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STAFF APPRAISAL REPORT

TURKEY

EASTERN ANATOLIA WATERSHED REHABILITATION PROJECT

FEBRUARY 9, 1993

Agriculture Operations Division
Country Dapartment I
Europe and Central Asia Region

CURRENCY EQUIVALENTS AT APPRAISAL

Currency Unit = Turkish Lira (TL)
US$1 = TL 7,000 (Appraisal: June 1992)
US$1 = TL 8,200 (November 1992)

WEIGHTS AND MEASURES

Imperial Units		Metric Units
1 foot (ft)	=	30.5 centimetres (cm)
1 square foot (ft^2)	=	0.093 square metres (m^2)
1 cubic foot (ft^3)	=	0.028 Cubic metres (m^3)
1 mile (mi)	=	1.609 kilometres (km)
1 acre (ac)	=	0.405 hectare (ha)
1 square mile (sq mi)	=	259 ha
1 pound (lb)	=	0.454 kilograms (kg)
1 long ton (1 ton)	=	1,016 kg (1.016 metric ton)
1 ft^3/sec (cusec)	=	0.028 m^3/sec

ABBREVIATIONS AND ACRONYMS USED

AGM	Department of Reforestation and Erosion Control (MOF)
APKKB	Research, Planning and Coordination Board (MOF)
DSI	General Directorate of State Hydraulic Works
FCPCPS	Farmer Centered Problem Census Problem Solving
FTE	Farmer Training and Extension Department of PDA
GEF	Global Environment Fund
GET	Global Environment Trust
GIS	Geographical Information System
GOT	Government of Turkey
ICARDA	International Centre for Agricultural Research in Dry Areas
KHGM	General Directorate of Rural Services
MARA	Ministry of Agriculture and Rural Affairs
MC	Microcatchment
MIS	Management Information System
MOE	Ministry of Environment
MOF	Ministry of Forestry
OGM	General Directorate of Forestry
ORKOY	Forest Village Development Fund
PCSU	Project Coordination and Support Unit
PDA	Provincial Directorate of Agriculture
PPF	Project Preparation Facility
PUB	Project Implementation Unit
SMS	Subject Matter Specialist
TAGEM	General Directorate for Agricultural Research
TCZB	Agricultural Bank of Turkey
TEDGEM	General Directorate of Organization and Support
TKV	Turkish Development Foundation
TMO	Turkish Grain Marketing Board
TUGEM	General Directorate of Production and Development
TYAUP II	Second Agricultural Extension and Applied Research Project
VGT	Village Group Technician

GLOSSARY

Kaymakam	County Governor
Mezra	Village Sub-unit
Muhtar	Village Leader
Stere	1 m^3 of stacked wood
Voli	Province Governor

GOVERNMENT OF TURKEY FISCAL YEAR

1 January - 31 December

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EASTERN ANATOLIA WATERSHED REHABILITATION PROJECT

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LOAN AND PROJECT SUMMARY

Borrower:	Republic of Turkey
Beneficiaries:	Ministry of Forestry (MOF) Ministry of Agriculture and Rural Affairs (MARA) Ministry of Environment (MOE) GET co-financed
Amount:	US$77 million equivalent loan US$5.1 million equivalent GET grant (cofinanced)
Terms:	Seventeen years, with a five-year grace period, at the Bank's standard variable interest rate. GET funds would be on a grant basis.
Project Objectives:	The project addresses important problems of rural poverty and natural resource degradation. It would help restore sustainable range, forest and farming activities in three provinces in the upper Euphrates watershed, reducing soil degradation, erosion, and sedimentation in reservoirs as well as increasing productivity and incomes in this impoverished region of Turkey. By using a participatory approach it would strengthen farmers' planning and implementing capacity, and improve the responsiveness of rural services agencies to farmers' needs. A subproject for *in-situ* gene conservation supported by a Global Environment Trust grant would establish, manage and monitor sites for *in-situ* conservation of the wild relatives of globally significant herbaceous and woody species indigenous to Turkey.
Project Description:	The project would support development of a participatory approach to watershed rehabilitation in 54 micro-catchments in Malatya, Elazig and Adiyaman provinces over a seven-year period. Treatments would be integrated across a micro-catchment, and selected and implemented with the participation of the local population. Treatments would include improved range management and enrichment, reforestation and oak coppice rehabilitation, improved crop husbandry and fodder production. Supporting treatments would include small scale irrigation, fruit tree cultivation and apiculture.

The project would also strengthen provincial field services and planning and coordination capacity and would provide for some applied research. The in-situ gene conservation subproject would support surveys and inventories, selection and management of in-situ gene conservation areas, data management, in-situ gene conservation strategies, institutional support, monitoring and training.

Benefits and Risks: The benefits focus on poverty reduction and sustainable resource management. The project would increase vegetative cover and control soil degradation. It would increase output of fodder, fuelwood and other wood products, horticultural and food crops. It would increase the incomes of poorer farmers living in remote hilly areas in Eastern Turkey. By supporting a participatory planning approach it should make rural service agencies more responsive to farmers' priorities. Its success could prove a model for participatory natural resource management and watershed rehabilitation in Turkey and elsewhere. The ERR is estimated at 17%. The GET subproject would protect in-situ the biodiversity of wild relatives of globally significant herbaceous and woody species. Nevertheless, the project has technical and institutional risks. Technologies are mostly well confirmed but where this is not the case, treatments are reduced to a pilot scale or phased. The project requires coordination between provincial institutions which do not have much experience of working together. However, these institutions have been closely involved in the project preparation and are well-versed with and committed to an integrated, participatory approach. Government has budgetary constraints; project size has been adjusted so that local budgetary commitments can be met. The project is robust, to delays, cost increases and benefit decreases.

Costs, Financing, Disbursement Summary

Estimated Project Costs:

Component	Local	Foreign	Total	% Foreign Exchange	% Total Base Cost
	(US$ million)				
Strengthening Agency Capacity	2.4	3.5	5.9	59	7
Watershed Rehabilitation	40.5	18.2	58.7	31	67
Supporting Activities	14.7	8.1	22.8	36	26
Applied Research	0.7	0.1	0.8	17	1
Baseline Costs	58.3	29.9	88.2	34	100
Physical Contingencies	5.8	2.8	8.6	32	10
Price Contingencies	9.7	3.3	13.0	25	15
Total Project Costs	73.8	36.0	109.8	33	125
GET subproject*	1.9	3.8	5.7	67	119
Grand Total	75.7	39.8	115.5	32.6	123

* Includes contingencies.

Financing Plan

Source	Local	Foreign	Total	Total Costs	Foreign Exchange Costs
	(US$ million)			(% of Project)	
Government	32.5	0.3	32.8	30	1
IBRD	41.3	35.6	77.0	70	99
Subtotal	73.8	35.9	109.8	100	100
GET Grant	1.3	3.8	5.1	89	100
Govt. Contribution	0.6	0.0	0.6	11	0
Subtotal	1.9	3.8	5.7	100	100
Grand Total	75.7	39.8	115.5		

Estimated Completion Date: Watershed Project - March 31, 2000
GET in-situ Subproject - September 30, 1996

Estimated IBRD and GET Disbursements:

	IBRD Fiscal Year							
	93	94	95	96	97	98	99	2000
	(US$ million)							
Watershed Project								
Annual	0.75	11.7	13.5	11.1	13.6	14.3	9.4	2.6
Cumulative	0.75	12.5	26.0	37.1	50.7	65.0	74.4	77.0
In-Situ Subproject								
Annual	0.2	3.1	1.0	0.6	0.2			
Cumulative	0.2	3.3	4.3	4.9	5.1			

Economic Rate of Return: 17% for Watershed Rehabilitation Project. Not applicable for In-Situ Gene Conservation Subproject

MAP: IBRD No. 24166 Turkey Eastern Anatolia Watershed Rehabilitation Project

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EASTERN ANATOLIA WATERSHED REHABILITATION PROJECT

I. PROJECT AND SECTOR BACKGROUND

A. Introduction

1.01 The Government of Turkey is attaching increasing priority to sustainable environmental management, and in particular to natural resource conservation. Soil degradation from erosion is one of the most serious problems affecting long-term sustainability of agriculture; erosion affects 57 million hectares in Turkey, or over 70% of the land area of the country. The Government has requested the World Bank to assist in financing a project to restore productivity through better soil and moisture conservation farming practices in the Upper Watershed of the Euphrates River, in the three provinces of Elazig, Malatya, and Adiyaman in Eastern Anatolia.

1.02 Soil degradation was recognized as a serious problem in the 1983 World Bank sector Report "Agricultural Development Alternatives for Growth with Exports" and confirmed in the draft report on Agricultural Resource Conservation in Turkey (June 1992). This project was first identified by the Turkish government in May 1990 and examined in a joint FAO/World Bank identification mission which visited Turkey in April 1991. The project was prepared by Consultants together with GOT from September 1991 to February 1992. It was preappraised by the World Bank in January 1992 and appraised in June 1992. Post-appraisal took place in November 1992.

B. Agricultural Sector

1.03 Turkey has an area of 780,000 km2, including 78,000 km2 of lakes. According to the latest agricultural census (1991) it has about 21 million ha of cultivated land, 3.6 million ha of which are irrigated. Field crops account for about 14.4 M ha, fallow land for 3.6 M ha, orchards and permanent crops 2.3 m ha and vegetables for 0.6 M ha. Significantly, Turkey with a population of 56 million is not only largely self-sufficient in food but has considerable net agricultural exports. Agricultural GDP growth averaged 3.3% annually over the 1985-90 period, contributing 17-18% of GDP. In addition, clothing and textiles represented 37% of exports and other industries based on agricultural raw materials about 16% of exports. About 4 million households in Turkey are engaged in agriculture. Crops contribute about 56% of agricultural GDP, animal products 32%, forestry 7% and fisheries 4%.

1.04 The country consists primarily of undulating plateaux rising eastward from 800 m to 2,000 m, bordered by high mountains with fertile plains next to the coast and in inland valleys. Much of the land is hilly, over one third having slopes of more than 20%. Climate is characterized, except along the coastal areas, by cold winters and hot dry summers. Much of the precipitation, averaging from 350 to 600 mm (more along the coasts), falls in winter and spring. This combination of climate and precipitation shortens the growing season except along the coasts and increases the vulnerability of

soils to erosion, particularly if they are fallow or overgrazed, with sparse vegetative cover.

1.05 The distribution of land-use, excluding lakes, urban land, national parks and military reserves is indicated below in Table 1.

Table 1: LAND USE IN TURKEY

Cultivated Land	Area (M ha)
Field crops:	
Wheat	7.3
Barley	2.6
Rice	0.04
Sugarbeet	0.37
Sunflower	0.44
Oats	0.16
Chickpea	0.69
Lentil	0.48
Others	2.35
Of which cotton	0.59
Of which tobacco	0.24
Subtotal	14.43
Orchards & permanent crops	2.34
Vegetables	0.59
Fallow	3.63
Cultivated land subtotal	20.99
Land suitable for farming but not in use	2.16
Permanent range and meadow	12.37
Forest land	19.23
Area unsuitable for farming	11.34
Total	66.09
Total Area of Turkey	78.00

Source: 1991 Census (preliminary results subject to change).

1.06 Cultivated land is dominated by cereal production, which accounts for nearly 50% of cultivated area. Forest land accounts for 25% of the land area; however, over half of this is seriously degraded and unproductive for forest purposes. Rangeland accounts for a further 16%. Range area has been reduced by half since 1950 as low fertility, often steeply sloping land has been brought into cultivation, while cropped area has increased by 60%. Farmland is largely privately owned. Average farm size is 6.5 ha; however 62%

of farms are under 5 ha. Fragmentation through inheritance is an issue; the proportion of farms with 6 or more parcels increased from 31% to 41% between the 1970 and 1980 censuses. Fragmentation increases the difficulties of using soil and moisture conserving cultivation techniques across a sub-watershed.

1.07 In addition to cereals Turkey grows a wide range of crops; particularly important are chickpeas and lentils for which Turkey is a significant exporter; area planted to legumes has increased significantly as the result of a successful fallow-reduction project introduced by the Turkish government in the early 1980s. Fruit trees are also important and Turkey exports large quantities of apricots, hazelnuts and raisins. In the west and south horticulture and citrus are of importance, while cotton and tobacco make an important contribution to industrial exports and meet local market demands. Turkey, where three major phytogeographical regions converge, is unusually rich in its range and variety of plants. More than 3,000 species are known to be endemic, including wild relatives and landraces of the major crop species that feed the world (wheat, barley, lentils, chickpeas, pasture plants and horticultural and forest plants). Plant breeders from all over the world use these strains to develop enhanced varieties that are more productive and are resistant to cold, drought, salinity and disease.

1.08 Livestock is a major resource in Turkey, accounting for 32% of agricultural GDP, and comprising 16 million cattle and buffalo, 45 million sheep, 11 million goats, 1.4 million equines and 64 million poultry. Mixed farming is the predominant farming system, with 86% of farms producing both livestock and crops. Animals feed on range and pasture grasses in the summer, and crop residues, conserved forages and purchased concentrate in the winter. The winter diet is often deficient, and animals are frequently put out to graze on communally owned rangeland too early in the spring for vegetation to be well established. Rotational grazing is rarely practiced, further reducing range productivity. Increased fodder production on agricultural land would reduce pressure on fragile rangelands. In the center and east vegetative cover averages only 10-20% compared with the 40% that is necessary to control erosion effectively and the 80-90% that could be achieved with proper management; yields, currently 100 to 500 kilos of dry matter per hectare could be tripled. Turkey has many indigenous legumes and grasses and the production potential of the rangelands is good from a genetic standpoint. Overgrazing, however, is weakening the genetic resource base.

1.09 Forest land accounts for 25% of land area. Forests vary from productive, well managed coniferous and mixed deciduous/coniferous forests along the Black Sea and Mediterranean coasts to the degraded oak coppice forest, used and overexploited for fuelwood and fodder, that is characteristic of Eastern and South-Eastern Anatolia. Poor management of rangelands has increased grazing pressure on forest lands and also lowered their productive potential. Approximately 40% of forest land is classified as productive and 60% as unproductive. Annual production of fuelwood is estimated at 28 million m^3, and fuelwood accounts for about 20% of household energy consumption. Approximately 8 million people live in villages in and around forest areas. They have access to forest products at reduced prices and are employed in forest management programs. While in some areas relations between foresters and the local community have been good, in others there have been tensions.

Nevertheless forestry staff, of all the government rural support services, have the most contacts with forest village populations and the most experience in working to conserve soils in difficult upland areas.

1.10 Development objectives. GOT's agricultural sector development objectives are to: (a) modernize production techniques to raise productivity, yields, farmers' incomes and reduce dependence on the weather; (b) maintain the food requirements of the population; and (c) promote agricultural exports.

1.11 Strategies. Government introduced many key economic reforms in the early 1980s whose aims were to encourage private sector and market forces for increased efficiency and growth. In agriculture, although these reforms were more limited, input trade and distribution was gradually liberalized, regulatory restrictions were reduced and the privat sector played an increasing role in crop marketing. Overall throughout the 1980s there was a policy bias against agriculture compared with industry, though the degree of policy bias was limited. In 1992, however, the sector has been more favored through price support and input subsidy policies. GOT plans to reexamine these over the next years. In general, both the research and extension subsectors suffered from declining government budgetary support, especially in the late 1980s. This lack of support has been reflected in disappointing progress in yields, further exacerbated by crop husbandry techniques which do not emphasize soil and water conservation.

Bank's Agricultural Strategy

1.12 Agricultural lending has aimed at increasing output productivity and exports, and supporting the necessary policy and institutional reforms in the sector. This has included:

(a) Supporting institutional strengthening and particularly technical support services of research and extension, improving irrigation agencies' implementation capabilities especially at on-farm level and reforming government enterprises involved in agricultural marketing and input supply;

(b) rationalizing the public sector investment program especially in irrigation;

(c) expanding credit supply, especially for medium and small farms, together with increasing the efficiency of credit institutions and improving financial sector policies to encourage greater private investment in the sector;

(d) reducing subsidies and price supports to prompt increased use of market forces, interest rate reform and increased private sector involvement in agricultural marketing;

(e) increased focus on environmental concerns, to ensure that in the long run Turkey preserves the resource base for sustainable agriculture; and

(f) increasing support for improving agricultural productivity in the poorer Eastern provinces, which have been relatively neglected until recently.

C. Bank Group Lending for Agriculture

1.13 As of December 1991 the Bank group had supported 26 agricultural projects in Turkey; however, 20 are closed and only 6 are under implementation. Lending to the sector has declined through the 1980s. The ongoing projects include an irrigation/drainage project, a credit project, an agroindustries project and two extension projects with applied research components. An Agricultural Research Project was approved in May 1992. This project includes provision for support to Research Institutions in Eastern Turkey, whose work programs focus on support to farming systems in cold, drought-prone areas with soils vulnerable to erosion. Some of the provinces receiving support under the Extension projects are also in Eastern Turkey. Earlier Bank projects included support for Rural Development Projects, and two such projects are currently ongoing with IFAD support. The Bank also supported a Forestry Project in the 1970s. However, this would be the first watershed management project, integrating activities on range, forest and agricultural land to improve productivity by focussing on activities which conserve soil and moisture and reduce erosion, and ensure the long-term sustainability of farming in the watershed.

1.14 Experience with project implementation has been mixed. The main difficulties have included procurement delays and inadequate local funding. Government is well aware of these difficulties and is no longer willing to agree to new projects unless counterpart funding will be available The Ministry of Forestry (MOF), which would be the coordinating agency for the proposed project, has in general suffered less than the Ministry of Agriculture and Rural Affairs (MARA) from budgetary shortfalls since many of its expenditures are financed from internally generated funds. It has also retained a strong central management which has facilitated the making of decisions and allocation of priorities.

