives of the Study are;

1. To formulate Master Plan for the small-scale irrigation and rural development projects in the study area(hereinafter referred to as "the Project(s)"),

2. To conduct Feasibility Study in the priority Project(s),and

3. To carry out technology transfer to the Turkish counterpart personnel through on-the-job training in the course of the Study.

III. Study area

Nationwide

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IV. Scope of the Study

In order to achieve the above objectives, the Study will consist of two(2) phases and the following items.

1. Phase I (Master Plan Study)

1.1. Collection and Review of existing data and information in the Study area:

A.Natural condition
(1)meteorology
(2)hydrology
(3)geology
(4)soil
(5)topography
(6)others

B.Socio-economic situation
(1)population
(2)employment
(3)household and farmers
(4)regional socio-economy and household economy
(5)others

C.Agriculture
(1)land use and land tenure
(2)cropping pattern and yield
(3)farming practices
(4)agro-economy and marketing
(5)farmers organization and supporting services
(6)others

D.Inland water fisheries

E.Agricultural and rural infrastructure
(1)irrigation and drainage facilities
(2)agricultural land conservation facilities
(3)water supply and waste water disposal
(4)farm road
(5)others

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F.Other information related to the Project(s)
(1)administrative organizations related to the Project(s)
(2)environmental impacts
(3)gender issue
(4)others

1.2. Review of the existing development plans and policies.

1.3. Conduct of inventory survey of the Project(s).

1.4. Formulation of basic development plan of the Study.

1.5. Selection of the priority Project(s) for the feasibility study in phase Ⅱ.

2. Phase II(Feasibility Study)

2.1. Additional collection of data and information, and detailed field survey of the priority Project(s).

2.2. Formulation of development plan of the priority Project(s) with the following components:

(1)Land use plan

(2)Cropping pattern plan

(3)Irrigation and drainage plan

(4)Agricultural and rural infrastructure plan

(5)Operation and maintenance plan

(6)Agricultural supporting plan(farmers organization, financing, research, training and extension services ,etc)

(7)Environmental conservation plan

(8)Project implementation schedule

(9)Preliminary design of major structures

(10)Estimation of project cost and benefit

(11)Evaluation of the project

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2.3 Preparation of guideline to be applied by the General Directorate of Rural Services (hereinafter referred to as "GDRS") for subsequent preparation and appraisal of projects.

2.4.Recommendations

V. Study schedule

The Study will be carried out in accordance with the attached tentative work schedule.(ANNEX1)

VI.Reports

JICA will prepare and submit the following reports in English to the Government of Turkey.

1. Inception Report
Twenty (20) copies at the commencement of the Phase I study.

2. Progress Report (1)
Twenty (20) copies at the end of the work in Turkey of the Phase I study.

3. Interim Report
Twenty (20) copies at the commencement of the Phase II study.

4. Progress Report (2)
Twenty (20) copies at the end of the work in Turkey of the Phase II study.

5. Draft final Report
Twenty (20) copies at the end of the Phase II study. The Government of Turkey will provide its comments on the Draft Final Report to JICA within one (1) month after receiving the Draft Final Report.

6. Final Report
Fifty (50) copies within two (2) months after the receipt of comments on the Draft Final Report.

VII. Undertakings of the Government of Turkey

1. The Government of Turkey shall facilitate to carry out the Study in accordance with the prevailing laws and regulations stipulated by the Republic of Turkey ,as follows:

(1)to secure the safety of the Japanese study team,

(2)to permit the members of the Japanese study team to enter, leave and sojourn in the Republic of Turkey for the duration of their assignment therein, and exempt them foreign registration requirements and consular fees,

(3)to exempt the members of the Japanese study team from taxes, duties, fees and any other charges on equipment, machinery and other materials to be brought into and out of the Republic of Turkey for the conduct of the Study,in accordance with the relevant Turkish legislation in force,

(4)to exempt the members of the Japanese study team from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the Japanese study team for their services in connection with the implementation of the Study,in accordance with the relevant Turkish legislation in force,if necessary,

(5)to provide necessary facilities to the Japanese study team for the remittance as well as the utilization of the funds introduces into the Republic of Turkey from Japan in connection with the implementation of the Study,if necessary,

(6)to secure permission for entry into private properties for the purpose of implementing the Study when it is required,

(7)to secure permission which is considered and issued by the relevant authorities for the Japanese study team to take data and documents related to the Study out of the Republic of Turkey to Japan,

(8)to provide medical services as needed. Its expenses will be chargeable on the members of the Japanese study team.

2. The Republic of Turkey shall bear claims, if any arises, against the members of the Japanese study team resulting from, occurring in the course of, or otherwise connected with, the discharge of their duties in the implementation

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of the Study, except when such claims arise from gross negligence or willful misconduct on the part of the members of the Japanese study team.

3. GDRS shall act as a counterpart agency to the Japanese study team and also as coordinating body in relation with other organizations concerned for the smooth implementation of the Study.

4. GDRS shall provide, at its own expense, the Japanese study team with the following, in cooperation with other organizations concerned;

(1) available data and information related to the Study,

(2) counterpart personnel,

(3) suitable office spaces with necessary furniture in Ankara and other cities,

(4) credentials or identification cards, and

(5) necessary number of vehicles with drivers.

VIII. Undertakings of JICA

For the implementation of the Study, JICA shall take the following measures;

(1)to dispatch, at its own expense, the study team to the Republic of Turkey,

(2)to pursue technology transfer to the counterpart personnel of the Government of the Republic of Turkey in the course of the Study.

IX. Consultation

JICA and the Republic of Turkey shall consult with each other in respect of any matter that may arise from or in connection with the Study.