1.15 Recent reviews of projects in Turkey include those of the Second Agricultural Credit Project, the Erzurum Rural Development Project, and the Northern Forestry Project. The Erzurum Rural Development Project Completion Report (PCR) concludes that even in less developed areas in Turkey farmers respond readily to an appropriate development package. It also highlights the need for participation of beneficiaries in project preparation. The Northern Forestry Project PCR emphasizes the importance of realistic project preparation, and the need for technologies to have been tested in Turkey before they are introduced on a large scale.

1.16 Watershed Rehabilitation projects are relatively new in the Bank, and few have yet been completed. PPARs on two early ones, however, suggest the following. For the Philippines Watershed Management and Erosion Control Project (Loan 1890-PH, August 1980), the PCR (September 1991) emphasized the need for a thorough understanding of prevailing legislation, simplification of organizational arrangements, a reasonable time frame for project implementation and the importance of securing the support of local communities

in project planning and implementation. For the India Kandi Watershed and Area Development Project (Loan 1897-IN, September 1980) the PPAR (December 1991) emphasized the value of addressing man-induced environmental degradation in upper watersheds, and the broader value of the project as providing the starting point for other watershed management projects in India.

1.17 Government initially requested Bank assistance with financing a project focussing on reforestation, improved range management and environmentally sustainable farming in 17 provinces in Eastern Turkey. It was realized that a project with such a wide geographical area would be difficult to implement, and project size was reduced to the 10 provinces of the upper watershed of the Tigris and Euphrates Rivers, where erosion problems appeared to be particularly severe. Furthermore, because of poor endowment of natural resources, compounded by a harsh climate, income levels in these areas are relatively lower. Project area was further reduced, to the three provinces of Elazig, Malatya and Adiyaman in the middle catchment of the upper watershed, principally for logistical reasons, and partly because provincial government officials in these provinces were most ready to work with local communities.

II. PROJECT AREA AND RATIONALE

A. Definition of Area

2.01 The project concerns the rehabilitation of ten highly degraded subcatchments in the middle basin of the Euphrates river. These subcatchments cover an area of about 1.5 M ha within the provinces of Elazig, Malatya and Adiyaman and can be broken down into 214 microcatchments (MCs). They have been selected to exclude plains areas which experience minor problems of degradation. On the basis of an analysis of the implementing capacity of concerned agencies 54 of these MCs covering an area of about 400,000 ha will be treated during the seven year project period. The provincial forestry department would in consultation with other agencies be responsible for selection and MCs with a larger proportion of range and forest land would be given priority. The criteria for selection of MCs will include judgements about (i) the severity of problems in terms of vegetative degradation and soil erosion including the imbalance between the supply and demand for fodder and wood; (ii) the prospects for achieving an adequate return to the treatments offered under the project; and (iii) the extent to which the problems are recognized by the MC population and there is a willingness to explore solutions. Eighteen MCs have been tentatively identified while the remaining 36 will be selected during the course of project implementation. The definition of the project area is summarized in table 2.1 below (see also Annex 1A, Table 1B).

Table 2.1: DEFINITION OF PROJECT AREA

Province Name	Area ('000 ha)	SUB-CATCHMENT Name	SUB-CATCHMENT Area ('000 ha)	MICRO-CATCHMENT TOTAL Number of MCs	MICRO-CATCHMENT TOTAL Average size (ha)	MICRO-CATCHMENT TO BE SELECTED Number of MCs	MICRO-CATCHMENT TO BE SELECTED Area (ha)
Elazig	915	Kuzova	116	7	16,600		
		Uluova	28	20	1,400		
		Baskil	187	16	11,700		
		Subtotal	331	43	7,700	18	136,000
Malatya	1,231	Kuru Cayi	277	35	7,900		
		Siro Cayi	155	12	1,200		
		Malatya	84	13	6,500		
		Tohma (part)	40	4	10,000		
		Subtotal	556	64	8,700	18	161,000
Adiyaman	761	Kahta	306	35	8,700		
		Ziyaret	112	34	3,100		
		Goksu	183	36	5,100		
		Subtotal	601	107	5,600	18	103,000
Total	2,907		1,488	214	7,000	54	400,000

B. Physical Characteristics

2.02 The climate in the project area is semi-arid and harsh. Precipitation averages between 350 to 600 mm and much of it falls in the form of snow. Summers (June-September) are very hot and dry. The geology of the area is extremely complex and soils are variable with a high proportion of erodible materials (fine-grained sediments, acid igneous rock, and unconsolidated parent material or soft rock). The topography is characterized by steep slopes interspersed by valleys of varying width. The vegetative coverage on forest and range lands is poor and 35% of the project area (Middle Basin) is severely and 44% strongly eroded (both sheet and gully erosion). The mean annual soil loss in the project area is estimated at a very high 40-50 tons per hectare. Erosion is particularly high during the snow melt and intense rainfall in the spring.

2.03 Out of the cultivated area in the three provinces about 17.5% is irrigated, 7.5% is devoted to orchards (mainly apricot) and the remaining 75% is under rainfed cereal production; about one third of this area is fallowed under the prevailing cropping system. The main cereal crop is wheat which is reported to yield 1.5 to 2 tons per ha under rainfed conditions and double that under irrigation. Yields have not changed significantly during the last ten years. Other crops include barley, tobacco, pulses and vegetables.

Fodder production is rarely integrated into the cropping system. The plains which to a large extent are excluded from the project area, support more intensive cropping and have a higher proportion of irrigation. The mid-slopes, which lie between the plains and the ridges and have slopes between 8% and 30%, are of major concern to the project. Crop production there is less stable and mainly rainfed, although there is some irrigation in combination with terracing. Orchards comprise a larger proportion of cultivated area than on the plains. Even shallow soils and steep slopes have, wherever possible, been brought under cultivation. Some mountain villages also practice subsistence cereal production on the highland plateaux under marginal conditions. Major problems identified by project area farmers include the short growing season, lack of fodder and fuelwood, moisture stress and low productivity in dryland farming systems. Inadequate drinking water supplies, caused in part by the drying of springs due to excessive runoff, are also identified as a problem.

2.04 Rangelands constitute, as noted above, 40% of the project area and have yields varying from 100-500 kg dry matter per hectare. The opportunities of conversion of range land to cultivated land have been more than fully exploited. Land used for feeding of livestock is commonly classified into three types:

- highland range (yayla) i.e. rangelands with summer houses on the high plateaux which are used for communal grazing by transhumant herds during the summer months;

- rangelands (mera) i.e. upland areas which are used for communal grazing;

- meadowlands (cayir) i.e. highly productive spring watered grasslands which are used for hay production. They occupy a very small proportion of the land area (only about 3,000 ha in the three provinces).

The range- and meadowlands belong to the government (Treasury) but villages are reported to have exclusive usufruct rights (see also Annex 2 para 5). The Ministry of Agriculture and Rural Affairs is responsible for overall range management; this will be formalized in a Rangeland Law shortly to be considered by Parliament.

2.05 Livestock production in the three provinces is based on some 1.4 M sheep, 0.45 M goats and 0.45 M cattle. The long winter necessitates stall feeding for 5-6 months using scarce crop by-products, hay from meadows and better rangelands, oak leaves from lopping of oak forest and purchased concentrate. The number of livestock units has not increased significantly in the last 20 years, but the productive range area has diminished. The objectives of livestock keeping have changed with draught power diminishing in importance. Due to the increasing shortage of labor, there is the beginning of a trend away from large flocks of small ruminants, requiring much labor for shepherding and milking, towards stall feeding and milking of improved dairy cattle. The scarcity of winter fodder, which means keeping livestock outside for as long as possible in the fall and releasing them early in the spring,

together with general over stocking has had disastrous effects on vegetative coverage and species composition. The range lands are thus rapidly deteriorating and are by now a major source of erosion. The decreasing productivity of the range is fortunately recognized by farmers and, together with the scarcity of winter fodder and labor shortages for shepherding, seen as major problems in livestock production.

2.06 Forest land belongs to the government and is administered by the Ministry of Forestry but is used on a controlled basis by villages for fuel and fodder. Degraded rangeland may also be allocated to the Forestry administration for rehabilitation, and this sometimes causes friction with the villagers. However, by and large boundaries are respected and villagers do not encroach onto land managed by MOF for rehabilitation purposes unless allowed to do so. Although the project area reportedly contained dense oak forests some 30 to 50 years ago, exploitation before nationalization of these lands and increasing pressure on natural resources have resulted in most of the forest area (88%) now being classified as bush, rather similar in appearance to the rangelands. Protection until recently has focused on the small proportion of remaining forests and particularly on the areas which have been rehabilitated or planted. Thin, often infertile soils and low and badly distributed rainfall cause slow woody biomass growth averaging 1-2 cubic meters per hectare per year.

C. Social Characteristics

2.07 Although socioeconomic data comparing the project area with the rest of Turkey are not available, aggregated data indicate that the project provinces are substantially poorer than Turkey as a whole, while incomes in the rural mountainous areas of the project area are below the average for the project provinces. Rural incomes in Turkey are lower than urban incomes, and those in Eastern and South-Eastern Anatolia are lower than those elsewhere in the country. According to the Household Income and Consumption Survey of 1987, per capita incomes in Eastern and South-Eastern Anatolia were 67% of the Turkish average, while rural per capita income was 60% of urban. Food absorbed 46% of household expenditure in rural Eastern and South-Eastern Turkey (a money value was given to home produce) compared with 32% for Turkey as a whole. Other significant indicators include fertility, 5 in the east compared with 4 for all Turkey, and infant mortality which in 1985 averaged 66/1,000 for Turkey, compared with 95/1,000 in Elazig and Adiyaman project provinces (including urban and rural areas). Female literacy averaged 50% for the project provinces (again including urban and rural areas) compared with 62% for Turkey.

2.08 The average village in the three provinces has a population of about 600 people and embraces an area of roughly 2000 hectares. Settlement is rather scattered and the village frequently contains a core and a number of smaller settlement units. On average there are three units per village. The microcatchment would normally cover an area with about 4 to 6 villages. The village is administered by an elected headman (Muhtar) who executes the laws and decisions of Government and by the Council of Elders which is an advisory body containing elected as well as appointed members (teacher, religious leader). Cultivated land is privately owned; a survey in Eastern Anatolia

indicated considerable fragmentation as the average farm contained about 6 parcels of land. In the project area, farm size is smaller than the national average and some 13% of villagers have no cultivated land. The same survey concluded that almost all households keep some cattle, sheep and/or goats. Livestock is the main economic activity in some of the villages where livestock producers tend to leave in May for the highland pastures and return to the home village in October.

2.09 The rural population in the three provinces, 816,000 in the 1990 census, constitutes about half of the total. The population of the project area is estimated at about 230,000. Annual growth of rural population between 1985 and 1990, according to the 1990 census, was 1.49% in Adiyaman but negative in Elazig (-0.80%) and Malatya (-1.10%), compared with a national average of 2.3% per annum and a national rural average of 0.67% per annum. There is thus a clear trend of movement towards urban centers. Patterns of population movement include dual residences, summers in the village - winters in the city, releasing young male members to work in Istanbul while other family member pursue farming, or seasonal agricultural wage labor by part or the entire family. Agriculture and livestock are in some cases increasingly becoming secondary sources of livelihood (less so in Adiyaman) and many households in Elazig and Malatya have substantial non-farm earnings. There is a strong cultural attachment to land and the home region and few families appear willing to dispose of the land and move away permanently. Women play an important role in agricultural production. Women are responsible for the care of livestock in addition to their domestic responsibilities and child rearing. With the male work force increasingly engaged in non-farm employment the women have to take over most of the agricultural work and/or reduce the farm operations.

D. Infrastructure

2.10 The project area has a well developed road network which permits access during most of the year. While snow temporarily may block high elevation passes principal routes are reopened within a matter of days. Tertiary roads may occasionally be cut by erosion. Electricity and telephone service is available in most project area villages. Electricity is used principally for lighting; the preferred cooking fuel is gas while fuelwood is used for heating. Markets and marketing organizations operate freely throughout the project area and marketing should thus not be a constraint in project implementation with the possible exception of fresh milk. There are two main sources of credit, the Agricultural Bank of Turkey (TCZB) and the Agricultural Credit Cooperatives (TKK). The Forest Village Development Fund (ORKOY) also provides credit to forest villages.

E. The Institutional Setting

2.11 Administratively the state is represented at the provincial level by a Governor (Vali) reporting to the Ministry of Interior. The elected village leader (Muhtar) reports to the Governor through the Kaymakan (county governor) at the county level. Almost all Ministries are represented at the provincial level by provincial directors. The organizations relevant to the project are the Provincial Forestry Directorates reporting to the relevant directorate in

the Ministry of Forestry (MOF), the Provincial Rural Services Directorates reporting to the General Directorate of Rural Services (KHGM) in MARA, and the Provincial Agricultural Departments (PDA) reporting directly to the Ministry of Agriculture and Rural Affairs (MARA). Provincial work programs for Rural Services (i.e. roads, water supply and small-scale irrigation) and Forestry are prepared provincially and approved at national level by the relevant General Directorate. For agriculture they are prepared by the Provincial Agricultural Directorates, and approved directly by the Ministry. Thus, no single General Directorate in Ankara is responsible for agricultural activities at provincial level. The responsibility for natural resource preservation is fragmented although a Ministry of Environment (MOE) has recently been established at the national level. Key ministries are well established and functioning. An agricultural extension system has existed for many years in Turkey at provincial, county and village levels, while the Provincial Directorates of Forestry also have staff at county and village level. The Ministry of Forestry also has a Forest Village Development Fund (ORKOY), which finances various income generating activities in villages in forest areas. The present staffing of the Ministries of Forestry, and Agriculture and Rural Affairs in the three project provinces is given in Table 2.2 below. The administrations are for the most part well staffed, and the project is expected to be implemented with existing staff resources. As regards in-situ gene conservation, research has a long tradition in Turkey, with a research establishment of over 8,000. MARA has experience in ex-situ gene conservation while MOF has experience in land management. The project would build on the complementary strengths of the two agencies.

Table 2.2: PROJECT PROVINCES: STAFFING OF KEY MINISTRIES

	ADIYAMAN	ELAZIG	MALATYA	TOTAL
FORESTRY				
- Engineers	16	63	21	100
- Technicians	38	103	68	209
Subtotal	54	166	89	309
PROVINCIAL AGRICULTURE DEPARTMENT*				
- Agricultural Engineers	19 (3)	39 (5)	42 (8)	100 (16)
- Veterinarians	8 (4)	29 (5)	32 (17)	69 (26)
- Technicians	96 (43)	107 (52)	241 (134)	444 (229)
Subtotal	123 (50)	175 (62)	315 (159)	613 (271)
PROVINCIAL RURAL SERVICES DIRECTORATE				
- Engineers	22	33	28	83
- Technicians	9	15	12	36
Subtotal	31	48	40	119

* Numbers in parentheses indicate personnel at County Agricultural Directorates

2.12 Despite the large Turkish research establishment there is no program which systematically examines rangeland and meadow management and productivity. The only research capacity within the project area is the Forest Research Institute at Elazig and the Apricot Research Institute of Malatya. Erzurum Regional Research Institute lies in the high mountain zone while the research institutes at Diyarbakir (agriculture) and Sanliurfa (soil and water research) are situated in the low plains zone.

2.13 Among ongoing activities in the three provinces the Second Agricultural Extension and Applied Research Project (TYUAP II) covers Adiyaman and Malatya but not Elazig, and the Fallow Reduction Project implemented by MARA which aims at replacing fallow with pulses and forage legumes has shown considerable success. Upgrading of livestock and stall feeding are being promoted under ongoing programs. The MARA Rangeland and Meadow Development Project which started in 1991 and aims at demonstrating the experience from the Erzurum Pilot Range Development and Forage Project is being implemented in the project area, though on a small scale. The Ministry of Forestry annually executes a substantial program of soil conservation, range improvement, coppice rehabilitation and afforestation within the project area. This

program reached a peak of 19,000 ha in 1987 but has in recent years stagnated at an annual treatment of 11,000 ha. The General Directorate of Rural Services (KHGM) within MARA has substantial experience in the three provinces with small-scale irrigation schemes in hilly areas fed with water from springs and streams, and with structural soil conservation. Rural service agencies have not in the past, however, integrated their activities in a particular geographical area.

F. Project Rationale

Rationale for Bank Lending

2.14 The project would conform to the Bank lending strategy for Turkey, which includes increased focus on environmental issues, and increased assistance to the poorer provinces of Eastern Turkey. By improving sustainability of forestry, livestock and agriculture, the project would contribute to increased productivity and higher rural incomes in these areas. It would also strengthen coordination between the agencies responsible for providing rural services. Because of the focus on poverty and natural resource protection, GOT is fully committed to the project. Concerned provincial agencies have been closely involved in the preparation process, at central and provincial levels, and no other significant external funding source is available. Institutions are able to expand activities but financial resources and equipment are limited. The In Situ Gene Conservation subproject supports, for the first time, the conservation in their natural environment of the wild relatives of globally significant food and forest species. This innovative biodiversity activity could become a model for in-situ conservation elsewhere.

III. THE PROJECT

A. Objectives

3.01 The project addresses important problems of rural poverty and natural resource degradation. The project catchments embrace valleys, rolling hills and rugged mountains. Close to 80% of the area is strongly to severely eroded, vegetation is badly degraded, soils are shallow in many places, runoff and soil loss are very high. The project would help to restore sustainable range, forest and farming activities in the upper watersheds of the three project provinces, reducing soil degradation, erosion and sedimentation in reservoirs as well as increasing productivity and incomes in this impoverished region of Turkey. These objectives would be pursued by efforts (i) to improve productivity of range and forest land; (ii) to promote the production of fuelwood, cultivated fodder, and more sustainable use of marginal farm lands; (iii) to facilitate the adoption of treatments for range and forest land by funding selected supporting activities designed to yield quick benefits; and (iv) to ensure increased responsibility and involvement of local communities in the planning and management of their resources. A key underlying objective of the project is environmental rehabilitation of degraded land. The In-Situ Gene Conservation subproject would initially focus on sites in Western, South-

Eastern and Central-Southern Anatolia. Its objective would be the conservation in their natural habitat of the genetic resources of globally significant species indigenous to Turkey.