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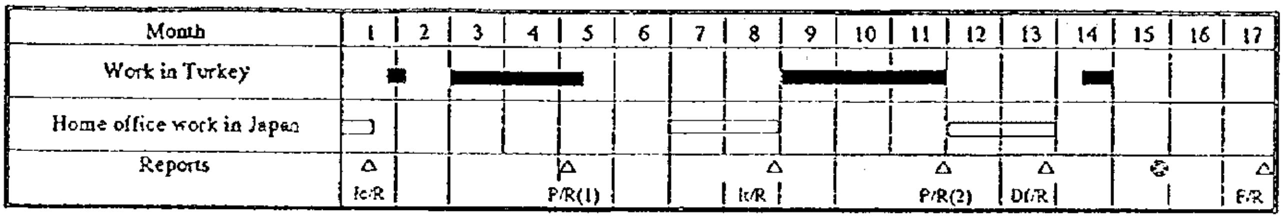
ANNEX 1

TENTATIVE WORK SCHEDULE



(Remarks)

Ic / R	: Inception Report
P / R(1)	: Progress Report(1)
It / R	: Interim Report
P / R(2)	: Progress Report(2)
Df / R	: Draft Final Report
F / R	: Final Report
◎	: Comments on DF /R by the Turkey side

Attachment 2

Minutes of Meeting of Scope of Work for the Study on National Small-Scale Irrigation and Rural Development Program in the Republic of Turkey

MINUTES OF MEETING
ON
SCOPE OF WORK
FOR
THE STUDY
ON
NATIONAL SMALL-SCALE IRRIGATION AND RURAL DEVELOPMENT PROGRAM
IN
THE REPUBLIC OF TURKEY

AGREED UPON BETWEEN
GENERAL DIRECTORATE OF RURAL SERVICES
AND
JAPAN INTERNATIONAL COOPERATION AGENCY

Ankara, 21.08. 1996

Mr. Mustafa Mirbey ERTUĞRUL
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Japanese Preparatory Study Team,
Japan International Cooperation Agency

In response to the request of the Government of the Republic of Turkey (hereinafter referred to as "the Government of Turkey"), the Government of Japan decided to dispatch through Japan International Cooperation Agency (hereinafter referred to as "JICA"), which is responsible for the implementation of technical cooperation programs of the Government of Japan, the preparatory study team(hereinafter referred to as "the Team"),headed by Mr.Shigeaki Uchimura, to the Republic of Turkey from July 21th to August 3th,1996 so as to discuss and exchange views on the study with General Directorate of Rural Services (hereinafter referred to as "GDRS"), and officials concerned of the Government of Turkey the implementation of the study.

GDRS and the Team mutually agreed to the Scope of Work for the study on National Small-Scale Irrigation and Rural Development Program in the Republic of Turkey(hereinafter referred to as "the Study").

The following minutes were prepared to confirm the main issues discussed and matters agreed upon by both sides in connection.

1. The Study will be carried out in accordance with the attached list indicating provinces and the small-scale irrigation and rural development projects in the study area(hereinafter referred to as "the Project(s)") (excluding 'Etud' stage)ANNEX1

2. With regard to the Small-Scale Irrigation and Rural Development sectors in the Republic of Turkey, the Inventory survey is to be conducted for the purpose of selecting the priority Project(s), and will be serving as a basic data for the selection of Project(s) after the completion of the Study by GDRS themselves.

3. Inventory survey will be conducted by the Study Team in collaboration with GDRS in approximately 200 projects.

4. Determining the Project(s) to conduct the Inventory survey is basically based on the following criteria.

*Availability of data with adequate information is prerequisite
*Acreage of irrigation and the population to be benefited are to fulfill the required scale and number
*Avoidance in duplication with projects related another organization
*Typical areas (geographical and farming practices, etc.) are to be included

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*New projects and rehabilitation projects are to be covered
*The Project(s) are considered in a balance on facilities

5. Feasibility Study will be conducted by the Study Team in collaboration with GDRS in approximately 10 projects.

6. GDRS requested that the counterpart personnel training in Japan related to the Study to promote an effective technology transfer. The Team promised to convey this request to the Government of Japan.

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ANNEX I

(31 July, 1996)

KÖY HİZMETLERİ GENEL MÜDÜRLÜĞÜ TARIM SEKTÖRÜ REZERV KONULARI

İller	Küçüksu						Yeraltısuyu(Y.A.S.)				Gölet				Toprak Muhafaza				Arazi Toplulaştırma			
	Etüd		Planlama		Proje		Planlama		Proje		Etüd		Planlama		Planlama		Proje		Planlama		Proje	
	Ad	Ha	Ad	Ha	Ad	Ha	Ad	Ha	Ad	Ha	Ad	Ha	Ad	Ha	Ad	Ha	Ad	Ha	Ad	Ha	Ad	Ha
ANKARA	32	2704	18	939	42	784									2	40						
BOLU	51	2564	13	205	7	65					1	1500										
ÇANKIRI	55	2549	4	403	32	723																
KIRIKKALE	9	1337	2	150	7	402							1	108								
KONYA	25	724	1	64	22	302	14	6462	7	1289	4	417	3	843					1	18805		
AKSARAY	14	999	1	17	4	449	1	149	5	1000	1	245	1	207	1	500			1	15200		
KARAMAN	19	839	2	35	12	171	3	895	2	644									1	1988		
NİĞDE	10	549			13	700	1	193	10	756	4	1325	1	182								
ADANA	28	5696	4	761	35	677					1	319			1	30						
İÇEL	16	412	5	119	63	502																
HATAY	11	741	9	404	19	236	2	260														
KAYSERİ	20	465	14	340	45	605	1	130			1	535					2	250				
KIRŞEHİR	20	958	2	101	5	-					2	531					2	428				
NEVŞEHİR	14	1101	4	396	4	46	1	150	1	28												
YOZGAT																						
SİVAS	117	4910	122	5456	55	1359					2	376										
TOKAT	58	3048	35	923	28	534					2	221	1	128	1	150			1	16892		
TRABZON	13	672			5	29																
ARTVİN	63	4162	21	823	39	756																
BAYBURT	42	3614	4	68	28	1093																
GİRESUN	13	428	1	12	21	220																
GÜMÜŞHANE	40	2171	17	363	46	685																
RİZE	1	30																				
SAMSUN	13	754	3	12	11	10							1	293								
AMASYA	22	917	8	671	22	330			2	204	1	163			1	60			1	1195		
ÇORUM	35	2183	17	400	36	1494					3	304	1	66								
ORDU	2	34																				
KASTAMONU	39	2806	8	288	43	1321							1	108			1	80				
ZONGULDAK																						
SİNOP	30	1527	11	568	12	96									1	107			1	150		
KARABÜK	8	349	3	67	9	384																
BARTIN	9	1370	2	-	5	165																
ESKİŞEHİR	24	1122	12	263	3	-	1	53			4	381			1	300	1	35				
AFYON	5	166	1	62	1	-	13	1235														
KÜTAHYA	20	1832									3	711										
UŞAK	9	430	2	37	2	31											4	269				
ANTALYA	44	1591	12	350	30	280			1	83	1	84										
BURDUR	9	454	30	280	2	-	3	967	1	90	1	600							1	425		
ISPARTA	9	752			4	-	1	250			1	141	2	380			1	180	1	1127		
İZMİR	5	191	4	522	12	200	3	432	2	540	1	316			1	300			1	5100		
AYDIN	7	535	4	400	12	150									1	165	5	650				
DENİZLİ	14	1308	3	237			6	1532	1	85					1	80			1	1650		
MANİSA	8	246	2	86	8	67					1	26					1	100				
MUĞLA	12	2436	2	182	30	3012					1	396					7	840				
BURSA	42	3451	16	394	14	282					3	599										
BALIKESİR	28	2500	4	75	6	45					1	397							1	20050		
BİLECİK																						
ÇANAKKALE	12	913	1	99	1	-					5	1302	4	958								
YALOVA	1	62																				
ISTANBUL	3	203	1	5	1	-																
EDİRNE	8	313							1	320	5	755	2	1052					1	18500		
KIRKLARELİ	8	160			5	50	1	110	1	120												
KOCAELİ	14	346			1	-																
SAKARYA	22	435	2	22	1	9					5	1457										
TEKİRDAĞ											2	234	2	176								
TOPLAM	1224	76416	399	16319	801	18264	51	12818	54	7223	56	15335	20	4501	11	1732	24	2832	12	101082		