3.02 Watershed development is a continuous process in which the main rehabilitation phase is followed by a maintenance and management phase to ensure that improvements are sustained and growth in productivity keeps pace with population and the needs for income and employment. The main features of the proposed approach include:

(a) Interactive microcatchment (MC) planning (see Annex 4) using a "Farmer-Centered, Problem-Census, Problem-Solving" (FC-PCPS) approach, involving discussion of farmers' perceptions of problems, a menu of treatment options (Annex 5) as a basis for agreement on possible solutions, and a flexible design to incorporate lessons of experience, results of adaptive research and demonstrations. Plans for each village in the microcatchment would be the building blocks of the microcatchment plans and annual budget requests.

(b) Coordination of provincial departmental efforts within the framework of the MC plans to ensure that the treatments of cultivated land, rangelands and forestlands reinforce each other in restoration of sustainable land-use and alleviation of constraints e.g. fodder and fuelwood shortages.

(c) Strengthening the village capacity to organize management of communal rangelands and to form a partnership with the Ministry of Forestry for protection and resource sharing for forest lands.

(d) Emphasizing soil fertility management and vegetative means of soil and moisture conservation rather than expensive terracing and drainage line treatments.

(e) Emphasizing stallfeeding, forage production and conservation, and upgrading of livestock to diminish pressures on range.

3.03 Large parts of Turkey face problems of natural resource degradation similar to those in the project area. The project is thus expected to provide a useful model for future efforts not only in the upper reaches of the Firat (Euphrates) basin but also elsewhere in Turkey. The replicability and cost effectiveness of the approach will thus be a major objective.

B. Summary Description

3.04 The means for project implementation would be through an interactive planning process, whereby local implementing agencies work together with villagers to prepare and implement a plan across a microcatchment, defining interventions for improved range management, reforestation and improved soil and moisture cultivation methods. These measures would bring a mix of short-term and long-term benefits, and would lead to a sustained increase in fuelwood, fodder and agricultural production. Since villagers will select from a menu of interventions, the proportion of project costs devoted to each

activity cannot be determined in advance with any accuracy. The appraisal mission has prepared a "best estimate", for the purpose of costs and benefit calculations, based on field work during project preparation. Six microcatchment plans, sufficient for the first year's implementation, have been prepared (see Annex 14), and the implementation plan for 1993 is summarized in Annex 15. Activities would be initiated in two microcatchments in each province in the first year, three in each province in years two and three, four in years four and five, and two in year six. Microcatchments treated in a particular year would be grouped within a subwatershed, in order to facilitate the logistics of project implementation. The microcatchment planning process is summarized in paras 4.08-4.10, and described in more detail in Annex 4. The main components of the project would include:

(a) Rehabilitation of an estimated 54 microcatchments through a series of treatments on cultivated, range and forest lands with the participation of the local population. These include fallow reduction, increased fodder production, soil and moisture conserving farming techniques, improved range management and range enrichment, oak coppice rehabilitation and afforestation;

(b) Supporting activities with short and medium-term income benefits to the local population, including small-scale irrigation, horticulture and apiculture;

(c) Support to project planning and management;

(d) Adaptive research and pilot work to supplement and improve the menu of treatment options; and

(e) For the GEF subproject activities include survey and inventory, management of selected sites, monitoring and data management, institutional strengthening and preparation of a national plan for gene conservation.

C. Detailed Features

(a) Watershed Rehabilitation (US$58.7 million)

3.05 The volume of treatments has been estimated from the size of the project area, land uses (see Table 2.1 and Annex Tables 1A and 1B), the physical characteristics of the project area and the general experience of adoption of such treatments. As mentioned above, activities need to be integrated across a watershed and among land uses in order to bring about sustained improvements, and the right balance of short-term and long-term benefits.

3.06 Improvements in Farming Practices (US$3.4 million). The project would promote technical packages which increase sustainable productivity, increase integration of livestock and cropping systems and control erosion. Activities include:

(a) promotion of food and forage legumes (chickpeas, lentils, vetch) on existing fallow land to enhance soil fertility and expand food production and the availability of forage;

(b) introduction of conservation tillage using sweep tined cultivators along the contour on slopes exceeding 4%;

(c) strengthening the present efforts to promote early planting, use of high yielding cold tolerant cultivars, fertilizers and the use of minimum tillage; and

(d) encouraging conversion of marginal land to perennial fodder banks (planting of sainfoin).

3.07 The project would finance on a grant basis the seed and fertilizer package for the first year for farmers who adopt the recommended treatments, and would undertake demonstrations of improved tillage practices. For fodder banks the project would also include the costs of preparing the seedbed and broadcast the seed for the first year. Project costs include seed (vetch, alfalfa, sainfoin, chickpeas, lentils, HYV wheat) fertilizers (DAP, ammonium nitrate) and seedbed preparation. Activities are described in more detail in Annex 1A.

3.08 Rangelands (US$4.5 million). The objective would be to increase sustainable productivity by promoting improved management systems over the bulk of the rangeland and rangeland enrichment over a limited land area of higher potential that would respond to such treatment. Activities include:

(a) improved management by farmers of communal rangeland, including encouragement of rotational grazing, with a later start and an earlier end to the grazing season, to allow recovery of vegetation. Range management plans would be prepared with full participation by villagers, and extension staff and farmers would be trained in improved participatory range management techniques;

(b) enrichment seeding and fertilization of degraded rangeland capable of increased production, initially on a pilot basis, through improved soil nutrition combined with grazing management; and

(c) enrichment through fertilization of range and meadowland with adequate seed population to increase hay production, initially on a pilot basis, again combined with grazing management.

Project costs include training, seed and seed pelleting, fertilizer, soil ripping where appropriate to increase moisture retention, and labor. Activities are described in more detail in Annex 2.

3.09 Forest land (US$36.8 million). Although forest land belongs to Government it is frequently used by villagers. Sustainable rehabilitation will require close cooperation between villages and MOF staff to determine the best combinations of treatments according to village preferences and site conditions. Emphasis will be placed on cost-effective measures which produce

early increases in production while maintaining at least 40% vegetative cover over soils. Proposed treatments include:

(a) oak coppice rehabilitation which would comprise felling existing degraded oak stands prior to encouraging coppicing, together with enrichment sowing of acorns in open areas;

(b) fuelwood coppice plantations which involve oak planting and acorn seeding sites which are manually prepared and/or mechanically ripped to encourage moisture conservation;

(c) soil conservation afforestation which would comprise earth terracing by mechanical means where necessary, planting trees along ripped and fertilized terraces, planting acorns between the bulldozed earth terraces, and broadcast seeding of the entire area with a mixture of forage seed, grass seed and fertilizers. Gullies would be revegetated, and small check dams constructed where necessary;

(d) establishment of conifer plantations by planting on mechanically or manually prepared slopes;

(e) rangeland rehabilitation by broadcast seeding with a mixture of forage seed, grass seed and fertilizers, and gully rehabilitation with checkdams and tree planting; and

(f) riverbank protection through planting of poplars.

3.10 Project costs would include planting material (including acorns, seedling trees e.g., robinia, fruit trees, nut trees, conifers etc., and forage seed), survey, labor and machinery costs, fertilizer and initial maintenance costs. Activities are described in more detail in Annex 3.

Strengthening Field Services (US$14.0 million)

3.11 The project would provide technical assistance and training to strengthen the provincial Forestry, Agriculture and Rural Services directorates to enable them to carry out the above activities. Training would be mostly in-country, but would also comprise short overseas courses. For the Provincial Agricultural Departments the project would finance agricultural equipment, vehicles and office equipment. For KHGM the project would finance survey equipment, tractors, caravans, 4WD vehicles and office equipment. Most of the work undertaken by KHGM would be executed by contractors. For the provincial Forestry Departments the project would finance nurseries, labor, 4WD vehicles, bulldozers, caravans, tractors and related implements, and office equipment (US$10.2 million).

(b) Income Supporting Activities (US$22.8 million)

3.12 The above activities, which bring a mix of short-term and long-term benefits, would be complemented by supporting activities bringing short-term increases in income. These would normally constitute about 25% of the total

cost of rehabilitation activities in any one microcatchment. They would include:

(i) Beekeeping. This activity has important externalities in terms of conservation of vegetative cover and resource rehabilitation. Furthermore it has a long tradition in the project area. The provision of modern apiculture kits is linked to individuals adopting rehabilitation treatments such as perennial fodder banks, fallow reduction measures etc. The project would provide apiculture kits consisting of beehives and swarms and a set of equipment to farmers in each microcatchment through the forest village credit program of ORKOY (Forest Village Development Fund) (see Annex 1A Attachment 1).

(ii) Horticulture in gullies and along boundaries. High value fruit and nut, robinia, willow and poplar trees would be planted in gullies and along boundaries for participating households, the cost of the seedlings being met through the project.

(iii) Upgrading of livestock. The project would strengthen existing services to upgrade the existing livestock, through natural and artificial insemination, including provision of reliable supplies of Holstein and Brown Swiss semen for crossing with local Anatolian cows. Breeding bulls would be made available.

(iv) Dryland terracing. The project would finance construction of small intervalled earth bench terraces on selected sloping dryland farming areas, to reduce erosion and increase water infiltration. The terraces would be mechanically prepared to promote moisture retention and root growth and planted to tree crops, with grapes, sainfoin and vetch, cereal and legumes grown between the terraces (see Annex 1B).

(v) Small-scale irrigation. The project would finance small irrigation schemes through diversion of springs and streams, construction of small water ponds and tertiary channels (Annex 1B). Higher value crops particularly tree crops would be grown on the irrigated lands.

(c) Planning and Management (US$5.9 million)

3.13 The project would provide training, technical assistance and logistical support to the provincial authorities and to a small Project Coordination and Support Unit (PCSU) which has been established in the Ministry of Forestry in Ankara. An estimated 97 manmonths of international and 39 manmonths of local technical assistance would be required, to assist in project implementation, in watershed management, range management, local participation, monitoring and evaluation/MIS and adaptive research and to carry out specialized studies related to M&E. A total of 108 manmonths of short-term overseas training/study tours, 30,000 mandays of farmer training and 950 manmonths of on-the-job in-country training is envisaged. GOT agreed at negotiations to sign the first principal Technical Assistance Contract for assistance in project implementation by 1st October 1993 (para 6.02(h)). A

separate local TA contract to assess possibilities of adapting the project to other provinces is envisaged in years four and five. Short-term in country training would be funded, as would office equipment and vehicles. A geographical information (GIS) system and related technical assistance and training to assist provincial staff in mapping and watershed planning would be financed beginning in year 3.

(d) Applied Research (US$0.8 million)

3.14 A flexible approach would be followed for adaptive research, with new topics added as appropriate. The following programs are ongoing or planned and would be supported in the project area (see Annex 12 for details).

3.15 Ministry of Forestry. Research would examine: (a) the effects of bench terracing and ripping related to success and cost-effectiveness of afforestation, erosion control and soil and moisture conservation; (b) the effects and cost-effectiveness of fertilizers on the survival and growth of oak seedings; (c) comparisons of survival and growth of seedlings after different preparation techniques; and (d) community management of selected rehabilitated forest areas.

3.16 Ministry of Agriculture and Rural Affairs. Research activities would include: (a) run off trials to estimate soil loss from cultivated land and range lands of varying slopes; (b) testing and demonstration of various cold tolerant species and varieties of forage and food legumes for the fallow reduction and rangeland enrichment programs; (c) equipment and methods for sustainable seedbed preparation on slopes in excess of 4%; (d) Pilot aerial seeding and fertilization program for 5,000 ha of degraded rangelands; and (e) pilot assignment certificates for communal rangelands.

(e) In-Situ Gene Conservation Subproject Activities (US$4.8 million)

3.17 Activities comprise:

(i) Genetic resources survey of selected sites, and designation of gene management zones;

(ii) Genetic resource inventory, preparation and implementation of management plans for gene management zones;

(iii) Data management,

(iv) Preparation of a national plan for in-situ conservation of wild crop relatives, woody species and landraces; and

(v) Institutional collaboration and strengthening.

Table 3.1: PROJECT COST SUMMARY

Watershed Rehabilitation Project
Eastern Anatolia

	TL000			US$000			% Foreign Exchange
	Local	Foreign	Total	Local	Foreign	Total	
A . Strengthn'g Agency Capcty							
1. Planning and Management	20962325	30712500	51674825	2383	3491	5874	59
B . Watershed Rehabilitation							
1. Cropland Soil Moist. Cons	6283953	1694937	7978891	714	193	907	21
2. Cropland Fallow Reduction	14124296	7596885	21721181	1606	864	2469	35
3. Range-Meadowland Enrichmt	7834881	6880538	14715419	891	782	1673	47
4. Rangeland Rehab,Tedm/Tugm	17496977	7271939	24768916	1989	827	2816	29
5. Fuelwood Coppice Plantn.	74566468	3171248	77737716	8476	360	8837	4
6. Oak Coppice Rehabilitat'n	78584705	8541439	87126144	8933	971	9904	10
7. Soil Cons. Afforestation	62051730	15719417	77771146	7054	1787	8840	20
8. Conifer Plantations	35792659	2829971	38622630	4069	322	4390	7
9. Rangeland Rehab., MOF	33412227	9099371	42511598	3798	1034	4832	21
10. River Bank Planting	254154	0	254154	29	0	29	0
11. Strength. Field Services	25811144	97039784	122850928	2934	11031	13965	79
Sub-Total	356213194	159845530	516058724	40492	18170	58662	31
C . Supporting Activities							
1. Small Scale Irrigation	85494840	54930712	140425552	9718	6244	15963	39
2. Rainfed Terraces	10682488	8558525	19241014	1214	973	2187	44
3. Apiculture	26030084	6507555	32537639	2959	740	3699	20
4. Horticulture	7264164	1286493	8550657	826	146	972	15
Sub-Total	129471576	71283286	200754862	14717	8103	22820	36
D . Applied Research							
1. Forestry Research	22248	155733	177980	3	18	20	88
2. Range & Agric Research	5829758	1037036	6866795	663	118	781	15
Sub-Total	5852006	1192769	7044775	665	136	801	17
Total BASELINE COSTS	512499101	263034084	775533185	58257	29900	88157	34
Physical Contingencies	51033311	24478557	75511868	5801	2783	8584	32
Price Contingencies	1525384821	600762992	2126147813	9736	3313	13049	25
Total PROJECTS COSTS	2088917233	888275633	2977192866	73794	35996	109790	33

In Situ Conservation of Genetic Diversity

	TL000			US$000			% Foreign Exchange
	Local	Foreign	Total	Local	Foreign	Total	
A . Inventory/Survey							
1. Inventory and Survey	3927954	12411953	16339907	447	1411	1857	76
2. Germplasm Management	2325384	2493208	4818592	264	283	548	52
Sub-Total	6253338	14905161	21158499	711	1694	2405	70
B . Designation of Gmz	1512822	0	1512822	172	0	172	0
C . Nat. Plan for in Situ Con	2085989	2207779	4293768	238	250	488	51
D . Institutional Strenghth.	1952360	7124277	9076638	222	809	1032	78
E . Data Management	1982377	4775598	6757975	226	543	768	71
Total BASELINE COSTS	13786886	29012815	42799701	1569	3296	4865	68
Physical Contingencies	1378689	2901282	4279970	157	330	487	68
Price Contingencies	20420369	30163561	50583929	120	201	321	63
Total PROJECTS COSTS	35585943	62077657	97663600	1846	3827	5673	67

D. Cost Estimates

3.18 Project costs are summarized in Table 3.1 and are estimated at US$88.2 million excluding physical and price contingencies. Costs include a PPF (Project Preparation Facility) of US$750,000 which is being used for preparation of microcatchment plans for the first year's implementation. It must be emphasized that actual costs will depend on village preferences and priorities; there will be an expansion of some treatments and a contraction of others. Present costs are based on overall estimates of the most likely balance between activities and the outcome of the preparation of the first six microcatchment plans to be implemented in the first year. A breakdown of project cost and price contingency assumptions and detailed project costs is presented in Annex 8. Total project costs including physical and price contingencies are estimated at US$109.8 million. Taxes and duties are estimated at 14% of project costs and foreign exchange at 33% of project costs. A separate project cost summary has been produced for the In-Situ Gene Conservation Subproject (see also Table 3.1). Base costs are estimated at US$4.8 million and costs including price and physical contingencies at US$5.7 million. Foreign exchange costs are estimated at 67% of total costs. Total project costs, including the GET subproject are estimated at US$115.5 million including all contingencies.

E. Financing

3.19 The proposed IBRD loan of US$77 million would finance 70% of total project costs and be made available to GOT on standard terms and conditions. GOT would thus finance US$32.9 million equivalent including taxes and duties. Assurances would be sought at negotiations that GOT would make adequate budgetary provisions to sustain the project (para 6.02(b)). The GET grant would finance US$5.1 million, or 89% of total project costs. GOT would in addition to its contribution of US$0.6 million contribute existing staff, research capacity and use of laboratories.