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LIST OF PARTICIPANTS

1. Turkey Side

Mr.M.Güner SAYGILI	General Director GDRS
Mr.Mustafa Mirbey ERTUĞRUL	Deputy General Director GDRS
Mr.Hasan COŞKUN	The Head of Basin Management and Earth Filled Dams Department GDRS
Mr.Nejat ŞENGÜN	The Head of Irrigation Department GDRS
Mr.Sadettin TAKKA	Director of Land Consolidation Section GDRS
Mr.Levent KORAL	Director of Land Reclamation Section GDRS
Mr.Cavit BÜYÜKGÜRAL	Director of Survey and Project Section GDRS
Ms.Yurdanur SÜRMELİ	Agriculture Engineer GDRS
Mr.Mustafa ÇELİKEL	Agriculture Engineer GDRS
Mr.Nazım ÖZŞAHİN	Agriculture Engineer GDRS
Ms.Nevin ERGENELİ	Geology Engineer GDRS
Mr.Şevki ÜNSALDI	Agriculture Engineer GDRS
Ms.Nuran Dalgün	Agriculture Engineer GDRS

2. Japanese Side

Preparatory Study Team

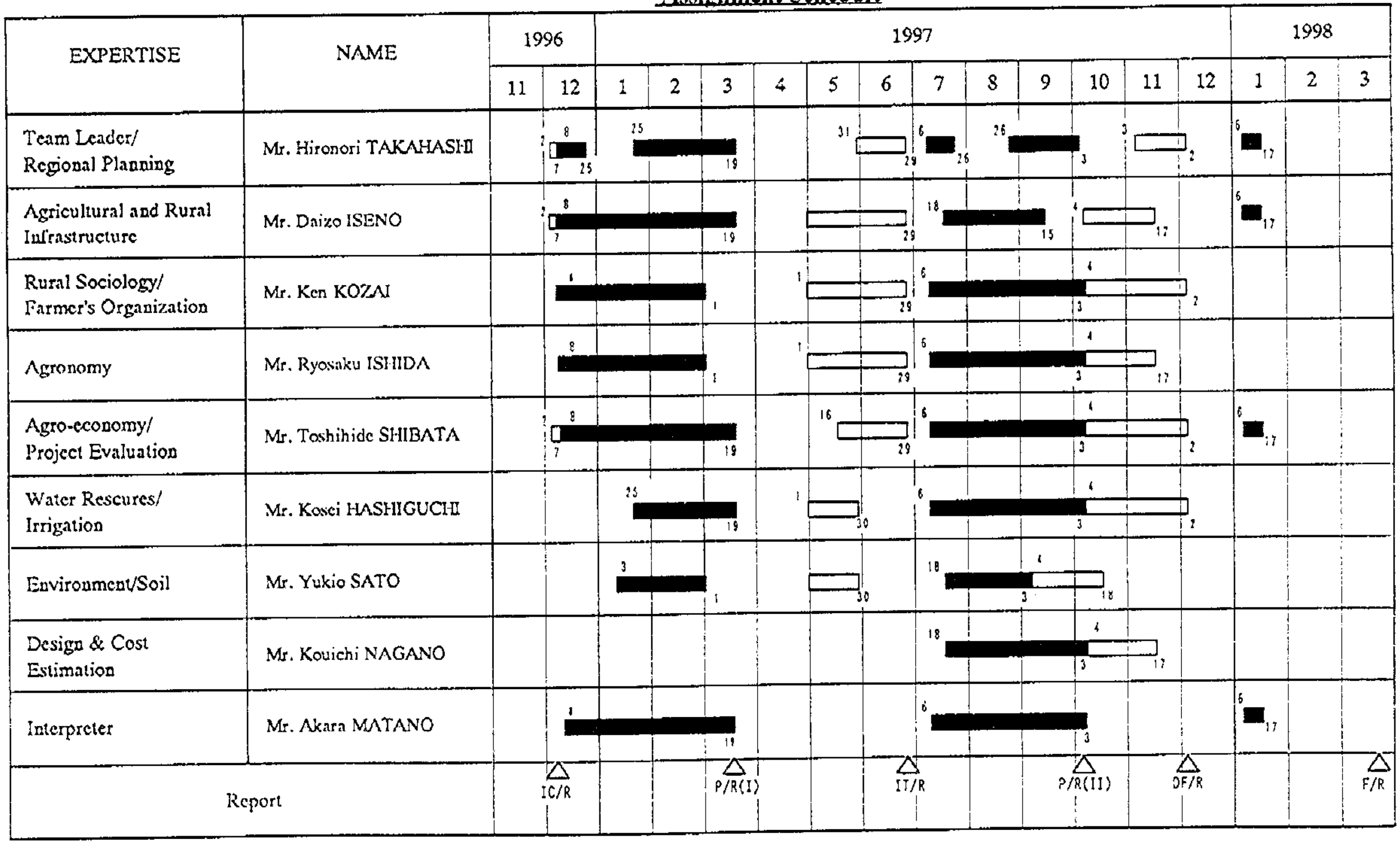
Mr. Shigeaki UCHIMURA	Leader
Mr. Masahiro SASAKI	Member
Mr. Hisashi GOTO	Member
Mr. Kenichiro KOBAYASHI	Member
Mr. Yutaka NOZAKI	Member
Ms. Keiko NONAKA	Member

S.U

Attachment 3

Assignment Schedule

Assignment Schedule



Field
Home Office

IC/R: Inception Report
P/R: Progress Report

IT/R: Interim Report
DF/R: Draft Final Report

F/R: Final Report

Attachment 4

Member of Study Team and Counterpart Personnel

LIST OF COUNTERPART PERSONNEL

Japanese Side	Turkey Side
Team Leader **Mr. Hironori TAKAHASHI**	Team Leader **Mr. Sadettin TAKKA** (Responsible for Land Cons., Land Rec., Land Leveling, Drainage)
Agricultural and Rural Infrastructure **Mr. Daizo ISENO**	Sprinkler / drip irrigation **Ms. Yurdanur SURMELI**
Water Resources / Irrigation **Mr. Kosei HASHIGUCHI**	Watershed Management **Mr. Mustafa CELIKEL**
Design & Cost Estimatiom **Mr. Kouichi Nagano**	Small dams **Mr. Sevki UNSALDI**
	Small irrigation **Mr. Nevzat ERDOGAN**
	Groundwater **Mr. Sadi KASAPOGLU**
	Hydrology **Ms. Nuran DALGUN**
	Geology **Ms. Nevin ERGENELI**
	Land Con., drainage **Mr. Metin BIRBUDAK**
	Land Con., drainage **Ms. Mine DEDEOGLU**
Rural Sociology / Farmer's Organization **Mr. Ken KOZAI**	Sociology **Ms. Hatice TAPAN**
Agronomy **Mr. Ryosaku ISHIDA**	Agronomy **Mr. Adem ILBEYLI**
Agro-economy / Project Evaluation **Mr. Toshihide SHIBATA**	Agro-economy **Ms. Jale TAMZOK**
	Agro-economy **Ms. Zeynep DERNEK**
Environment / Soil **Mr.Yukio SATO**	Soil **Mr. Mehmet TANSOY**

Attachment 5

Government Officials Participated or Interviewed by the Study Team

M. Güner Saygılı	General Director of GDRS
Hasan Coşkun	Head, Basin Management and Earth Filled Dams Department, GDRS
Rüştü Kasap	Former Head of Basin Management and Earth Filled Dam, GDRS
Ahmet Kaya	Deputy Director, Groundwater Division, DSİ
Bunji Seta	JICA Expert, DSİ
Lütfi Aktekin	Director of Irrigation and Drainage Division, DSİ
Ahmet Çalışan	Director of Machinery and Electricity Division, DSİ
Altan Turgul	Electrical Engineer, DSİ
Hüseyin Toksoy	Director of Pump Division, DSİ
Mehmet Kartal	Deputy Director of Groundwater and Geotechnical Services Division, DSİ
Nazım Özşahin	Agricultural Engineer, GDRS
Nevin Ergeneli	Agricultural Engineer, GDRS
M. Atif Ala	Agricutural Engineer, GDRS
Ali Çağlar Çelikcan	Agricultural Engineer, GDRS
O. Nüvit Bektaş	Agricultural Engineer, GDRS
Ali Sayar	Agricultural Engineer, GDRS
Batuk Cimili	Agricultural Engineer, GDRS
Ahmet Unlukalaycı	Agricultural Engineer, GDRS
İbrahim Kalkan	Agricultural Engineer, GDRS
Atsuko Toyama	Ambassador, Embassy of Japan
Toshiriro Hosoi	Second Secretary, Embassy of Japan
Naoyoshi Sasaki	Resident Representative, JICA Turkey Office
Akiko Tomita	Assistant Resident Representative, JICA Turkey Office
Nurettin Elbir	Forest Engineer, JICA Turkey Office
Emin Özdemir	Head of Technical Cooperative Division, JICA Turkey Office

Hacılar Project

Kubilay Genç	Agricultural Engineer,Kırıkkale Provincial Office,GDRS
Tuba Turgut	Agricultural Engineer,Kırıkkale Provincial Office,GDRS
Ahmet Zahir Erkan	Ankara Regional Office, GDRS
Hasan Durdun	Ankara Regional Office, GDRS

Ürünlü Project

İsmail Şahin	Head of municipality,Belkaya village
Gülseren Atıcı	Agricultural Engineer,Konya Provincial Office, GDRS
Nazım Yılmaz	Agricultural Engineer,Konya Regional Office, GDRS
Ahmet Güven	Management of Irrigation and Drainage Dept.,Konya Regional Office, GDRS
Elvan Dursun	Konya Regional Office, GDRS
Mustafa Usta	Head of Irrigation Cooperative,Ürünlü village
Sadi Celik	Ürünlü village chief,Ürünlü village
Suat Armutlu	Contrac.of Drainage Project,Kos IV-VII Konya I Dre.Pre.
Muhammet Temel	Contrac.of Belkaya village

Kalesekisi Project

Eilf Nur Bozkurt	Mayor of Saimbeyli,Saimbeyli
Basri Tetik	Head of Project Department,Adana Provincial Office, GDRS
Emin Yalçınkaya	Director of Adana Regional Office, GDRS
Yusuf Yüksel	Agricultural Engineer,Head of Associate
Ahmet Sayım	Agricultural Engineer,İçel Provincial Office, GDRS
Türker Çetin	Agricultural Engineer,Adana Provincial Office, GDRS
Yasemin Akdemir	Agricultural Engineer,Adana Provincial Office, GDRS
Mehmet Ali Altun	Deputy Manager of Planning Department,Adana Regional Office, GDRS
Prof.Dr.Şinasi Akdemir	University of Çukurova
Ali Yüzgeş	Adana Regional Office, GDRS
Suat Kozanoğlu	Head of Irrigation Cooperative,Saimbeyli
Ahmet Teke	Second Head of Irrigation Cooperative,Saimbeyli

Çamlıbel-Kervansaray-Güzelce Project

Süleyman Arslan	Head of Irrigation and Water Work Dept.,Tokat Provincial Office, GDRS
Dursun Güney	Director of Tokat Research Inst.,GDRS
Akif Özdemir	Agricultural Engineer,Tokat Provincial Office-GDRS
Halis Esenboğa	Deputy Director,Tokat Provincial Office,GDRS
Ümit Bingöl	Agricultural Engineer,Tokat Provincial Office-GDRS
Hamza Yüzüak	Civil Engineer,Tokat Provincial Office,GDRS
Mustafa İpek	Tokat Provincial Office,GDRS
Alper Demiroluk	Sivas Regional Office, GDRS
Duran Yanar	Active Headman of Güzelce

Kozluk-Akçay-Dumantepe Project

Asım Bilgin	Director of Samsun Provincial Office, GDRS
Kenan Önen	Agricultural Engineer,Samsun Regional Office, GDRS
Ercan Yanoğlu	Agricultural Engineer,Samsun Regional Office, GDRS