Table 3.2: FINANCING PLAN (US$ MILLION)

		World Bank	Government	GET	Total
A.	Civil works	34.2	23.1		57.3
B.	Goods	30.1	4.0		34.1
C.	Apiculture kit	2.4	2.4		4.8
D.	Training and technical assistance	6.0	0		6.0
E.	Project preparation	0.8	0		0.8
F.	Incremental operating costs	3.4	3.4		6.9
	Subtotal	77.0	32.8		109.8
G.	In-Situ Gene Conservation Subproject		0.6	5.1	5.7
	TOTAL	77.0	33.4	5.1	115.5

F. Procurement

3.20 Procurement arrangements are summarized in Table 3.3. As is usual with watershed rehabilitation projects in other countries, the project has only a small element of procurement of goods through ICB, and a large element of civil works by LCB or force account, and direct purchase or purchase through local shopping of materials such as seed. It is also more difficult than in many projects to quantify precisely the civil works to be undertaken or materials to be procured, since these will be determined on an annual basis as part of the participatory microcatchment planning process. A further feature of this project is the very large number of small contracts to be expected over the life of the project, for civil works and purchase of materials and certain goods. Goods manufactured in Turkey and procured through ICB may be granted a margin of preference equivalent to the amount of the customs duties or to 15% of the cost of the item, whichever is lower.

Table 3.3: PROCUREMENT ARRANGEMENTS

Procurement Element	Procurement ICB	Procurement LCB	Procurement Other	Total Cost (US$M)
Civil Works		22.5 (13.4)	34.8/b (20.8)	57.3 (34.2)
Plant and Equipment	8.3 (7.3)		0.9/c (0.8)	9.2 (8.1)
Apiculture Kits		4.8 (2.4)		4.8 (2.4)
Materials			19.9/c (17.5)	19.9 (17.5)
Vehicles	5.0 (4.4)			5.0 (4.4)
Technical Assistance and Training			6.0/d (6.0)	6.0 (6.0)
PPF			0.8 (0.8)	0.8 (0.8)
Incremental Operating Costs /a			6.9/e (3.4)	6.9 (3.4)
Sub-total	13.3 (11.7)	27.3 (15.9)	69.2 (49.3)	109.8 (77.0)/f
GEF Subproject	1.9 (1.7)		3.7 (3.4)	5.7 (5.1)
Grand Total	15.2 (13.4)	27.3 (15.9)	72.9 (52.7)	115.5 (82.1)

/a Bank financing would be limited to operations and maintenance of vehicles procured under the project.
/b Force account.
/c Local shopping US$20.2 M; international shopping US$0.6 M.
/d IBRD guidelines for consultants.
/e GOT procedures.
/f Rounded.

Note: Details of procurement by disbursement category for the GET subproject are indicated in Schedule B of the MOD.
Figures in parentheses indicate amounts financed by IBRD and GET.

3.21 Civil works may be broken down into two principal categories. The first category consists of small-scale irrigation and land terracing totalling US$22.5 million, which will be undertaken using LCB procedures, under the supervision of the KHGM. (All figures refer to the Eastern Anatolia Watershed Rehabilitation Project). It is estimated that over the project life there will be a total of about 54 LCB contracts, each averaging US$400,000 in value. Given the cost of these contracts, and their widely scattered nature in hilly terrain, the contracts would be very unlikely to appeal to international bidders, although they would be allowed to participate. Turkish LCB procedures are generally consistent with the need for economy and efficiency in project execution, and procurement would follow a format agreed under earlier projects regarding use of LCB procedures. The first contracts for each province in the fist year would be subject to the Bank's prior review. In cases where no qualified bidder applies for the contract, the KHGM would undertake the work on force account. It has ample experience with such work, with qualified staff, and an accounting and recording system for expenditures which is subject to auditing.

3.22 The second principal category for civil works comprises reforestation activities which would be undertaken by force account (total value approximately US$34 million) by the provincial staff of the MOF. It is estimated that these would be scattered over about 250 sites through the seven year project period, on high, steeply sloping terrain in remote mountainous areas requiring specialized knowledge both for earth moving and for planting activities. Attempts to use LCB have failed in the past. Local labor is available and would be hired for the manual element of the work. MOF has ample experience with carrying out such work, and maintains monitorable standards of output. It has a commercial accounting and expenditure recording system which is subject to auditing. Finally, about US$300,000 would be for nurseries; they would also be widely scattered through the project area, and would be built through force account also.

3.23 Plant and equipment totals US$9.2 million. About US$7.5 million would be for the purchase of earth-moving equipment, tractors and related implements and would be subject to ICB. Approximately 6 contracts would be required for this. A simple GIS system (estimated value US$0.35 million) would also be procured through ICB, as would about US$0.45 million for office computers, printers, etc. The remainder of the plant and equipment (totalling approximately US$0.8 million) comprises office equipment and laboratory equipment. These items would be grouped as logical into contracts: contracts under US$100,000 would be procured through local shopping involving at least three price quotations, and above US$100,000 through international shopping. It is unlikely that any contract would be above US$150,000 for the above items; however, any contracts above US$200,000 would be subject to ICB. Also subject to ICB would be about US$5 million for the purchase of vehicles, mostly 4 wheel drive twin cab pickups, but including trucks, caravans and mobile repair vehicles. About 6 contracts would also be required for this. US$4.8 million would be for beehives and related equipment (veils, smokers, knives, swarms etc). The quantities required would be determined annually at provincial level, and procured through LCB in about 6 contracts (they are not appropriate for ICB procurement).

3.24 Materials comprise fertilizer, seed, seedlings and small quantities of other materials (sacking, pesticides etc). Quantities to be procured would be determined annually by province through the microcatchment planning process. It must be emphasized that the figures given below are estimates only. Fertilizer is produced locally in Turkey, and also imported. It is sold through the state input supply agency and private outlets. Quantities to be procured (principally DAP and NPK) would be determined annually at provincial level (in 21 separate packages through the project period, with each package averaging US$250,000 in value), and the fertilizer would be purchased through local shopping.

3.25 Most seed vetch, sainfoin, alfalfa (about US$5.5 million through the project period) would be procured through local shopping, the amounts determined annually by the provincial implementation units. It is important to be flexible regarding seed procurement, since timely availability is essential, and the most reliable source of supply varies from year to ear. Acorn seeds and grass and certain forage seed (US$3.3 million) would be purchased directly from individuals who have collected it locally; this method has the advantage of ensuring a supply which is adapted to local agro-ecological conditions. Fruit and forest tree seedlings (total approximately US$4.7 million, again determined annually through the project period) would mostly be directly purchased from Agricultural and Forest State nurseries whose prices are reasonable. Attempts to purchase seedlings from private producers have so far failed to provide disease-free seedlings in reliable quantities. The remainder of materials comprise sacking, bags, fencing and office materials, to be purchased annually through local shopping.

3.26 Consultants to provide technical assistance (total US$2.7 million) would be recruited according to IBRD guidelines for use of consultants, and all contracts would be subject to prior review by the Bank. The TA would comprise three main contracts, for TA in watershed rehabilitation (about US$1.8 million), for TA in GIS (about US$300,000 including local training in GIS application;, and for management of overseas training (management contract about US$300,000). Local consultants are expected to participate either alone or in joint ventures in the majority of TA assignments. The remainder of TA (US$300,000) would be for small contracts for TA to be recruited from time to time for specialized studies or tasks. Training comprises international training (US$1.9 million) and local training (US$1.4 million). The detailed local annual training programs (see Annex 11) would be determined with the assistance of TA provided for under the main contract, and carried out by line agency staff. All arrangements for training would be subject to IBRD approval. Project items in the category incremental operating costs (US$6.9 million) i.e. fuel and repairs for vehicles and earth-moving equipment purchased under the project, would be procured using the normal GOT procedures.

3.27 GOT agreed at negotiations to follow the procurement procedures outlined above in paras 3.16 to 3.24. All procurement would be handled by the MOF on behalf of the other implementing agencies, except for the civil works for dryland terracing and small scale irrigation, which would be handled by GDRS. MOF has substantial experience in procurement, including the recruitment of consultants and is expected to be able to handle the workload

in a timely fashion. The situation will be reviewed, however, and any need for revision in the proposed arrangements will be assessed at the proposed project implementation review at the end of year 2 (para 4.15). All contracts for goods and equipment above US$75,000 equivalent would be subject to prior Bank review. Other contracts would be subject to selective ex-post review. It is expected that these review arrangements cover about 80% of total procurement.

G. Disbursements

3.28 The proceeds of the loan are expected to be disbursed over seven years (Annex 8). The pattern of disbursements corresponds to the historical profile of agricultural projects in Turkey. Project completion is expected by March 31, 2000 and Loan closing by September 30, 2000. The proceeds of the GEF grant would be disbursed over four years. Subproject completion is expected by March 31, 1997 and grant closing by September 30, 1997.

3.29 IBRD would disburse loan funds at the following rates for these items:[1/]

Category		
Civil Works	60% of expenditures	(US$31.1 million)
Goods	100% of foreign expenditures 100% of local expenditures (ex-factory cost) and 90% of local expenditures for other items procured locally	(US$30.1 million)
Apiculture Kits	50% of expenditures	(US$2.4 million)
Technical Assistance and Training	100% of expenditures	(US$6.0 million)
Incremental Operating Cost	50% of expenditures	(US$3.4 million)
PPF	100% of expenditures	(US$0.75 million)
Unallocated		(US$3.25 million)

3.30 Disbursements would be made against statements of expenditures for incremental operating costs, civil works undertaken by MOF, goods procured through direct purchases or prudent shopping, and training locally and abroad.

[1/] GET grant disbursement arrangements are discussed in the In-Situ Conservation of Genetic Diversity Technical Annex.

Implementing agencies would retain supporting documentation for these items for review by IBRD and external auditors. Up to US$3 million of retroactive financing would be possible, for expenditures incurred after November 1, 1992, provided the appropriate procurement procedures are followed.

3.31 To facilitate project implementation GOT would establish a Special Account with the Central Bank and would initially deposit US$4 M of loan funds. Withdrawal of funds would be on the basis of SOEs as discussed in para 3.22. This account would be opened in accordance with arrangements for existing Bank projects, and would be used for most disbursements except those in excess of US$1 million (para 6.02 (d)).

H. Accounts and Audits

3.32 The Project Coordination and Support Unit (PCSU) of the Directorate of Reforestation and Erosion Control of the Ministry of Forestry would prepare reports on expenditures under the project on completion of each semiannual period, i.e. by December 31 and June 30 of each year. Separate accounts would be maintained for the in-situ gene conservation subproject by the General Directorate for Agricultural Research (TAGEM) and would also be produced semiannually. In addition, an annual audit would be carried out by the Treasury inspectors (with knowledge of English), including specific reference to, and comments on, SOEs and supporting documents and disbursements from the special account, and submitted to the Bank within nine months of the end of each fiscal year. Assurances were obtained from GOT at negotiations that implementing agencies would follow these auditing practices (para 6.02 (g)).

I. Project Supervision

3.33 Two Bank supervision missions per year during seven years of project implementation would be required. A "project launch" mission would be fielded shortly after Board approval and an implementation review would be held within two years of effectiveness (see also para 4.15). Flexibility in implementation would be stressed to adjust to changing circumstances and permit effective responses to participatory planning. During supervision the Bank would agree with the authorities on lessons learnt from that experience, on future modifications, and on the form and content of the next MC plans to be implemented. A key element in supervision missions would be staff continuity; missions would be expected to include natural resource management expertise and, periodically, participatory range management, irrigation and crops/soils expertise. Turkish expertise on missions will be important. The implementation review would include a monitoring/evaluation specialist. Each mission would spend adequate time in the project area to gain a realistic view of field problems and achievements. Supervision would require about 20 staff weeks per year in the first two years, 25 in the third and 16 per year in the fourth and fifth, decreasing to 10 per year in the last two years. Approximately 10 additional staff weeks per year would be required for supervision of the GET In-Situ Gene Conservation Subproject.

IV. ORGANIZATION AND MANAGEMENT

A. Institutional Arrangements

4.01 The project uses the strength of existing institutions. The Ministry of Forestry would be responsible for coordinating project implementation.

Provincial Level

4.02 The Assistant Provincial Directors for Forestry (MOF), for Extension (Provincial Agricultural Directorate (PDA)) and for Irrigation and Soil Conservation (KHGM) would form a team (Provincial Project Implementation unit) for each province, take major responsibility for project implementation and assign staff for that purpose. The team would be responsible for the identification of priority MCs, coordination of fieldwork, joint interactive planning of selected treatment options in the light of experience and the results of adaptive research. The Assistant Provincial Director of Forestry would be assigned the task of liaison with the PCSU and with colleagues in the other departments. One of the staff in his office would be trained and take the lead in MC planning. A capacity to maintain and operate a data base for future planning would also be established in his office and training provided to the responsible officer. The Provincial Directorates of Forestry would also have overall responsibility for selection of microcatchments, for coordination of work, and for determination of the content of the microcatchment plans. One of the officers serving with each Assistant Director of Extension (PDA) would be trained to assume the responsibility for agricultural adaptive research and to coordinate with the agricultural research institutes at Diyarbakir and Erzurum. A second would be nominated as a microcatchment engineer, with fulltime responsibility for the agricultural elements of the project. One of the officers from Elazig Forest Research Institute would be trained to assume responsibility for project related forest applied research in the provinces. The Provincial directors of the departments would constitute a Steering Committee which would be chaired by the Provincial Forestry Director.

Microcatchment Level

4.03 Provincial implementation units would appoint MC planning teams. The composition of the MC planning group would vary according to the characteristics of the particular microcatchment. It would include the relevant county level agricultural and forestry staff, the Village Group Technician (VGT) of the agricultural extension service, and the provincial staff assigned to the project. The MC planning team in each province would be responsible for the initial interaction with the MC villages and the resulting indicative plan, and for the continuous contacts which are necessary to monitor progress in implementation; the group would define annual work programs and budget requirements. There are sufficient forest and extension staff at the local level but no staff are expected to be permanently located in the MCs. The PDAs have undertaken to allocate one agricultural engineer with specific responsibility for each microcatchment. The limited experience

of range improvement and management would be addressed through technical assistance and intensive training.

Central Level

4.04 The PCSU within the Planning Department of the Directorate of Afforestation and Erosion Control in Ankara would have the main responsibility to assist the provincial authorities to build up a capacity for coordinated watershed development, to review and approve indicative MC plans, to monitor progress, to serve as secretariat to the National Steering Committee (see below) and to provide certain logistical services such as arrangement of training and study tours, procurement of goods and technical assistance, and aggregation of accounts, reports and withdrawal applications. The unit would comprise a team of full-time, seconded specialists and would work closely with the responsible officers within General Directorates of Rural Services and of Production and Development of MARA. Five senior staff have been nominated: a watershed management specialist, an assistant watershed management specialist with special responsibility for coordinating training and technical assistance, a procurement specialist, a MIS/monitoring and evaluation specialist with knowledge of computers, and an accountant in charge of accounts and withdrawal applications. MARA's General Directorate of Rural Services (KHGM) and General Directorate of Production and Development (TUGEM) would also each nominate one staff member with responsibility for the project. All of the staff were nominated before negotiations, and GOT has agreed to the organizational arrangements outlined in these paragraphs (para 6.02(a)). An Organization Chart is provided in Annex 6. Technical assistance would be employed to support GOT with project planning and field services as described in para 3.10 and Annex 11.

4.05 The MOF would be guided by a six member National Steering Committee chaired by the Planning and Coordination Department of the MOF and consisting of representatives of the Directorates for Afforestation and Erosion Control (AGM), for Forestry and for Village Development (ORKÖY) of the Ministry of Forestry; of TUGEM and KHGM of the Ministry of Agriculture and Rural Affairs; and of the Directorate of Foreign Economic Relations within the Undersecretariat of Treasury and Foreign Trade.

4.06 Non-Government Organizations (NGOs) would be encouraged to participate in project implementation. Because several NGOs have considerable experience with community development, they could help in at least four ways: (i) by extending informal advice to staff from the line agencies upon request; (ii) by conducting training courses for line agency staff, under contract, to teach methods of participatory assessment of village preferences; (iii) by designing and implementing, under contract, systems for monitoring and evaluation of baseline status and project progress; and (iv) by participating in the development of village income-generating businesses where appropriate. No NGOs are currently active in the project area, and under present arrangements villagers work directly with line agencies; there are no funds specifically allocated for NGO assistance in the current project budget; however, project staff have agreed to explore possible NGO activities during implementation. The Swiss-funded Community Forestry Pilot Project within the MOF works with the Turkish Development Foundation (TKV); TKV and the Community

Forestry Project work jointly in some villages, and in others TKV is engaged on contract to carry out Rapid Rural Appraisals and similar tasks. NGO involvement would be a subject of the Project Implementation Review, and in the light experience gained through the Swiss Community Forestry Project, the possibilities of contracting with an NGO for certain activities would be reexamined.

4.07 The organizational arrangements for the GET In-Situ Gene Conservation subproject are summarized below. The principal implementing agencies would be the Research and Environment Department within the Research, Planning and Coordination Board (APKKB) of MOF, and the Breeding and Agronomy Research Department within the General Directorate of Agricultural Research (TAGEM) of MARA. These agencies would coordinate the field work (survey, inventory, selection and management of gene management zones) of the relevant forestry and agriculture research institutes based in Izmir, Menemen, Ankara and Diyarbakir. The Ministry of Environment (Department of Protection of Nature, Directorate of Protection of Environment) would be responsible for production of extension material, publicity and coordination of the national plan for in-situ gene conservation. A project implementation committee and a steering committee are being established to coordinate activities between agencies. Overall responsibility would be with TAGEM.

B. Microcatchment Planning

4.08 Microcatchment planning is the key element to interaction with the local population and coordination of departmental efforts (Annex 4). The building blocks of the MC-plan are the village plans. Where necessary the MC boundaries would be adjusted to avoid dividing a village between two MCs. After the selection of the MC, which includes confirmation of local interest, the first step in the planning process entails the marshalling of existing information (data and maps). Turkey is fortunate in having a very good basis for such planning but on some points it may be necessary to verify, update and or supplement available information through further surveying.