İbrahim Kaya Ersöz	Agricultural Engineer,GDRS Institute in Samsun
İlyas Kırman	Samsun Provincial Office, GDRS
Turan Alasun	Chief of Samsun Regional Office, GDRS
Arcan Yanoğlu	Samsun Regional Office, GDRS

Kuşkara Project

Durmuş Atay	Deputy Director of Kastamonu Provincial Office,GDRS
Süleyman Kaldırım	Agricultural Engineer,Kastamonu Regional Office,GDRS
A.İlhan Gültekin	Director of Kastamonu Regional Office
Mustafa Bay	Chief of Kastamonu Regional Office
Hasan Bayar	Kastamonu Regional Office, GDRS

Özdenk Project

Rıfat Akyol	Agricultural Engineer,Head of Eskişehir Provincial Office, GDRS
Selahattin Bey	Geological Engineer,Eskişehir Provincial Office, GDRS
Bilal Değirmenci	Construction Engineer, Head of Eskişehir Regional Office, GDRS
Beyhan Göktay	Planning Department Manager,Eskişehir Regional Office, GDRS
Bahri Özsoy	Eskişehir Regional Office, GDRS
Raşit Hortanır	Özdenk Village Chief
Yılmaz Özaydın	Özdenk Village Master

Aslanlar Project

Oğuz Torunlar	Agricultural Engineer,Head of İzmir Regional Office, GDRS
Kemal Nazım Ergin	Agricultural Engineer,İzmir Provincial Office, GDRS
Mustafa Bilir	Agricultural Engineer,İzmir Provincial Office, GDRS
Mustafa Ögettin	Agricultural Engineer,İzmir Regional Office, GDRS
Yakup Aydın	Head of Irrigation Cooperative,Pamukyazı Village
Yurdadağ Mutlu	Head of Machinery Supply Firm,Torbalı-İzmir
Cafer Gezgin	Aslanlar Village Chief

İlyasköy Project

İsmail Zengin	Construction Engineer,Head of Yalova Provincial Office, GDRS
Enver Keskin	Agricultural Engineer,Yalova Provincial Office, GDRS
Fuat Savaş Ünver	Bursa Regional Office, GDRS
Doğan Aras	Chief Of Building Site,Yalova-Çınarcık-Ortaburun
Ali Kamis	Director of Store,Yalova Construction Supply
Ömer Saraçoğlu	Ortaburun Village Chief

Küçükkarıştıran Project

Mahmut Uslu	Irrigation Department Manager,Kırklareli Provincial Office, GDRS
Abdullah Aksu	Agricultural Engineer,İstanbul Regional Office, GDRS
Selahattin Tarhan	Agricultural Engineer,Kırklareli Provincial Office, GDRS
Muammer Köydem	Head of Küçükkarıştıran Irrigation Cooperative
Emin Halebak	Head of Doysan Sunflower Factory
Mehmet Soydan	Küçükkarıştıran Village Chief

Attachment 6

Minutes of Meeting of Inception Report for the Study on National Small-Scale Irrigation and Rural Development Program in the Republic of Turkey

MINUTES OF MEETING

OF

INCEPTION REPORT

FOR

THE STUDY

ON

SMALL-SCALE IRRIGATION AND RURAL DEVELOPMENT PROGRAM

IN

THE REPUBLIC OF THE TURKEY

Ankara, December 16,1996

Mr.M Güner SAYGILI
General Director
General Directorate of Rural Services

Mr.Hironori TAKAHASHI
Leader
Study Team
Japan International
Cooperation Agency

Witness

Mr. Kenichiro KOBAYASHI
Advisory Team
Japan International
Cooperation Agency

The Study Team organized by Japan International Cooperation Agency, headed by Mr. Hironori TAKAHASHI as the Team Leader and the General Directorate of Rural Services (hereinafter referred to as "GDRS"), headed by Mr.Hasan COSKUN as the Head of Basin Management and Earth Filled Dams Department, had a series of discussion and exchanged views on the Inception Report for the study on Small-Scale Irrigation and Rural Development Program prepared by the Study Team.

1. Receipt of Inception Report

GDRS received 20 copies of Inception Report submitted by the Study Team on December 10, 1996.

2. Meetings

A series of meeting was held at the head office of GDRS on December 10 to 13, 1996 respectively.

3. Presentation

The Study Team presented a brief of Inception Report including the plan of operation, and the undertaking of the Government of the Republic of Turkey for the Study.

4. Discussion

The Inception Report of the Study was generally accepted by GDRS. Therefore, the contents of the Inception Report were agreed by both parties in principle. The following are the matters discussed by both parties.

1) In order to make long list inventory, the survey forms shall be distributed to the 13 regional offices and shall be filled and collected by 15th January 1997.

2) Candidates of 200 sub-projects to be selected as short list are recommenced by GDRS. The survey forms of candidate shortlist inventory shall be distributed to the 13 regional offices and collected by 31st December 1996. The final selection and identification of shortlist sub-projects shall be carried out with refference to the longlist inventory by both parties in closest cooperation.

3) The following are the priority criteria by type of works considered by GDRS;

(1) Groundwater
(2) Small dam
(3) Small scale irrigation
(4) Watershed rehabilitation and soil conservation
(5) Land consolidation, drainage, land reclamation and land leveling

4) The counterpart personnel assigned by GDRS are shown in the attached list.

5) GDRS requested the study team to invite counterpart personnel as trainees to Japan for the technology transfer. The study team promised to convey the request to the Government of Japan.

LIST OF COUNTERPART PERSONNEL

Japanese Side	Turkey Side
Team Leader **Mr. Hironori TAKAHASHI**	Team Leader **Mr. Cavit BUYUKGURAL**
	Mr. Sadettin TAKKA (Responsible for Land Cons., Land Rec., Land Leveling, Drainage)
Agricultural and Rural Infrastructure **Mr. Daizo ISENO**	Sprinkler / drip irrigation **Ms. Yurdanur SURMELI**
Water Resources / Irrigation **Mr. Kosei HASHIGUCHI**	Watershed Management **Mr. Mustafa CELIKEL**
Design & Cost Estimatiom **Mr. Kouichi Nagano**	Small dams **Mr. Sevki UNSALDI**
	Small irrigation **Mr. Nazim OZSAHIN**
	Groundwater **Mr. Sadi KASAPOGLU**
	Hydrology **Ms. Nuran DALGUN**
	Geology **Ms. Nevin ERGENELI**
	Land Con., drainage **Mr. Metin BIRBUDAK**
	Land Con., drainage **Ms. Mine DEDEOGLU**
Rural Sociology / Farmer's Organization **Mr. Ken KOZAI**	Sociology **Ms. Hatice TAPAN**
Agronomy **Mr. Ryosaku ISHIDA**	Agronomy **Mr. Adem ILBEYLI**
Agro-economy / Project Evaluation **Mr. Toshihide SHIBATA**	Agro-economy **Ms. Jale TAMZOK**
	Agro-economy **Ms. Zeynep DERNEK**
Environment / Soil **Mr.Yukio SATO**	Soil **Mr. Mehmet TANSOY**