4.09 Active village participation is an innovative and essential feature of this project. Using a "farmer centered - problem census, problem solving" (FC-PCPS) approach, the MC planning process involves the following steps: (i) village discussion of problems and constraints and presentation of the menu of treatments funded under the project, including cost sharing arrangements (Annex 5); (ii) village discussion of solutions and priorities (selections from the menu); (iii) preparation of draft village plans; (iv) village discussion of draft plans; and (v) finalization of an indicative MC plan aggregating the village plans. The FC-PCPS process implies active village participation involvement not only in approval but also in the formulation and implementation of these plans. It also entails a joint effort by the concerned departments to allow an integrated view of the role of forest, range and farm lands in meeting village needs of fodder and wood, as well as income and employment, within realistic cost constraints. The FC-PCPS process is expected to ensure that the interventions respond to the perceived local needs and priorities and that a genuine commitment to and responsibility for the success of the project is generated. The scope for organizing improved village management of rangelands and participation in the protection and

management of forest lands would be key topics for discussion. Training of villagers in MC planning and in different treatment options would be provided and study tours arranged to adjacent areas where alternative treatments or organizational arrangements have been tried.

4.10 The outcome of this interaction would be agreements on an "Indicative MC Plan" summarizing and aggregating the analysis of available data, the results of the FC-PCPS process, the type, volume and phasing of different treatments selected from the menu and the extent of cost and benefit sharing for each investment (Annex 5). The budget for each microcatchment plan will obviously vary according to population and site characteristics, but is expected to average US$1.5 million. Plans would be reviewed by the provincial steering committee and submitted through the PCSU to the National Steering Committee. After approval detailed implementation plans would be agreed with the participating community members and groups and commitments would be recorded in writing. The first six microcatchment plans, sufficient for the first year's project implementation, have been prepared (Annex 14) and an outline implementation plan for 1993 has also been prepared (Annex 15). At negotiations, the Government agreed to review annually and approve with the World Bank the form and content of the microcatchment plans to be implemented the following season (para 6.02 (f)).

C. Monitoring and Evaluation

4.11 Monitoring and Evaluation (M&E) would be undertaken using existing resources, augmented by some project funds. Project finance would cover purchase of equipment, contracting external support and studies. The proposed M&E system is designed to reflect staffing and financial constraints and ensure close consultation between provincial and central project management. A primary objective would be to generate management information to guide project implementation and ongoing planning, and to provide the basis for an accurate evaluation of progress during implementation (see Annex 7 and attached progress chart).

4.12 Monitoring project implementation. A calendar of key events would be maintained to document issues arising and actions of central and regional management. Topics would include: progress on institution building and strengthening, staff (including performance of TA) training, procurement, regional planning and objectives, budget preparation and disbursement, microcatchment planning and implementation, cost and expenditure monitoring and cost sharing activities. A Central Unit has been established in the MOF to coordinate the M&E activities and this unit would discuss requirements with provincial management. Information would be collated at provincial level, to be used primarily as a management tool, and submitted to the Central Unit, quarterly, following an agreed format. The submissions would be consolidated into an annual report which would also include a short section on the implications of findings for on going policy and planning. Government agreed at negotiations to review annually the microcatchment planning guidelines, and to adapt them as appropriate in the light of experience (para 6.02 (f)).

4.13 Treatment adoption rates and measurement of project benefits. Certain treatments benefit all villagers, certain others groups of villagers,

and others individuals. Basic technical and socioeconomic data against which project impact would be measured would be collected concerning the community in the microcatchment. Existing data on selected catchments which do not ultimately benefit from the project would also be collected, for purposes of comparison. An in-depth study of the community in selected microcatchments would be commissioned to a university or consultants, as an aid to project planners. Adoption rates and constraints would be measured at community and individual level and would include impact on forest and rangeland vegetative cover, species composition, improved yields and cash benefits, shifts towards stall feeding, improved land use and range management. A more detailed impact study would also be commissioned, as a guide to management. Analysis of results of adaptive research would be undertaken by the regional research institutions at Elazig (forestry), Diyarbakir (agriculture) and Sanliurfa (GDRS). These would also guide any modifications to the treatment menu.

4.14 Organization. The PCSU in the MOF would take responsibility for coordinating the M&E activities in each Province to ensure that compatible information is collected. The PCSU would also be responsible for contracting technical assistance and institutions to implement studies. Project management at provincial level would be responsible for the collection and compilation of data in the microcatchments. Staff in the Ministry of Agriculture provincial Projects and Statistics sections would play a key role in compiling data for the monitoring and evaluation exercise.

4.15 An Implementation Review, managed by the PCSU, would be carried out within two years from the date of project effectiveness (i.e. by July 31, 1995). The review would focus on: the experience with the participatory approach to MC planning; the institutional framework; initial results of the applied research program; the potential for more widespread introduction of low cost and cost sharing treatments; the responsiveness and potential for amendment to the treatment menu to reflect the stated needs at village level; institutional, financial and socioeconomic project constraints; the scope for NGO involvement and for enlarging the project in terms of provinces or microcatchments. Assurances were obtained at negotiations that the Ministry of Forestry would organize the Review with full participation of MARA and that recommendations would be communicated to the Bank and carried out as agreed with the Bank (para 6.02(e)).

V. PROJECT BENEFITS AND JUSTIFICATION

A. Production and Marketing

5.01 As mentioned in para 3.04, the scope and type of interventions and hence incremental annual production at the end of the project period cannot be determined with any accuracy; the balance between interventions will be determined annually through the microcatchment planning exercise. Difficulties in making estimates are compounded by widely varying agroecological conditions between microcatchments. Nevertheless, an estimate of likely incremental production was made in order to calculate benefits. It must be emphasized, however, that the figures given below are highly tentative

(see also paras 5.02 and 5.13). On current assumptions, production increases are estimated as follows:

(a) 57,000 ha of replanted or rehabilitated forest on average producing annually: first 10 yrs 50,000 m^3/year; next 5 yrs 38,000 m^3; next 5 yrs 99,000 m^3; years 20-30 155,000 m^3; and 210,000 m^3/year thereafter;

(b) 117,000 tons (dry matter) of livestock fodder;

(c) 42,000 tons fruit (apricot, almonds, grapes, mixed fruit);

(d) 650,000 kg honey;

(e) 36,000 tons wheat;

(f) 2,700 cows benefiting from AI or improved bulls.

5.02 Secondary benefits of the rehabilitated or newly established forest areas and range areas (erosion control, water retention etc.) are not directly quantified in the ERR. They would manifest themselves in the form of improved agricultural output in the lower catchment areas, and in decreased reservoir sedimentation downstream of the project area.

5.03 Extraction and marketing systems for timber vary. MOF frequently operates a system whereby the village adjoining the forest may extract a certain amount of wood; the MOF may also license commercial timber cutters and the product then is marketed either locally or to fuel merchants from the urban centers. To achieve harmonious development with the participation of the villagers, the project would encourage self policing. The wood produced is largely firewood but fencing poles and commercial timber are produced from the conifers. Commercial timber is expected to achieve a price equivalent to US$100/$m^3$ whilst other timber products, mainly fuelwood, would achieve US$30-50/$m^3$.

5.04 The incremental output of fodder from the project would lead to increased production of meat and dairy products. Discussion at village level indicates that there is, at present, little price differentiation between natural fodders despite considerable variation in their nutritional (protein) value. This is expected to change as the 'new' crops, sainfoin, vetch and alfalfa, become more widespread and their value is recognized. For the economic analysis, fodder is valued at a constant US$70 per ton of dry matter, the current market price, a realistic basis for future prices where the demand for animal protein in the diet would be expected to increase.

5.05 At present the rural marketing of livestock and dairy products depends largely on traditional outlets which do not provide for sophisticated means of transport and cold storage. Nevertheless, processing as yoghurt or cheese prolongs the shelf life of dairy products and sales of livestock 'on the hoof', mean that existing outlets, private and cooperative, would readily cope with increased production resulting from the project. Prices would not be adversely affected.

5.06 The projected annual incremental output of fruit (42,000 tons) is a project benefit. It is, however, difficult to predict with any certainty the expected composition of this output. Over half (55%) is expected to be fresh apricots valued conservatively at US$500 per ton. Almonds are valued at US$1,200 per ton; other fruit production has been valued at US$500 and grapes at US$250 per ton, net of labor hired for harvesting. The increase in dried apricot production would contribute less than 5% of total regional production, much of which is currently exported. Incremental production due to the project would not significantly affect local or world prices and would be readily assimilated into the local marketing and processing systems.

5.07 The local domestic market would readily absorb the incremental production of wheat. The price (US$110) in the economic analysis is the import parity price as reported by the Grain Market Organization TMO. This price allows for local transport (US$11), handling (US$2) and insurance (US$1) per ton for imports through the port of Iskenderum. This price is approximately 60% of the intervention price that has been paid by TMO to farmers in the region over the last two years.

5.08 The incremental 650 tons of honey produced annually will find a ready national market, since imports are currently required to satisfy local demand. Existing producers are skilled in the extraction of honey and wax but, when sold on the comb, honey commands a premium. The price used for the economic analysis is US$4.9 per kilogram of honey on the comb which includes the value of the wax.

5.09 The In-Situ Gene Conservation subproject would protect the biodiversity in-situ of globally significant herbaceous and woody species. It has the potential for significant global benefit through protection of disease and climate resistant strains of key crops. It would also build up the institutional capacity for comprehensive genetic resource management, integrating in-situ and ex-situ programs.

B. Farm Income and Cost Sharing

5.10 Ignoring the considerable benefits which would accrue in the longer term from forestry rehabilitation, the net annual incremental income per village in the microcatchment is estimated at US$70,000 from fodder, cereal and horticultural crop production increases. Estimated average annual incremental income would be US$525 equivalent per family in each of the participating villages in the microcatchment. Analysis of the expected pattern of distribution of this income would be speculative only but it seems likely that most groups would gain. Overall, the project would increase incomes in a seriously impoverished region of Turkey.

5.11 Cost sharing arrangements for watershed rehabilitation and income generating activities are shown in Annex 5. The cost of demonstrations, pilot work and adaptive research would be fully borne by Government. Forest lands belong to Government and Government would be fully responsible for both establishment and O&M costs but would also derive a substantial share of the benefits from such investments. The project would provide for increased village involvement in the management and protection of forest lands against a

larger share of the benefits. Range lands are also Government land but villages have clearly recognized usufructuary rights. For both range and cultivated land present cost sharing arrangements and the fact that part of the benefits occur outside the intervention area in the form of reduced runoff and sediment load result in Government shouldering the establishment (investment) cost of watershed rehabilitation treatments. Under the project, the individual and community share of the rehabilitation efforts would include some labor for establishment but would be mainly contributed in the form of operation and maintenance of the facilities and improvements created. In the case of income generating activities, the government and beneficiaries would share the investment cost equally while the beneficiary would be responsible for operation and maintenance.

C. Economic Analysis and Risks

5.12 In a project of this nature, estimated economic rates of return are best viewed as rough orders of magnitude. Lack of precision reflects in part the difficulty in predicting the extent and scope of ameliorative interventions. Communities in the microcatchments would be consulted and would themselves choose from the "menu" of rehabilitation options; the choices available may also evolve during the project period. The economic rate of return (ERR) is estimated at 17% (see Annex 9) based on the most likely mix of treatments. Each microcatchment would have a mix of treatments yielding short-term and long-term benefits. Calculation of separate ERRs for each activity was not considered useful since benefits from particular interventions are frequently complementary to other interventions.

5.13 The analysis is considered conservative since it does not take into account other benefits due to reduced runoff or resource conservation, e.g. the likely increase in the economic life of the dams in the project area through reduced sedimentation. Furthermore and perhaps more importantly, the analysis does not take into account likely falls in productivity due to declining soil fertility in the "without" project situation. Finally, costs might well decrease rather than increase as lower cost solutions are adopted more widely.

5.14 An analysis of switching values indicates that total benefits would have to decrease by 41% or costs would have to increase by 68% before the rate of return is unacceptable, given an opportunity cost of capital of 10%.

5.15 A number of sensitivity tests were carried out to assess the "robustness" of the project to various risks. The table illustrates that the rate of return is not overly sensitive to changes in likely costs or benefits, nor is it seriously affected by delays. Only when costs are up by 20% and benefits are lagged by one or two years, does the ERR drop significantly, to 13% and 12% respectively.

Benefits	Costs	ERR (%)
Central case	Central case	17
Constant	Up 20%	15
Up 20%	Constant	20
Lagged 1 year	Constant	15
Lagged 1 year	Up 20%	13
Lagged 2 years	Up 20%	12
Lagged 1 year	Down 10%	17

Risks

5.16 The project is not without technical and institutional risks. Like all watershed rehabilitation efforts, it requires the integration of conservation and development, coordination of interventions in crop, livestock and forestry production and revisions in the way land is managed. It involves three institutions and requires a mode of operation where village perceptions of problems and priorities constitute the starting point. Some of the risk elements and how they have been addressed are discussed below:

(a) The intervention technologies, while used successfully elsewhere, have not always been proven in the project area. Where this is the case, treatments are reduced to pilot scale or tested in adaptive research trials. The interventions for improved range management are perhaps the most "risky"; they require full participation by villagers, and agricultural extension agents do not have much experience working in high range. The problem has been addressed by (i) provision of technical assistance and training; (ii) focussing on low cost participatory approaches to range management initially; and (iii) allowing for a review of progress within two years and modifying the approach if necessary, possibly contracting with an NGO with experience in community organization at that time;

(b) The provincial line agencies have little experience of working together. Microcatchment treatments are expected to reinforce each other and if some are not executed or are unduly delayed, this may jeopardize other work and the total effort. The MC planning and budgeting process provides the framework for the involvement of different line agencies. Close coordination of the work has been promoted by substantial involvement by all agencies in project preparation and the planning of six microcatchments for the first year's program. The record during preparation is encouraging. The project organization provides for liaison committees at the national and the provincial levels, and an implementing team drawn from different agencies in each of the provinces. These teams are already functioning. This arrangement will be monitored continuously if necessary.

(c) The difficult working conditions in the project area, in combination with budgetary constraints, have resulted in low staff morale and frequent rotations. The provision of adequate resources and a meaningful work program under the project will improve the situation. This will be further reinforced by efforts to publicize the project as a major new initiative addressed at the problem of resource degradation in Turkey. The project may thus be seen to spearhead a future national program and provide valuable experiences and career prospects; and

(d) Experience from other projects also points to implementation difficulties caused by inadequate budget allocations. This has been countered by careful Government review of resources that can be made available for this project, and by adequate Bank financing.

5.17 The GET In-Situ Gene Conservation subproject is not subject to economic analysis. It would be of long-term, possibly very significant, benefit to the global community by conserving in-situ the genetic diversity of crops and forest species whose qualities may provide essential elements to high-yielding varieties.

5.18 In summary, reasonable efforts have been made to mitigate these risks. Given the seriousness of problems being addressed and the potential for positive spinoffs which might be applied elsewhere, the assumption of the risks is warranted.

D. Environmental Impact

5.19 The environmental impact of the project would be substantially positive and the project has been given a "C" classification. Restoration of sustainable natural resources is a principle objective. It will restore natural vegetative cover and reduce runoff and soil loss. The reforestation components will focus on indigenous species, in particular the native oak. The GEF in-situ gene conservation subproject will promote preservation of wild relatives of forest and crop species in their natural habitats, and strains with drought and disease resistant qualities.

5.20 Considerations relating to possible environmental side effects include:

(a) In cultivated land; the aim of treatments would be: (i) improving soil fertility by replacing fallow with forage legumes and pulses; (ii) changing use of marginal lands; and (iii) increasing productivity through soil and moisture conservation, agronomic practices and minor irrigation. Some increased use of fertilizers may be expected but is most unlikely to reach wasteful or environmentally damaging levels. Some terracing would be undertaken to increase moisture retention but with careful design no negative impact is expected.

(b) Range and forest lands; the treatment objectives are: (i) enhanced vegetative coverage for in situ soil and moisture conservation; (ii)

improved management; and (iii) increased productivity. Chemical fertilizers would be used in the vegetative rehabilitation efforts but application would be mainly of a one shot nature and quantities would be small and rapidly absorbed. The forest rehabilitation would mainly focus on coppicing of rootstocks within the natural oak forest and seeding of acorns in more denuded areas. Some terracing in selected areas would be necessary to increase moisture retention but efforts to minimize earth movement and the possible negative effects would be minimized.

E. Impact on Women

5.21 Women traditionally are responsible for livestock, domestic chores (including fetching water and fuelwood) and child care but now, in the absence of many of the men, also play a major role in crop cultivation. The afforestation and range improvement programs would in the long term reduce the burden on women by providing larger quantities of fuel and fodder closer at hand. Increased reliance on stall fed dairy production and reduced participation in seasonal migration to tend dairy sheep and goats at highland pastures is a positive development. The extent to which project activities make it possible to earn a living locally and thus diminish male migration to the cities would have a positive effect on the quality of family life and relieve some of the drudgery of female labor. The participatory planning approach has been designed to give the women an important role in the selection of treatments.

5.22 The project should directly benefit women in the villages within a framework whereby: (i) every effort is made to reduce the time and labor which women are forced to expend (and waste) on inefficient household and agriculture tasks; and (ii) women are given a valid role through the participatory planning process in selection of treatments, which will reliably reflect what they themselves feel they would be able to handle. The project will not design and implement activities specifically for women at this would further complicate project implementation, and might impose on gender relationships which are culturally sensitive. The nature of the involvement of the women depends on the attitudes prevailing in each village. Experience to date indicates that in some, joint sessions are held; in others, separate sessions are held for women. In some cases, women lead the discussions. All provincial staff will receive training on involvement of women in the FC-PCPS process. Women agricultural extension agents have participated in the FC-PCPS sessions during preparation, and will continue to participate under project implementation.

VI. AGREEMENTS REACHED AND RECOMMENDATIONS

6.01 GOT met the principal condition of negotiations agreed after appraisal, preparation of six microcatchment plans, sufficient for the first year's project implementation. Their form and content was reviewed and found satisfactory during a Bank post-appraisal mission in November 1992 (para 4.04).