LIST OF PARTICIPANTS

1.Turkey Side

Mr.Hasan COSKUN	The Head of Basin Management And Earth Filled Dams Department
Mr.Nazim ÖZSAHİN	Agriculture Engineer GDRS
Mr.Sadi KASAPOĞLU	Agriculture Engineer GDRS
Mr.Seviki ÜNSALDI	Agriculture Engineer GDRS
Mr.Metin BİRBUDAK	Agriculture Engineer GDRS
Ms.Jale TAMZOK	Agriculture Engineer GDRS
Ms.Yurdanur SÜRMELİ	Agriculture Engineer GDRS
Mr.Mustafa CELIKEL	Agriculture Engineer GDRS
Mr.Sadettin TAKKA	Agriculture Engineer GDRS
Mr.Cavit BUYUKGURAL	Agriculture Engineer GDRS

2.Japanese Side

The Study Team

Mr.Hironori TAKAHASHI	Leader
Mr.Daizo ISENO	Member
Mr.Ken KOZAI	Member
Mr.Ryosaku ISHIDA	Member
Mr.Toshihide SHIBATA	Member
Ms.Akara MATANO	Member

Advisory Team

Mr.Kenichiro KOBAYASHI	JICA Headquarters

Embassy of Japan

Mr.Toshihiro HOSOI	Second Secretary

JICA

Ms. Akiko TOMITA	JICA Turkey Office
Dr.N.ELBIR	JICA Turkey Office

Attachment 7

Minutes of Meeting of Progress Report (I) for the Study on National Small-Scale Irrigation and Rural Development Program in the Republic of Turkey

MINUTES OF MEETING

ON

PROGRESS REPORT (1)

FOR

THE STUDY

ON

NATIONAL SMALL-SCALE IRRIGATION AND RURAL DEVELOPMENT PROGRAM

IN

THE REPUBLIC OF TURKEY

Ankara, March 13, 1997

Mr. Mustafa Mirbey ERTUĞRUL Deputy General Director, General Directorate of Rural Services	Mr. Hironori TAKAHASHI Leader, Study Team, Japan International Cooperation Agency

The Study Team dispatched by Japan International Cooperation Agency (hereinafter referred to as JICA), headed by Mr. Hironori TAKAHASHI as the Team Leader and General Directorate of Rural Services (hereinafter referred to as GDRS), headed by Mr. Rustu KASAP, head of Basin Management and Earth Filled Dams Department, had a series of discussions and exchanged views on the Progress Report (1) for the Study on National Small-Scale Irrigation and Rural Development Program prepared by the Study Team.

1. Receipt of Progress Report (1)

GDRS received twenty (20) copies of Progress Report (1) submitted by the Study Team on March 3, 1997.

2. Meetings

A meeting was held at the head office of GDRS on March 11, 1997. The participants are listed in the attached paper.

3. Presentation

The Study Team presented a brief explanation on Progress Report (1) consisting of major activities of the members, socio-economic background in Turkey, major findings made during this Phase I field work, inventory survey, outline of the master plan, and future working plan.

4. Discussions

A series of discussions have been made following the presentation of the Progress Report (1), and GDRS has accepted the contents of the Report with some comments. Given below are the major issues discussed by both sides and the comments given by GDRS:

1. The Team stated that the long and short lists shall be of updated as required since they have been made based on information as of January, 1997.

2. GDRS requested that the counterpart training in Japan be more facilitated in line with this Study or in another way. The Team will convey this request to the Government of Japan.

3. Technology transfer, specially relating to engineering technology, shall be further made on the course of Phase II study. The transfer will be made through the coordinated work together with the Team members, and the counterpart personnel be participated in preparing the Progress Report (2).

4. Regarding "1.2 Background" in page 1, the present agricultural production does not necessarily meet the self-sufficiency although Turkey had achieved the food self-sufficiency up to 1993/94.

5. Regarding "1.3.2 Study Area" in page 2, "excluding 24 provinces in the southeastern region" in the 2nd line shall read "except 24 provinces".

6. Regarding soils names quoted in "4.1.4 Soil" in page 14, the names shall refer to those presently applied in Turkey.

LIST OF PARTICIPANTS

Turkish Side

Mr. Rüştü KASAP	Head of Basin Management and Earth Filled Dams Department, GDRS
Mr. Cavit BÜYÜKGÜRAL	Agricultural Engineer, GDRS
Mr. Sadettin TAKKA	Land Consolidation and Drainage Specialist, GDRS
Ms. Yurdanur SÜRMELİ	Agricultural Engineer, GDRS
Mr. Metin BİRBUDAK	Land Consolidation and Drainage Specialist, GDRS
Ms. Jale TAMZOK	Agricultural Engineer, GDRS
Mr. Mehmet TANSOY	Agricultural Engineer, GDRS
Mr. Şadi KASAPOĞLU	Ground Water Specialist, GDRS
Mr. Ahmet YAŞAR	Land Consolidation Specialist, GDRS
Mr. Mustafa ÇELİKEL	Watershed Management Specialist, GDRS
Ms. Mine DEDEOĞLU	Agricultural Engineer, GDRS
Mr. Nevzat ERDOĞAN	Agricultural Engineer, GDRS
Mr. Nazım ÖZŞAHİN	Agricultural Engineer, GDRS
Dr. Zeynep DERNEK	Agro-Economist, Village Service Research Institute
Mr. Adem İLBEYİ	Agronomist, Ankara Research Institute

Study Team

Mr. Hironori TAKAHASHI	Team Leader
Mr. Daizo ISENO	Member
Mr. Kosei HASHIGUCHI	Member
Mr. Toshihide SHIBATA	Member
Ms. Akara MATANO	Member

JICA

Dr. Nurettin ELBİR	JICA Turkey Office
Dr. Emin ÖZDEMİR	JICA Turkey Office
Ms .Aslı YAZICIOĞLU	JICA Turkey Office

Attachment 8

Minutes of Meeting of Interim Report for the Study on National Small-Scale Irrigation and Rural Development Program in the Republic of Turkey

MINUTES OF MEETING
ON
INTERIM REPORT
FOR
THE STUDY
ON
NATIONAL SMALL-SCALE IRRIGATION AND RURAL DEVELOPMENT PROGRAM
IN
THE REPUBLIC OF TURKEY

Ankara, July 14, 1997

Mr. M. Guner SAYGILI
General Director
General Directorate of Rural Services

Mr. Hironori TAKAHASHI
Leader, Study Team
Japan International
Cooperation Agency

Witnessed by:

Mr. Takeshi KOIZUMI
Leader, Advisory Team
Japan International Cooperation Agency

In accordance with the Scope of Work agreed on August 21, 1996, between General Directorate of Rural Services (hereinafter referred to as "GDRS") and Japan International Cooperation Agency (hereinafter referred to as "JICA"), the Study Team organized by JICA has conducted Phase I study (Master Plan Study) of the above-captioned Study. Based on the study, Interim Report was prepared and presented to GDRS.

The Study Team headed by Mr. Hironori TAKAHASHI as the Team Leader and GDRS headed by Mr. Rustu KASAP, head of Basin Management and Earth Filled Dams Department, had a series of discussions and exchanged views on the Interim Report, dated July 9 and 10, 1997.

As a result of the discussions, GDRS has agreed with the contents of the Report with the comments within this Minutes of Meeting as agreed by both sides. Given below are the major issues discussed by both sides and the comments given by GDRS.

1. Both sides confirmed that this Study shall primarily undertake small scale projects but not large scale ones.

2. GDRS agreed that the priority projects, proposed by the Team, will be feasibility-studied during Phase II study, names of which are Urunlu, Aslanlar, K. Karistiran, Kakesekisi, Hacilar, Kusca, Kuskara, Ozdenk, Ilyaskoy, and Camlibel.

3. Technology transfer shall further be pursued during Phase II study through On-the-Job-Training, exchanging information and ideas, and preparing Progress Report (2). The Team will hold workshop(s) to facilitate the transfer.

4. GDRS suggested that field survey schedule be notified one (1) week in advance in order to facilitate the counterpart assignment.

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LIST OF PARTICIPANTS

1.Turkish Side

Mr.Rüstü KASAP	Head of Basin Management and Earth Filled Dams Department,GDRS
Mr.Sadettin TAKKA	Land Consolidation and Drainage Specialist, GDRS
Ms.Yurdanur SÜRMELI	Agricultural Engineer, GDRS
Mr.Metin BIRBUDAK	Senior Irrigation Engineer, GDRS
Mr.Sadi KASAPOGLU	Agricultural Engineer, GDRS
Mr.Sevki ÜNSALDI	Agricultural Engineer, GDRS
Ms. Hatice TAPAN	Sociologist, GDRS
Ms. Nuran DALGÜN	Agricultural Engineer, GDRS
Ms. Jale TAMZOK	Agricultural Engineer, GDRS
Dr. Ahmet ÜNLÜKALAYCI	Agricultural Engineer, GDRS
Mr.Nevzat ERDOGAN	Agricultural Engineer, GDRS
Mr. Niyazi SERIN	Agricultural Engineer, GDRS
Mr. Mehmet TANSOY	Agricultural Engineer, GDRS
Mr. Zekai OZER	Agricultural Engineer, GDRS
Dr. Zeynep DERNEK	Agro-Economist, Village Service Research Institute
Mr. Adem ILBEYLI	Agronomist, Ankara Research Institute

2.Japanese Side

The Study Team	
Mr.Hironori TAKAHASHI	Leader
Mr.Ken KOZAI	Member
Mr.Ryosaku ISHIDA	Member
Mr.Toshihide SHIBATA	Member
Mr.Kosei HASHIGUCHI	Member
Ms.Akara MATANO	Member
Advisory Team	
Mr.Takeshi KOIZUMI	Advisory Team Leader
Mr.Kazuya SUZUKI	JICA Headquarter
JICA	
Dr.Nurettin ELBIR	JICA Turkey Office

Attachment 9

Minutes of Meeting of Progress Report (II) for the Study on National Small-Scale Irrigation and Rural Development Program in the Republic of Turkey

MINUTES OF MEETING
ON
PROGRESS REPORT (2)
FOR
THE STUDY
ON
NATIONAL SMALL-SCALE IRRIGATION AND RURAL DEVELOPMENT PROGRAM
IN
THE REPUBLIC OF TURKEY

Ankara, September 29, 1997

Mr. M. Guner SAYGILI
General Director
General Directorate of Rural Services

高橋宏德

Mr. Hironori TAKAHASHI
Leader, Study Team
Japan International
Cooperation Agency

In accordance with the Scope of Work agreed on August 21, 1996, between General Directorate of Rural Services (hereinafter referred to as "GDRS") and Japan International Cooperation Agency (hereinafter referred to as "JICA"), the Study Team organized by JICA has conducted Filed Survey of Phase II study of the above-captioned Study. Based on the survey, Progress report (2) was prepared and presented to GDRS.

The Study Team headed by Mr. Hironori TAKAHASHI as the Team Leader and GDRS headed by Mr. Hasan Coskun, Head of Basin Management and Earth Filled Dams Department, had a series of discussions and exchanged views on the Progress Report (2), dated September 26, 1997.

As a result of the discussions, GDRS has agreed with the contents of the Report with the comments within this Minutes of Meeting as agreed by both sides. Given below are the major issues discussed by both sides and the comments given by GDRS.

1. Kalesekisi land holding pattern of "11.7, 30.0, 40.0, 20.0, 10.0" shown in Table 3.2.5 shall read "10.3, 27.6, 27.6, 34.5, 0.0" respectively.
2. The present planted area of Hazelnuts in Kozluk project mentioned in page 25 shall be reviewed and the area shall remain in the proposed cropping pattern presented in page 43.
3. "Kusca" in Table 3.4.2 on page 33 shall read "Kuzluk".
4. Social service presented in Table 3.5.1 on page 41 shall be categorized in terms of social facilities and public services separately.
5. Social interview results will be analyzed in more detail during the Home Work in Japan.
6. Soil conservation shall be planned for the catchment area of Ozdenk project in order to prevent soil erosion giving overload of sedimentation.
7. GDRS stated that land consolidation project shall also be further pursued from the view point of 1) construction cost of conveyance facilities could reduce, 2) water allocation could be equally achieved as much as 90 - 100% among irrigation units, and 3) a project accompanied with land consolidation could raise the project benefit.