6.02 At negotiations GOT:

(a) agreed on the arrangements for project organization and management, and provided evidence that the necessary staff had been nominated (the National Steering Committee, PCSU and provincial project implementation units have already been established) (paras 4.02 to 4.04);

(b) provided evidence that sufficient budget allocations to meet GOT contribution to the project have been made in the FY93 budget, and agreed annually to make adequate budgetary provisions to implement the project (para 3.19);

(c) agreed on the procurement arrangements outlined in paras 3.18 to 3.26;

(d) agreed to open a Special Account as outlined in para 3.31;

(e) agreed to arrange an Implementation Review by July 31, 1995 as outlined in para 4.15;

(f) agreed to review annually and agree with the World Bank the form and content of the microcatchment plans to be implemented the following season (para 4.10) and adapt the microcatchment planning guidelines in the light of experience gained in project implementation and analyzed through the monitoring process (para 4.12);

(g) agreed to follow the reporting, accounting and auditing procedures outlined in para 3.32; and

(h) agreed to sign the technical assistance contract outlined in para 3.13 by October 1, 1993.

6.03 With the above agreements and conditions, the project would be suitable for a Bank loan of US$77 million equivalent at the standard variable rate, for a period of 17 years, including five years of grace. The Borrower would be the Government of Turkey.

STAFF APPRAISAL REPORT

TURKEY

EASTERN ANATOLIA WATERSHED REHABILITATION PROJECT

AGRICULTURE

BACKGROUND

CROP PRODUCTION CHARACTERISTICS

1. Land Tenure and Distribution. The most common type of tenure in the project area is small landownership. Landholdings are highly fragmented, with average farm size in the area at about 3 ha divided in some 6 parcels. The majority of the farms are owner operated.

2. Land Use and Production Systems. Data provided by the 1991 Agricultural Census indicate that although there are significant differences among the project provinces, the principal land use is rangeland. It is followed by agricultural use (Table 1a and 1b). In the last decade, fallow has been significantly reduced in the project provinces. Currently, in the provinces of Adiyaman, Elazig and Malatya, 10%, 30% and 33% of field crop areas are left for fallow, respectively. The largest area allocated for orchards and perennial crops is in Malatya. Vegetable production is the most common in Adiyaman.

Table 1a
Current land use in the project provinces, 1991

	Adiyaman		Elazig		Malatya		Total
	(ha)	% of total area	(ha)	% of total area	(ha)	% of total area	
Field crop area	188,187	30.6	108,348	13.7	139,520	13.3	436,055
Fallow	21,445	3.5	46,748	5.9	70,229	6.7	138,422
Orchards + perennial crops	32,911	5.3	18,818	2.4	61,553	5.9	113,282
Vegetables	10,172	1.7	5,382	0.7	5,842	0.6	21,397
Permanent meadow + rangeland	78,512	12.8	360,315	45.5	289,016	27.5	727,843
Unused land (*)	9,108	1.5	48,146	6.0	61,024	5.8	118,278
Non-cropland (**)	130,753	21.3	77,506	9.8	262,089	25.0	470,348
Forestland (forest + bushland)	142,919	23.3	127,383	16.0	159,504	15.2	429,806
TOTAL AREA	614,008	100.0	792,646	100.0	1,048,775	100.0	2,455,431

(*) Suitable for agricultural use, but left unused
(**) Settlement area, swamp, stony, rocky area etc.
Source: SIS, 1992, Preliminary Results of 1991 Agricultural Census

Table 1b
Estimated land use in total project area (3 provinces, 54 MCs) (*)

Land Use	Adiyaman (18 MCs)	Elazig (18 MCs)	Malatya (18 MCs)	Total (54 MCs)
Field crops	28,620	17,100	23,580	69,300
Fallow	5,400	7,380	11,880	24,660
Orchards + perennial crops	8,370	2,970	10,440	21,780
Vegetable	2,610	900	9,900	13,410
Permanent meadow + range	19,890	56,970	48,870	125,730
Unused land (*)	2,340	7,650	10,350	20,340
Non-cropland (**)	33,120	12,240	44,370	89,730
Forest + bushland	36,270	20,160	27,000	83,430
TOTAL	136,620	125,370	186,390	448,380(***)

(*) suitable for agricultural use, but left unused due to various reasons (high production cost, migration, labor shortage etc.)
(**) settlement area, swamp, stony-rocky area etc.
(***) this figure is close to the total MC area of 400,000 ha that was estimated in the main text.

(*) Note: Although final selection of all the 54 micro-catchments has not yet been carried out, an analysis of land-use in 54 potential micro-catchments in the project area was undertaken for illustrative purposes.

3. Rainfed agriculture is the dominant form of farming. According to 1991 statistics, around 80% of the total field crop area is rainfed (dryland) in the project provinces. Under these conditions, crop rotation depends on the ecological characteristics of the area as well as the socio-economic conditions of the farmers. Usually wheat and barley are rotated with lentil or chickpea or fallow. In some MCs continuous wheat and barley production is also practiced. In the project area, 73% of the dryland field crop area is allocated to small grains (wheat and barley), 11% to food legumes (lentil and chickpea), 16% to other crops (mainly tobacco in Adiyaman, melon, bitter vetch, common vetch etc.). Although livestock production is important, farming systems rarely include fodder production.

4. Under rainfed conditions, crop management practices and input use are generally poor, particularly on mid-slopes and highland plateaux. Under existing rotation systems seedbed preparation, seeding time, crop varieties and fertilizer application are the major components of the crop management package that need special attention and improvement. Average yields of wheat, barley, chickpea and lentil are 2.0, 2.0, 1.1 and 1.0 t/ha in Adiyaman, 1.5, 1.8, 0.7 and 0.7 t/ha in Elazig and 1.4, 1.5, 0.9 and 0.8 t/ha in Malatya, respectively. In MCs, the yields are much below these provincial averages.

5. Irrigated agriculture is carried out to a limited extent only. According to 1991 statistics irrigated areas as a percent of total field crop are 12.7%, 26.3% and 26.8% in Adiyaman, Elazig and Malatya, respectively. In some areas of the MCs where perennial streams and springs exist small scale irrigation is possible. In the lowlands, wheat and barley are rotated with sugarbeet, bean, sunflower, cotton and maize. Other irrigated crops are orchards particularly

apricots, vegetables, and alfalfa. In addition, much lower lying irrigated land is also used for poplar or willow production. In MCs, the most important irrigated crops are alfalfa, fruit trees, some vegetables, beans and maize.

6. Due to inefficient crop management techniques, the full potential of irrigated agriculture has not been realized. Irrigated wheat, bean and sugarbeet yields are around 2.5 and 4.0 t/ha in Adiyaman, Elazig and Malatya. There is a strong need for effective extension to improve the irrigation techniques and agronomic practices.

7. Input sources and availability. Certified cereal and forage seeds are provided by General Directorate of Agricultural Enterprises (TIGEM). In mountainous areas, farmers produce their own seed from local varieties but without seed treatment. Seeds for other crops are usually provided from the local markets. In recent years, private companies have started to market imported vegetable seeds but only on a small scale. Fruit seedlings are provided by various agencies of the Ministry of Agriculture and by the local market. However, seedlings in the local market are not disease free and species and varieties are not labeled.

8. Commercial fertilizers are marketed by the State Agricultural Supply Office (TZDK), Agricultural Sales Cooperatives (TKK) and private companies. Since manure is considered as a valuable fuel source, its use as fertilizer is limited. However, in Adiyaman, it is used for pistachio trees.

9. Pesticide application is uncommon amongst the MC farmers except for apricot and vineyard production. Chemicals are provided from TDZK, TKK and private commercial companies.

10. In MCs where the topography is very rough, horse and oxen are widely use instead of tractors. Farm machinery is limited to moldboard ploughs, field cultivators and disc-harrows. Seed drills are very rare. The topography of the MC and the field sizes do not permit the use of harvesting machines. In some areas, where fields are not stony and rocky, grass-mower type of implements, generally scythes and sickle are used to harvesting wheat and barley. Therefore, harvesting costs are very high.

11. For livestock production concentrated feed is provided principally from state-owned feed factories. However, subsistence farmers of MCs can not afford to buy concentrates in sufficient quantities. Razmol is available at the local flour mills and straw is produced by the households or purchased from the local market.

12. Constraints. There are climatic, edaphic (soil), topographic and socio-economic constraints that limit the production in the project area. In Elazig and Malatya uneven distribution of limited precipitation (av. 404 mm) within the year and among the years, cold winters usually without snow cover, freezing soil temperatures, and short growing seasons are the major limiting factors in production. In Adiyaman, the long and severe drought period which starts in June and continues through October presents serious limitations for production. Other factors responsible for low productivity are the widespread soil degradation and rough topography.

13. Marketing. In the area, the major marketing bottleneck is in fresh milk production because of the long distance to large markets. Therefore, milk is processed to cheese and yogurt which have a ready market.

EXISTING INSTITUTIONAL ORGANIZATION AND PROGRAMS

14. At the central level four General Directorates of Ministry of Agriculture and Rural Affairs (MARA) are responsible for the project activities:

- Production and Development (TUGEM - Department of Crop Production Development and Department of Feasibility Studies and Projects);
- Organization and Support (TEDGEM - Department of Extension);
- Rural Services (KHGM - Division of Soil/Water Conservation and Regional Research Institutes); and
- Agricultural Research (TAGEM- Research Institutes).

15. At the provincial level, with its seven supporting sections, the Provincial Directorate of Agriculture (PDA) provides services to the farmers. Training and operation of the extension service is carried out by the Farmer Training and Extension Section (FTE). Adiyaman and Malatya which are being serviced by the Second Agricultural Extension and Applied Research Project (TYUAP II) are organizing to work with the T&V system. In Elazig extension activities are carried out through the existing structures.

16. At the county level, the PDA is represented by County Directorate of Agriculture with several technical staff. In Adiyaman and Malatya, some counties have an Extension Supervisor and a County Extension Group.

17. At the village level, extension activities are carried out by Village Group Technicians (VGT) in TYUAP II provinces; however, due to the lack of infrastructure in the villages and/or lack of incentives, in many cases VGTs are currently based in provincial and county offices and operate through daily visits to the villages. In Elazig, outside the TYUAP area, extension services to the villages are also carried out from the County Directorates through daily visits.

18. There are a large number of agricultural staff (123, 315 and 175 in Adiyaman, Malatya and Elazig, respectively) at the provincial/county level. Generally, the extension staff appeared to be underemployed and there is considerable scope to streamline and decentralize the provincial and even county structures. Although TYUAP II provinces recently obtained new and sufficient vehicles, transportation continues to be a problem in Elazig. It may to be noted that, in spite of all difficulties and inadequacies FTE Sections are dynamic and enthusiastic.

19. Activities regarding rural infrastructure, small scale irrigation, on-farm development, soil and water conservation are conducted by the Provincial Directorate of Rural Services. KHGM also has two Regional Directorates (in Elazig and Malatya) which cover the project provinces.

20. Activities regarding agricultural research are carried out by TAGEM and KHGM. Project provinces have linkages with the following research institutes: Eastern Anatolia Regional Agricultural Research Institute (Erzurum), Apricot Research Institute (Malatya), Southeastern Anatolia Regional Agricultural Research Institute (Diyarkabir), Plant Protection Research Institute (Diyarkabir), and KHGM Regional Research Institutes (Erzurum and Sanliurfa). Overlapping responsibilities and lack of coordination among research institutes create confusion in addressing problems that are critical to land husbandry. The institutes generally lack experienced staff, transport, research equipment and machinery. However, they will benefit from the Agricultural Research Project Loan No. 3472-TU.

21. The project provinces are included in several programs/projects carried out by various General Directorates of MARA. These include: Crop Production Development, Crop Protection and Control and Livestock Development. Some programs cover only some of the project provinces: Fallow Reduction (Adiyaman), Eastern and Southeastern Anatolia Meadow, Pasture and Forage Crops and Livestock Development (Adiyaman, Elazig). Adiyaman and Malatya are under TYUAP II.

THE PROJECT

AGRICULTURAL COMPONENTS

22. Agricultural components form part of a menu of project interventions from which communities, working with local PDA staff would develop and implement rehabilitation and development plans for their MC. To achieve agricultural objectives, the project would partly fund interventions, supporting activities, demonstrations, adaptive research and technical assistance. Agricultural components to be implemented in the MCs would:

- promote technical packages which increase sustainable production and maintain the agricultural resource base;
- increase integration of livestock and cropping systems on dryland farms to bring about a better balance between supply and demand for fodder and control erosion;
- provide village communities with income generating activities to improve rural incomes and provide alternatives to grazing and farming on marginal lands. Supporting activities would be used to facilitate the adoption of treatments on range and forest lands.

23. Since the scope of treatments will depend on the prevailing agro-ecological conditions and the wishes and willingness of the participating farmers, at this stage, the area of a particular treatment can only be tentatively indicated. Table 2 indicates the tentative scope and phasing of agricultural components (treatments and supporting activities).

Table 2
Estimated scope and phasing of agricultural components (ha)

Components	Unit	1993	1994	1995	1996	1997	1998	1999	Total
Treatments									
Fallow reduction and forage production	ha	2791	4187	4187	5582	5582	3631		25960
Agronomic package	ha	1667	2500	2500	3333	1667	0	0	11667
Supporting Activities									
Rainfed horticulture + conservation	ha	125	187	187	250	250	125		1124
Rainfed terrace agriculture	ha	499	749	749	998	998	499		4492
Irrigated horticulture + conservation	ha	234	351	351	468	468	468	234	2574
Pistachio grafting & establishment	ha	333	500	500	667	667	333		3000
Gully horticulture	ha	190	208	390	680	964	814		3246
Trees along field boundaries	km	64	97	97	129	129	64		580
Irrigated forage	ha	0	878	1316	1316	1755	1755	878	7898
Bee Keeping 1/	kit	0	180	270	270	360	360	180	1620

No. of MCs that will be treated annually over 6 years are 6, 9, 9, 12, 12, and 6 respectively.
1/ consists of 20 hives, 20 swarms and a set of equipment.

TREATMENTS

24. All treatments will depend on the effectiveness of extension activities. Development of a strong demonstration program will also accelerate the adoption process.

a) Fallow reduction and forage production. Annual and perennial forage production under rainfed conditions would be promoted by the project to protect the soil with a vegetative cover, reduce grain cultivation on marginal lands, bring about a better balance between supply and demand for fodder and make more productive use of land. These will include the following:

- Promotion of annual (Hungarian vetch and common vetch) and perennial (sainfoin) forage crops into the fallow - wheat/barley rotation under rainfed conditions;
- Promotion of annual or perennial forage crops into the system where continuous wheat (barley) production is a common practice in dryland farming; and
- Production of perennial forage (as a grass - legume mixture and a pure stand of sainfoin) on marginal wheat land.

Rehabilitation activities would lead to range and forest land being temporarily unavailable for grazing which in turn would result in feed shortages (feed supply is already well below present requirements). Forage crop production on agricultural land will not only compensate for this loss but will provide sufficient feed for improved livestock production as well. It is estimated that feed loss (as dry matter) due to closure of moderately degraded rangeland of about 100 ha could be compensated by producing Hungarian vetch on 8 ha of agricultural land. In addition to forage legumes, the hay from food legumes (chickpea and lentil) would be used for animal fodder. The project will finance on a grant basis the seed and fertilizer for the first year that farmers adopt the new package. It is assumed that over the project life feed and food legumes will be produced on approximately 26,000 ha of land at a cost of US$95 per ha.

b) Agronomic Packages. Under the project, small grain production will be reduced and other crops will be introduced and/or increased. However, subsistence wheat farmers of the MC population may be reluctant to convert wheat area to forage crops or horticultural crops since wheat is grown for subsistence. This difficulty could be overcome by reducing the number of parcels that are allocated to wheat and by increasing the yield in the selected parcels, through agronomic packages adopted to local conditions. It is estimated that farmers will adopt improved packages on approximately 12,000 ha of existing wheat and barley fields at a cost of US$78 per ha. The important components of the crop management package are as follows:

- Timely and appropriate soil tillage (tillage along the contours) and seedbed preparation that allows moisture and soil conservation, early seeding and uniform emergence;
- Early fall seeding that permits emergence and vigorous growth before the onset of cold weather;
- Economic seeding rates that permit uniform stands;
- Economic fertilization; and
- Use of cold tolerant high yielding varieties.

Measures such as timing of operations which do not need additional inputs should be emphasized at the beginning. This would avoid or at least reduce the fear of risk in the adoption process. It is important that high yielding varieties be recommended only after modifying the local crop management package. Otherwise, the adoption process will be affected negatively and 8.

SUPPORTING ACTIVITIES

25. Supporting activities would be used to facilitate the adoption of activities on range and forest lands. Supporting activities must therefore be contingent on village agreement to adopt improved range management practices and forest treatments. Project costs are given in Annex 5 and 8.

a) Rainfed horticulture + conservation. Under the project, KHGM will construct 5,616 ha of rainfed terraces on steeper agricultural land (Annex 1B). The land would then be cultivated on the contour leading to increased moisture conservation and erosion control. Local farmers are keen to adopt this practice. It is estimated that vineyard and almond orchards would be established on 1,124 ha at an average total cost of US$373/ha including a farmer contribution in the form of labor of 47% but excluding the terracing costs. Total terracing costs amount to US$410/ha. It is further assumed that the remaining 4,500 ha of rainfed terraces farmers would prefer to produce field crops. In the establishment year, planting material and fertilizers would be provided by the project, while other inputs and labor would be provided by the farmers. In the succeeding years, farmers would carry out the production with their own resources.

b) Irrigated horticulture + conservation. In areas where irrigation is possible and conservation practices are needed, KHGM would construct irrigated terraces (Annex 1B). Based on the keen interest expressed by the farmers, it is assumed that apricots, apples, plums and some vegetables would be produced on approximately 2,600 ha at an average total cost of US$460/ha (62% farmer contribution) for crop establishment. This establishment cost is to be added to the total terrace and irrigation construction costs of $1,622 per ha. It is estimated that on an area of about 1,250 ha of irrigated orchards alfalfa production underneath fruit trees would be adopted.

c) Pistachio grafting and establishment. In Adiyaman, there is great demand from farmers for pistachio grafting. Wild pistachio trees would be grafted in an area of around 2,000 ha and pistachio seedlings will be planted on another 1,000 ha where wild trees are sparse. The grafting and binding material and seedlings would be financed by the project while labor would be provided by farmers. Total costs amount to some US$50/ha of which 20% consist of farmer contricution in the form of labor.

d) Gully horticulture. Horticulture production would also be carried out on gullies that are formed at the outlets of the terraces. For rehabilitation purposes, almond, pear and walnut trees would be planted in gullies and vines on slopes. It is estimated that gully rehabilitation could be carried out on 3,200 ha of land depending on the demand by the farmers at a total cost of US$400/ha, 40 percent of which the farmers would provide in the form of labor.

e) Trees along field boundaries. It is expected that in each MC, fruit trees, Robinia, willow and poplars could be planted along the field boundaries of 5% of the total number of parcels for participating households. It is estimated that approximately 580 km of field boundaries could be treated within the project life at a total cost of US$300/km (66% farmer contribution). Costs of seedlings would be met through the project and labor would be provided by the farmers.

f) Irrigated forage. It is assumed that around 7,900 ha of irrigated terraces will be used to produce alfalfa at a total production cost of US$206/ha (76% farmer contribution). Approximately 5,000 ha of this could be sole cropping and 2,900 ha double cropping (beneath fruit trees).

g) Beekeeping. This activity has a long tradition in the project area. The provision of modern apiculture kits is linked to individuals adopting rehabilitation treatments such as perennial fodder banks, fallow reduction measures etc. The project would provide 30 apiculture kits to each micro-catchment consisting of 20 beehives and swarms and a set of equipment at a total cost of US$2,260 per kit. In view of the importance of establishing a strong link between the adoption of long-term natural resource rehabilitation and short-term income generation, the project would provide 50% of the investment cost on a grant basis, provided the village demonstrated adoption of long-term measures. Credit would be available for the remaining 50% through ORKOY (Forest Village Development Fund) at an interest rate of 12% p.a. ORKOY would also be responsible for the logistics of this activity, while the PDA through the VGT would be responsible for selection of eligible individuals and extension activities (see Attachment 1 to this Annex).

DEMONSTRATIONS

27. The need for demonstrations will be established during the FC-PCPS process in accordance with the requests and the knowledge level of the village communities. Defined problem areas where the participants lack experience can be answered by designing on-farm demonstrations. Demonstrations would be carried out by provincial agricultural extension and forestry staff working on the MC plans (see Annex 12).

28. There is considerable information on crop production developed by the national research institutes. Some of this information that is applicable to the project area could be transferred to the farmers through the following types of simply designed but effective demonstrations:

- Conservation village
- Fertilization
- Agronomic packages (HYV + crop management practices)
- Irrigated forage
- Pulses in context of fallow reduction
- Forage in context of fallow reduction
- Perennial forage production

Annual results will be obtained with each type of these demonstrations with the exception of perennial crops and fallow reduction demonstrations. There is provision for inputs and support services for 3 ha of demonstrations per MC. The number and size of each demonstration will vary.

ADAPTIVE RESEARCH

29. During FC-PCPS process the need for adaptive research trials will be established. Demonstrations are effective tools to answer the problem areas

where the farmers lack experience. However, if problems arise during the implementation stage that cannot be answered by MC or provincial extension staff, adaptive research trials would be conducted. These trials would be designed based on the previous experience of the research institutes, would have a short duration and kept simple in order to answer the problem on hand.

30. Adaptive research would be carried out by the Adaptive Research Specialist (ARS), one for each province, nominated from existing provincial staff, who will act as the link between villages and the research institutes mentioned below. Logistical support would be provided to staff from these research institutes to enable them to travel to the project area in order to conduct these trials with the Adaptive Research Specialist. The following subjects have been identified for adaptive research programs (see also Annex 12):

- Sustainable seedbed preparation on slopes ranging between 4% and 15% by the Southeastern Anatolia Regional Agricultural Research Institute (Diyarbakir) and Regional Institutes of KHGM (Sanliurfa);

- Annual and perennial forage crop (sainfoin, Hungarian vetch, common vetch, etc.) by the Eastern (Erzurum) and the Southeastern Anatolia Regional Agricultural Institutes;

- Use of herbicides as an improved management tool for minimum tillage with field crops by the Southeastern Anatolia Regional Agricultural Research Institute and Diyarbakir Plant Protection Research Institute; and

- Runoff and erosion measuring plots to calculate soil loss from representative dryland farming soils, with slops exceeding 9% by the Regional Research Institute of KHGM (Sanliurfa).

PRODUCTION IMPACT

31. Yield benefits. The expected yield benefits are summarized in Table 3. It should be noted that "without project yields" are lower than the provincial averages due to various reasons such as poor crop management practices and poor access to inputs, unsuitable soil and topography in the MCs.

Table 3
With and Without Project Yields

	Yields (t/ha)	
Crop	without project	with project (estimated)
Wheat	1.1	2.6
Wheat straw	1.6	2.75
Barley	1.0	2.5
Lentil	0.7	1.1
Chickpea	0.9	1.0
Common vetch	2.5	3.0
Almond	n. applic.	4.5
Grape	n. applic.	4.0
Apricot (irrigated)	n. applic.	12.0
Alfalfa (irrigated)	n. applic.	4.0

PROJECT STAFFING REQUIREMENT

32. The agricultural components of the project would be implemented by the existing MARA staff. Some reallocation and training of staff is needed (see Annex 11). The Director of the FTE Division would be the responsible officer within the PDA. In each province, there would be two staff allocated fulltime to the project (Micro-catchment Agricultural Engineer and Adaptive Research Specialist) with new responsibilities as follows below.

33. Micro-catchment Agricultural Engineer (MAE). This would be a existing staff member of PDA who would be retrained to take responsibility for coordinating and supervising the activities in the MCs. PDA will in addition nominate one agricultural engineer for each micro-catchment (MCs; Micro-catchment Specialist); this person is likely to be based at the closest county agricultural office, or possibly at provincial headquarters if these are easily accessible to the microcatchment.

34. Adaptive Research Specialist (ARS). An existing staff member of PDA would be retrained to facilitate the establishment and management of adaptive research and demonstrations. The ARS would act as the technical link between provincial field staff and research institutions relevant to each adaptive research topic. This person would facilitate research in agricultural, irrigation, soil conservation and forestry related topics.

STAFF APPRAISAL REPORT

TURKEY

EASTERN ANATOLIA WATERSHED REHABILITATION PROJECT

SUPPORTING ACTIVITIES:
APICULTURE

1. Apiculture has a long tradition in the project area and interest in beekeeping is keen. The project will provide apiculture kits and finance 80% of the investment cost (50% IBRD, 30% ORKOY) to individuals in villages adopting resource management activities in the microcatchments. Farmers would finance the remaining 20% (see para 2 below). The objective of this income generating activity is to ensure the lasting adoption of longer maturing treatments with respect to improved farming practices and rangeland and forest land rehabilitation. In particular, apiculture will allow villages to capture benefits in the short run from (a) the conversion of marginal cultivated lands to perennial fodder banks, (b) the introduction of food and fodder legumes in the context of fallow reduction, (c) the temporary cessation of grazing of degraded range, and (d) the implementation of soil conservation afforestation.

2. The project will provide some 30 apiculture kits consisting of 20 beehives, 20 swarms and a set of equipment (including drugs and sugar for the first year) at a unit cost of US$2,256 to each microcatchment or some 1,620 kits to the 54 microcatchments at an overall cost of US$3.65 million. The PDA through the VGT and ORKOY will jointly implement this component at village level. The VGT will be responsible for (a) the selection of beneficiary farmers which will be conditional on the adoption of rehabilitation measures by the beneficiary; and (b) the provision of extension services. ORKOY will be responsible for providing the apiculture kits to the villages and for establishing credit and payment procedures. Farmers will receive the apiculture kits directly from ORKOY who will procure in bulk on the basis of LCB. The farmer will receive a credit worth 80% of the purchase value of the equipment on present (1992) ORKOY terms. These consist of a 20% downpayment and an 80% credit at 12% p.a. with one year grace period during which capitalized interest; repayment takes place over the three consecutive years during which 25% of the initial credit amount (including capitalized interest) is repaid in the first year, 35% in the second and 40% in the third year.

3. This credit element is justified by the importance of establishing a strong link between the adoption of long-term natural resource rehabilitation and short term income generation. Targeting of apiculture support is an essential element of the rationale and will be ensured by the following. First, the provision of apiculture kits will take place in the second year and onwards of the development of a given microcatchment in order to allow for demonstration on improved agricultural practices and range and forest land treatments as well as for extension in beekeeping. Secondly, in view of

ensuring adoption the final decision to provide a village within a microcatchment with beekeeping kits will be with the PUB based upon the meeting of minimum adoption rates. Lastly, after the PUB has taken a positive decision, the VGT will be responsible for allocating apiculture kits to individuals that can demonstrate effective adoption of treatments.

4. ORKOY is the recently established Forest Village Development Fund under the MOF which provides subsidized credit for a number of activities, including the purchase of beehives, stoves, sheep and cattle. ORKOY normally operates in forest villages (i.e. villages located in areas declared as forests). Though the majority of villages in the microcatchments do not qualify as forest villages, ORKOY has declared to extend its services to all villages within the project area starting in 1993, and is presently making the administrative arrangements in this respect. Close coordination will be required between ORKOY and the PUB in order to avoid activities to be promoted which run against the aim of the project, in particular the provision of cattle, sheep and goat where overgrazing is a major concern. Possible conflicts arising in this respect which cannot be settled at the provincial level would be referred to the PCSU at central level. The arrangements related to apiculture, in particular the effectiveness of the link between adoption of resource management activities and recipient of apiculture kits and the institution involved, will be evaluated during the Project Implementation Review.

STAFF APPRAISAL REPORT

TURKEY

EASTERN ANATOLIA WATERSHED REHABILITATION PROJECT

RAINFED TERRACING AND SMALL-SCALE IRRIGATION

1. Rainfed terraces with subsequent plantation of orchards are a means of erosion control using physical and biological measures (see Attachment 1 to this Annex) which offer the possibility of considerable income generation in the medium term. Small-scale irrigation permits an increase in the productivity of agricultural land and income from farming and thus reduces pressure to utilize marginal lands. Both activities will be instrumental in linking long-term resource management with shorter term income generation. KHGM (General Directorate of Rural Services) of MARA will be responsible for planning and implementing these activities (including check dams) in the micro-catchments of the project area. KHGM, which is in charge of construction of public irrigation works involving water source with less than 500 1/s outflow (DSI for above 500 1/s), has considerable experience in the design and construction of small-scale irrigation infrastructure either on a contract or a force account basis.

2. The scope of rainfed terracing and small-scale irrigation within a micro-catchment will be determined within the framework of the participatory planning process (FC-PCPS) involving villagers and the concerned institutions (see Annex 4). Subsequently, provincial KHGM will a) update existing and provide supplementary surveys (e.g. soil and cadastral maps); and b) design and cost the individual works. Designs will then be approved at central KHGM. Tenders will be issued and contracts awarded by central KHGM on a micro-catchment basis. As civil works are scattered in remote areas, there may be insufficient response from contractors and works would then be carried out on force account. In both cases, provincial KHGM staff will supervise the works.

3. During project implementation the participatory planning process will run parallel to the survey and design work as well as to supervision of works under construction in the different micro-catchments. KHGM has allocated 3 staff members in each of the provinces to the project; more staff would be made available if necessary. Sufficient staff are available at central KHGM to appraise designs and carry out the bidding process.

4. Works to be carried out under KHGM consist of:

(a) Terracing of rainfed agricultural land as well as establishment of gradoni terraces (6-8 m wide, small sloping bench terraces) and pocket terraces. These terraces would be constructed on sloping dryland areas (some 5,620 ha) at an average total cost of US$410/ha (including 5% farmer contribution in the form of labor) and would reduce soil erosion and increase water infiltration. In the case of pocket terraces, farmers would contribute by providing the stone material and constructing the walls;

(b) Construction of some 270 tanks and small basins at a unit cost of US$4,000;

(d) Installation of tertiary (approx. 432 km at a cost of US$7,000/km) and diversion canals (some 162 km at a cost of US$2,000);

(e) Establishment of 10,530 ha of irrigation terraces at a total cost of US$1,622/ha which includes a 13% farmer contribution in the form of labor; and

(f) Construction of some 5,600 check dams using farmer labor and stones cleared from surrounding land.

The areas indicated are tentative. The final scope of terracing, irrigation and check structures will be determined in the context of the participatory planning process.

5. In accordance with GOT practice, government will finance the investment costs of these schemes. Operation and maintenance will be the responsibility of the village communities. New constructions will be subject to villagers having maintained existing irrigation infrastructure in an operating condition. KHGM will inform the village communities of this responsibility.

6. Rainfed terraces will reduce soil erosion and water runoff and increase water infiltration and moisture conservation. In addition, terracing will lead to contour ploughing. Almonds and other tree crops would be grown on the terraces. The irrigated area would be used to grow apricots and other fruit trees, alfalfa and other fodder crops as well as wheat and vegetables. These irrigated areas are expected substantially to contribute to farmers' income and the additional fodder produced from irrigation would encourage stall feeding and help to relieve the pressure from rangelands.

7. A key element is close coordination between institutions, in particular between KHGM and PDA with regard to extension and demonstration (e.g. irrigated fodder production, establishment of fodder banks) and the procurement of seedlings. In addition, the link between long term resource management carried out by the village community and the provision of income generating infrastructure will be stressed by KHGM and PUB.

8. Environmental impact. Soil erosion is by far the most important environmental problem found in the sub-catchments of the project area. The physical and biological conservation measures described above (rainfed and irrigated terraces including plantations) are specifically designed to counteract this problem. These measures will supplement other project activities such as reforestation and rangeland management which will lead to the rehabilitation of the selected micro-catchments. Soil salinity and waterlogging are not likely to be problems in the areas to be irrigated within the project.

SOIL EROSION IN THE PROJECT AREA

1. The project area is made up of that part of the catchment of the Euphrates River which lies in the three provinces of Adiyaman, Elazig and Malatya. Altogether the project covers an area of approximately 2.4 million ha.

2. The catchment covers a complex landscape which varies from rolling plains to steep mountains. Much of the area is geologically unstable and most of the natural vegetation has been removed by overgrazing and deforestation. These factors combined with harsh climatic conditions have led to extensive soil erosion.

3. Little soil loss data are available but estimates by the Directorate of Rural Services (KHGM) show that most of the project area is strongly or severely eroded. KHGM consider moderate rates of erosion to be from 1 to 10 tons per ha, strong erosion to be from 15 to 50 tons per ha, and severe erosion to be from 35 to 100 tons per ha.

Table 1 SUB-BASIN SEDIMENT YIELDS

Sub-basin	Mean sediment yield ($T/km^2/a$)
Upper (Keban Reservoir)	3,948
Middle (Karakaya Reservoir)	5,222
Middle (Ataturk Reservoir)	4,390

4. Mean annual soil loss in the project area averages about 40 tons per ha. Although this is high, large catchments offer opportunities for sediments to settle and be trapped. Because of this, not all the eroded material is being transported into the downstream dams. For example, it is estimated that as much as 88% of the eroded material from the catchment of the large Murat river, in the upper Euphrates, is retained within the sub-basin -- only 12% will reach the Keban Reservoir. On smaller streams, the opportunity for sediment storage is less and more sediment will remain in flux.

5. The Keban, Karakaya and Ataturk are very big dams with very large catchment areas and a recent study has indicated that they will all take over 1,000 years to silt up even if the present high rate of erosion is allowed to continue. As the project is not expected to deal with more than about 400,000 ha, or 17% of the total catchment area, it will not have a great impact on the rate of siltation or life expectancy of the larger dams. However, excessive runoff and erosion are seriously reducing the productivity of the forest, range and agricultural lands of the project area and the general environmental conditions are deteriorating. Unless land rehabilitation and conservation

measures are introduced, the agricultural productivity of the area will continue to decline, and farm incomes in this poor region will decrease.

Land Rehabilitation and Conservation

6. Two important factors were considered in planning the rehabilitation and conservation measures. First, rehabilitation and conservation measures can only be effectively introduced and maintained if they are accepted and wanted by the local communities. This means that the measures must not only aim at reducing erosion and runoff, but must also lead to increased yields and incomes. Secondly, soil conservation research is now conclusively showing that the most effective way of controlling erosion is by protecting the soil with a vegetative cover. A ground cover of 40% or more can reduce erosion to acceptable levels.

7. Consequently, the rehabilitation and conservation works of the project will concentrate on measures aimed at increasing and maintaining vegetative cover over the soil. This will be done through reforestation, and promoting rangeland rehabilitation and management and better crop husbandry practices. All the proposed measures are expected both to control erosion and to increase agricultural production.

8. Because of the severely eroded conditions of much of the project area, the steep slopes and difficult climatic conditions, some physical erosion control measure will have to be used but these will be kept to a minimum. Physical erosion control measures to be used will consist of the following:

i. **Forestry land**

Widely spaced, bulldozed, bench terraces would be selectively constructed on steep, highly degraded areas which are to be reforested. The terraces will then be ripped to allow moisture penetration. In selected places gradoni terraces will be built by hand. Technical details are given in the Forestry Annex 3.

ii. **Rangeland**

Rangeland would be rehabilitated by fertilizing or by fertilization and seeding. About 25%, will be contour ripped or contour furrowed. The rip lines and furrow will reduce runoff and erosion and at the same time create conditions conducive to the reestablishing of vegetation (Annex 2).

iii. **Arable land**

Small terraces would be built on the steeper agricultural land to reduce erosion and increase the infiltration of water into the soil. The construction of the terraces would also lead to the land being cultivated on the contour - a practice which by itself will help to

conserve moisture and reduce erosion. The terraces would be spaced according to the degree of slope. After construction, the terraces would be ripped to promote root growth and planted to almonds and other tree crops. The inter-terrace area would be used to grow grapes, alfalfa, cereals and legume crops. This terracing would be done mechanically as this is four to five times cheaper than manual construction.