LIST OF PARTICIPANTS

1.Turkish Side

Mr. Hasan ÇOŞKUN	Head of Basin Management and Earth Filled Dams Department,GDRS
Mr. Hasan BALABAN	Director of Soil Conservation Division, GDRS
Ms. Yurdanur SÜRMELİ	Director of Survey and Project Division, GDRS
Mr. Metin BİRBUDAK	Director of Land Consolidation Section, GDRS
Mr.Şadi KASAPOĞLU	Agricultural Engineer, GDRS
Mr. Şevki ÜNSALDI	Agricultural Engineer, GDRS
Ms. Hatice TAPAN	Sociologist, GDRS
Ms. Nuran DALGÜN	Agricultural Engineer, GDRS
Ms. Jale TAMZOK	Agricultural Engineer, GDRS
Dr. Ahmet ÜNLÜKALAYCI	Agricultural Engineer, GDRS
Mr. Nevzat ERDOĞAN	Agricultural Engineer, GDRS
Mr. Mehmet TANSOY	Agricultural Engineer, GDRS
Ms. Mine DEDEOĞLU	Agricultural Engineer, GDRS
Dr. Zeynep DERNEK	Agro-Economist, Ankara Research Institute
Mr. Adem İLBEYLİ	Agronomist, Ankara Research Institute

2.Japanese Side

Mr. Hironori TAKAHASHI	Leader
Mr. Ken KOZAI	Member
Dr. Ryosaku ISHIDA	Member
Mr. Toshihide SHIBATA	Member
Mr. Kosei HASHIGUCHI	Member
Mr. Koichi NAGANO	Member
Ms. Akara MATANO	Member

Attachment 10

Minutes of Meeting of Draft Final Report for the Study on National Small-Scale Irrigation and Rural Development Program in the Republic of Turkey

MINUTES OF MEETING
ON
DRAFT FINAL REPORT
FOR
THE STUDY
ON
NATIONAL SMALL-SCALE IRRIGATION AND RURAL DEVELOPMENT PROGRAM
IN
THE REPUBLIC OF TURKEY

Ankara, January 13, 1998

Mr. M. Guner SAYGILI General Director General Directorate of Rural Services	Mr. Hironori TAKAHASHI Leader, Study Team Japan International Cooperation Agency

In accordance with the Scope of Work agreed on August 21, 1996, between General Directorate of Rural Services (hereinafter referred to as "GDRS") and Japan International Cooperation Agency (hereinafter referred to as "JICA"), the Study Team organized by JICA prepared Draft Final Report and submitted 20 copies of the Report to GDRS in December 1997.

1. Receipt of Draft Final Report

GDRS received 20 copies of Draft Final Report submitted by the Study Team on December 29, 1997.

2. Meetings

A series of meetings were held at the head office of GDRS during the period from January 8 to 12, to discuss the contents of the Report.

3. Discussion

As a result of the discussions, GDRS has agreed with the contents of the Report with the comments within this Minutes of Meeting as agreed by both sides. Given below are the major issues discussed by both sides and the comments given by GDRS.

(1) Excavation depth and the borrow area of Özdenk dam are desirably described in more detail.

(2) Soil conservation works for Özdenk covering 6,500 square meter is desirably mentioned in detail in conformity with the Table 3.7.2.

(3) The work schedule for Camlibel should contain another item, i.e., reparcellation. Also, land acquisition expense for this project is dispensed, because the land area can mutually be raised among land holders free of cost by means of a shared-sacrificing (Katulumpa) system.

(4) Kidney bean adopted in the cropping plan in Ürünlü are not suitable due to alkalinity of irrigation water and the Study team agreed to replace it with another leguminous crop with alkali-tolerant character.

(5) As the construction schedule proposed to Ürünlü is not suitable due to coldness and poor road condition, the study team agreed to alter it into the

period from April to November.

(6) Miss-printed or omitted letters and figures found in the following parts of the Draft Report shall be corrected ; Fig.4.2.6 construction schedule should cover a 3-year term instead of 2-year term. Table 7.1.4 contains an item "net gain" but actually it shall be "gross gain". Table 6.5.1 has a note in which "1977" shall be corrected into "1997". The same correction should be made in 6.6.1. Table 5.1.1 should give a unit "decare".

(7) A farmer participatory system as recommended in the Report may not be directly applied to Turkish decision-making institutions as a method of the project implementation in the light of traditional custom. However, it agreed the proposal of establishing a coordination committee for closer liaison with the Ministry of Agriculture for the extension of irrigation techniques among beneficiaries of the projects.

(8) GDRS appraised the method of project evaluation by using economic internal rate of return as mentioned in the Report and it would like to employ it in future for project evaluation.

(9) GDRS expressed a positive intention of the implementation of the studied projects by means of an external fund.

(10) The study team requested that GDRS would provide comments on the Draft Final Report to JICA within one month after the receipt thereof, i.e., January 28, 1998. GDRS is of the opinion that no further comments than presented during the meetings will be added later. The study team promised to regard all the above-mentioned comments so that they are duly reflected in the Final Report scheduled to submit in March 1998.

LIST OF ATTENDANTS

Mr.	Hasan COSKUN	Head of Basin Management and Earth-Filled Dams Depaertment (B.M.E.D.D.)	
Ms.	Yurdanur SÜRMELI	Chief of Survey and Project Division, B.M.E.D.D.	
Mr.	Metin BIRBUDAK	Chief of Land Consolidation, Irrigation Department (I.D.)	
Mr.	Hasan BALABAN	Chief of Soil Conservation, B.M.E.D.D.	
Mr.	Celal YENGINOL	Chief of Irrigation Construction	
Mr.	Sevki ÜNSALDI	Engineer, Small Dams, B.M.E.D.D.	
Mr.	Nazim ÖZSAHIN	Engineer, Irrigation Department	
Mr.	Sadi KASAPOGLU	Engineer, Ground-water, B.M.E.D.D.	
Mr.	O. Nüvit BEKTAS	Engineer, Survey and Project Division. B.M.E.D.D.	
Mr.	Mehmet TANSOY	Engineer, Soil Science, Survey and Project Division	
Dr.	Zeynep DERNEK	Chief Researcher, Village Service Research Institute	
Ms.	Nuran DALGÜN	Hydrologist, B.M.E.D.D.	
Ms.	Nevin ERGENELI	Geology-hydrogeologist, B.M.E.D.D.	
Ms.	Jale TAMZOK	Economist, Land Consolidation, I.D.	
Ms.	Mine DEDEOGLU	Engineer, Land Consolidation, I.D.	
Dr.	Emin ÖZDAMAR	JICA Turkey Office	
Dr.	Nurettin ERBIR	JICA Turkey Office	
Mr.	Hironori TAKAHASHI	Leader,	JICA Study Team
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Mr.	Toshihide SHIBATA	Member,	JICA Study Team
Ms.	Akara MATANO	Member,	JICA Study Team

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