Much of the agricultural land is dissected by gullies. It is planned that these gullies will be reclaimed where it is economically viable to do so. Reclamation works would consist of building small check dams which would catch silt, conserve moisture and help in reestablishing vegetation. The gullies would then be planted to fruit trees, poplars or Robinia pseudoacacia.

STAFF APPRAISAL REPORT

TURKEY

EASTERN ANATOLIA WATERSHED REHABILITATION PROJECT

RANGELANDS

BACKGROUND

1. More than 50% of the Euphrates Basin is rangeland. Although extensive livestock production is potentially the most economically and ecologically sustainable way of using this rangeland, most of it is now badly degraded and eroded as a result of overgrazing. Technical solutions to rehabilitate rangelands exist and have been demonstrated on a small scale. The large-scale rehabilitation and improved management of these lands will depend on the development of economically and socially acceptable technical packages and the active participation and support of the rangeland managers - the villagers of the Euphrates Basin.

THE RANGELANDS

2. An important opportunity to raise production, control erosion and generally improve environmental conditions for the project area lies in the rehabilitation of rangeland. As can be seen from Table 1, about 30% of the total area is currently productive range; however, a further 430,000 ha in the project provinces is forest land, much of which is degraded range, and of the 470,000 ha classified as noncropland, much is also degraded range (see Table 1A of Annex 1A).

Table 1 RANGELAND IN THE EUPHRATES BASIN ('000 ha)

Land Use	Adiyaman	Elazig	Malatya
Total Ag. Land	252	179	278
Estimated Productive Range	79	360	289
% Productive Range/Total Area	13%	45%	27%
Total Area	614	793	1,049

(Source: Provincial Directorates of Agriculture and SIS 1991)

3. Grazing land in Turkey is generally classified into three types: **rangelands** *(mer'a)*, **meadowlands** *(cayir)* and **highland grazing** *(yayla)*. Rangeland *(mer'a)* conditions vary from moderately productive, but overgrazed, to severely

degraded and significantly eroded, depending largely on the type of material from which the soils are derived. Annual dry matter production per ha is estimated to vary from 500 kg from rangeland lying on igneous derived materials, 300 kg on sedimentary material and 150 kg or less on skeletal soils. These rangelands support a wide variety of resilient plant species which have the ability to re-establish themselves quickly. Upland *(yayla)* rangelands are only grazed in the summer months. They also support a wide range of plant species and have been shown to respond well to good management and fertilizers.

4. Covering a relatively small area, the spring fed meadowlands *(cayir)* are important as they are relatively productive - typically producing 2 tonnes or more of dry matter/ha per year - cut for hay. Besides this hay, crop residues and the lopped branches of oaks are dried and used for winter feed.

TENURE CONDITIONS

5. Only rangeland lying within the proclaimed forestry areas is considered to be the responsibility of the Ministry of Forestry (MOF). Other rangeland belongs to the State ("Treasury Land"). The Ottoman Land Law assigns usufruct rights to villages and groups that have historically used the rangelands; however, this Law is now technically abolished. The Land Reform Law of 1973 provides for the State the power to confirm usufruct rights through the granting of assignment certificates for particular rangelands, but it is not yet being applied in Eastern Turkey. It also provides wide powers to the Ministry of Agriculture and Rural Affairs (MARA) to develop detailed, annual grazing plans. Degraded Treasury land can also be allocated to the MOF for rehabilitation. A new rangeland law is at present being considered by parliament under which the MARA would become legally responsible for the rangelands.

LIVESTOCK

6. Livestock husbandry is important in eastern Turkey accounting for more than 40% of the regional agricultural GDP. However, conditions are difficult. Extreme winter conditions necessitate housing animals for up to six months of the year and degraded rangelands, combined with reduced winter forage supplies, means that many animals are poorly fed for much of the year. Red and Black Anatolian cattle are well adapted to the harsh conditions but have low productivity and poor genetic potential. This problem is recognized by the MARA which has been introducing exotic breeds over the last ten years; these breeds must be well nourished and cared for, however, to realize their genetic potential.

7. The number of livestock units in the project area has not changed significantly in the last 30 years but the composition has changed, principally as a result of agricultural mechanization and migration of family labour. As tractors have become widely used, most oxen have been replaced by cows and sheep, particularly in the lowlands. Goat numbers have dropped as they have been replaced by more profitable sheep. Cows have replaced small ruminants in households with labour (shepherding) constraints. The changing social and economic conditions have not only affected the livestock composition but also the way in which it is managed - this is changing from a mostly transhumant to sedentary system. This state of change provides opportunities to introduce improvements, particularly for the better integration of livestock, cropping systems and stall feeding to reduce pressure on the rangelands.

POSSIBILITIES FOR IMPROVEMENT

8. A number of measures have been successfully identified and demonstrated which increase livestock production, improving rangeland conditions and control of soil erosion in this area. These include the use of fertilizers, reseeding of badly degraded range, controlled grazing, stall feeding, the cultivation of fodder crops and trees and the introduction of improved animal breeds. Some of these measures, such as community rangeland management programmes, have been voluntarily introduced by some villagers without outside help. The technology and interest therefore exist to bring about the desired changes. The challenge is to implement what is required on a large enough scale to have an impact. Preparatory work indicates that most village communities see rangeland degradation as a high priority problem and are willing to work with the MARA and MOF to find a solution. A participatory approach has been developed (see Annex 4) through which MARA and MOF staff together with village communities to plan and implement integrated catchment rehabilitation and development.

THE PROJECT

9. The central theme to all rangeland components is village participation. FCPCPS techniques will be used to help villagers to identify, prioritize and solve their own problems. It is assumed that the project will help to rehabilitate and improve a total of 109,000 ha of rangeland. The proposed schedule for this work is given in Table 2 and costs are shown in Annex 5. The project will:

(a) Develop and use a participatory approach to rangeland management planning and implementation in 54 selected micro-catchments in the project area.

(b) Strengthen the institutional capacity to work with farmers in the project area by improving rangeland extension capabilities; training adaptive research assistants; providing equipment and vehicles for rangeland work; training provincial staff, village group technicians, farmers, pastoralists and shepherds in integrated catchment development and range management techniques. This will include herd size management as well as range management, in order to keep herd size optimal as range improves.

(c) Increase sustainable productivity on rangelands by promoting technical packages and management practices which include:

- Development and implementation of rangeland management plans on approximately 59,000 ha at a total cost of US$10 per ha focusing on range management groups and using delayed start and early end to the grazing season, rotational grazing and temporary cessation of grazing on selected severely degraded land;

- Fertilizing rangelands and meadowlands plus improved management of 30,500 ha at a total cost of US$73 (25% farmer contribution) per ha to increase hay production and to improve the quality of the hay;

- Enrichment seeding and fertilization of severely degraded rangeland of about 20,000 ha at a total cost of US$132 per ha;

- Pilot trials of aerial fertilization approximately on 5,000 ha at a cost US$63 per ha and aerial seeding + fertilization of about 2,000 ha at a cost of US$123 per ha.

(d) Increase the integration of livestock and cropping systems in the project area. This will be achieved through production of annual and perennial forage crops on agricultural land.

(e) Develop supporting activities to facilitate the adoption of treatments of range and forest lands which are discussed in more detail in Annex 1A.

Table 2 ESTIMATED VOLUMES OF RANGELAND REHABILITATION ACTIVITIES

Itervention	Unit	1993	1994	1995	1996	1997	1998	1999	Total
RM 1/	ha	0	6500	9775	9775	13050	13050	6500	58650
RM + fertiliser	ha	3389	5083	5083	6778	6778	3389	0	30500
RM+seeding + fertiliser	ha	2222	3333	3333	4445	4445	2222	0	20000
Total	ha	5611	14916	18191	20998	24273	18661	6500	109150

1/ Range Management Alone

10. The need for enrichment and fertilization of only part of the rangeland reflects the resilience of much of the rangeland in the project area and its ability to regenerate quickly without inputs other than good grazing management.

DEMONSTRATIONS

11. In order to accelerate the adoption of range rehabilitation treatments simple demonstrations will be carried out on the rangelands by the Adaptive Research Specialist (ARS). The demonstrations, as shown in Table 3, will be funded by the project and labor will be provided by the farmers. Demonstrations are summarized below:

- Rangeland grazing management
- Rangeland fertilization
- Rangeland seeding and fertilization

There is provision for inputs and support services for 3 ha of demonstrations per MC. The number and size of each demonstration will vary.

ADAPTIVE RESEARCH

13. Adaptive research work will be carried out by the ARS (see para 30 of Annex 1A). The following subjects have been identified:

- Assessment of seeding and fertilization treatments under grazing conditions on rangeland and meadowland by Eastern and Southeastern Anatolia Regional Agricultural Research Institutes;
- Determination of the impact of different fertilizer regimes on livestock productivity and soil management by Eastern and Southeastern Regional Agricultural Research Institutes; and
- Measurement of runoff and erosion on ungrazed range, fertilizer and seed enriched range and perennial forage production field by Regional Research Institutes of KHGM.

ENVIRONMENTAL IMPACT

14. The range management component of the project is expected to have a very important and positive social and environmental impact on the project area. The main environmental impact will be the effect on runoff and soil erosion. Modern research indicates that the most effective way of reducing erosion and excessive run-off is to increase ground cover. Erosion rates usually drop to acceptable levels once a minimum of 40% ground cover has been achieved. This degree of cover should be obtained on at least 109,000 ha if the plans outlined above are put into practice. The proposed range management activities will also increase the wildlife habitat and help to conserve the important botanical biodiversity of the region.

BENEFITS

15. Besides the considerable environmental benefits mentioned above, the project is expected to result in a considerable increase in available fodder, improved livestock production and greater possibilities for productive local employment. Expected increases in range and meadow production are shown in Table 3.

Table 3 RANGE AND MEADOW YIELDS WITH AND WITHOUT PROJECT

	Yield without project (kg/ha)	Yield with project (kg/ha)
High quality range	300	700
Median range	180	380
Poor range	100	250
Meadowland	2,000	5,000

16. Benefits will depend upon the rate at which farmers adopt the technical packages advocated by the project but, based on the projections given in the Rangeland Component report, the meadows will produce an incremental 1,500 tonnes of dry hay per year by the end of the project. Also, the rehabilitated and improved rangeland will produce an additional 26,000 tonnes of dry matter per year by the end of the project.

RISKS

17. With the exception of aerial seeding and fertilization, no untested technology will be introduced under this component. The widespread acceptance and implementation of the rangeland components will depend on the FCPCPS participatory approach being effectively applied by extension staff. The availability of extension staff, training and facilities will, in turn, depend largely upon the effectiveness and commitment of provincial management, and upon the availability of inputs, particularly forage seeds to farmers when required.

STAFF APPRAISAL REPORT

TURKEY

EASTERN ANATOLIA WATERSHED REHABILITATION PROJECT

TREATMENTS ON FOREST LANDS

1. INTRODUCTION

The objective of the project's forestry interventions is to rehabilitate degraded gazetted forestry lands in order to improve soil productivity, soil water storage and resistance to erosion, sustained production of woody and non-woody forest outputs.

2. BACKGROUND

2.1 General characteristics of forests

The three provinces in which the project will operate contain 430,000 ha of gazetted forest land (15.2% of total land in the provinces) much of which is regarded as unproductive forest, mostly oak species (Quercus infectoria, Q. brantii, Q. libani). The oak forests respond strongly to cutting at ground level and subsequent coppice growth and management. Within living memory large areas of forest have been removed for fuelwood, timber and forage, and soils have been severely degraded.

Geological conditions, soils and topography are extremely heterogeneous, and any management interventions must be closely matched with actual site conditions.

2.2 Tenure and encroachment

Proclaimed forestry land contains productive and unproductive forests, and also rangeland indistinguishable from adjacent Treasury rangeland. There has also been supervised management and utilization of forests under arrangements for concessional supplies of fuelwood, timber and forage to villagers.

Cadastral boundaries of proclaimed forest lands are not always clearly defined on maps or recognised on the ground.

2.3 Management objectives and systems

Current management systems aim to (i) supply some rural populations with domestic wood on a subsidised concessional basis; (ii) allow grazing on rangelands and within forests on proclaimed forestry lands; and (iii) rehabilitate forestry lands (see Table A3.1). The peaks of activities up to 1989 depended upon funds from a Revolving Fund which are no longer available for most of this work, and most rehabilitation and reafforestation now has to be funded from very limited regular forestry budgets.

2.4 Outputs of woody and non-wood forest products

Proclaimed forestry lands in the project area produce, or are capable of producing, the following products: timber (poles, sawlogs, peeler logs) from broadleaved and coniferous species, fuelwood, tree foliage fodder, fodder from grasses and shrubs, bee fodder for honey production, edible and marketable nuts (pistachios, walnuts, almonds) and fruits (apricots, grapes, plums, pears) and mulberry leaves for silkworms. Among the very wide range of non-wood forest products produced in Turkey, the project area may also be able to produce, with careful management, small quantities of some edible herbs (thyme, sage, oregano) and perhaps bulbs of ornamental species.

2.5 Past development activities

The project area has had regular forestry development programs (see Table A3.1) and in addition several foreign-aided projects (for example a WFP Afforestation, Erosion Control and Range Improvement Project) in related areas have produced or will produce results directly or indirectly applicable to the project area.

2.6 Constraints

Proclaimed forestlands in the project area suffer from extreme constraints on biological productivity: generally low precipitation, poor eroded soils over some 80% of the area, poor soil water retention rates, extreme cold and heavy snow cover in a long winter, high summer temperatures with little rain, and steep slopes with shallow rocky soils. These conditions produce very low growth rates, probably averaging 1 m3/ha/an of wood volume and less than 300 kgDM/ha/an of rangeland fodder.

Forestry interventions must aim to improve soil organic matter contents and soil water retention, and to achieve and maintain vegetative cover at 40% or more.

3. MODELS FOR PARTICIPATORY MANAGEMENT

3.1 Farmer Centred Problem Census Problem Solving (FCPCPS)

Forestry interventions will be employed as, when, where and how the iterative processes of FCPCPS indicate so that the optimum rehabilitation of each microcatchment (MC) occurs within the mandate of the Ministry of Forestry and in ways socially-acceptable to the villagers.

3.2 Planning and design

Following selection of a MC for project activities, forestry interventions will be planned and designed based on an updated inventory of MC geology, soils, slopes, existing forests and erosion status. Alternative types of treatments from the "menu" of possible interventions will be costed according to available resources, and benefits assessed so that optimum outcomes can be achieved.

3.3 Site matching and activity specifications

It will be important to match the selected interventions (and consequent on-site activities) with existing site conditions. In particular, interventions requiring mechanical land treatments such as terracing and ripping should only be employed when appropriate combinations of hydrologic soil group, land erodibility type, slope and soil depth are found. These are outlined in Tables A3.2 and A3.3, and are subject to change based on further field research and observations.

4. PROJECT INTERVENTIONS

4.1 Proposed interventions

There are six types of interventions, most with several sub-treatments, briefly described below (Table A3.4):

(a) Soil Conservation Afforestation which would comprise mechanical terracing, planting acorns on prepared gradoni terraces between the bulldozed terraces, and broadcast seeding of the entire area with a mixture of forage seed, grass seed and fertilizers. Gullies would be revegetated, and small check dams constructed;

(b) establishment of conifer plantations by planting on ripped or manually prepared slopes;

(c) rangeland rehabilitation by broadcast seeding with a mixture of forage seed, grass seed and fertilizers, and gully rehabilitation with multipurpose tree planting (robinia, willow, poplars, fruit and nut trees) and check dams when needed;

(d) oak coppice rehabilitation, comprising cutting of degraded oak stands to encourage coppicing, and acorn sowing in open areas;

(e) fuelwood coppice plantations which involve oak planting and acorn seeding on mechanically ripped and manually prepared sites;

(f) riverbank protection along unstable banks between low and high flood levels by planting poplars and willows.

These activities would be undertaken by the Forestry Department, employing local laborers. The local population, in accordance with current practices, enter rehabilitated areas to cut and carry fodder, and to participate in thinning operations.

4.2 Costs

Estimated costs of these interventions with their constituent treatments are tabulated below and in Annex 5 and 8. Labour costs (ranging from TL45,000 to TL90,000 per day) comprise a high proportion of treatment costs. The labour-intensive Oak Coppice Rehabilitation is costed at TL40,000 per day.

4.3 Outputs and impacts

Numerous quantifiable and non-quantifiable outputs can be expected from the forestry interventions. The former include fuelwood (from boles and branches), tree fodder, grass and forage species fodder, poles, sawlogs, peeler logs, and honey, nuts and fruits. Paid labour contracts inject cash into village economies, and income-generating activities (bees, silkworms, fruit products, livestock production) will have beneficial early economic effects. Non-quantifiable impacts include better land management capabilities, improved cooperative planning between OB and villagers, and greatly improved environmental conditions expressed as better soils, soil erosion and soil moisture conditions. Estimated outputs are tabulated below (Table A3.5), and in summary these estimates show that over 60 to 75 years about 600,000 t of fodder, 7.5 million m3 of fuelwood, 1.0 million m3 of branchwood, 220,000 t of leaves and twigs, 0.8 million m3 of sawlogs, 275,000 m3 of poles and 680,000 m3 of peeler logs will be produced.

4.4 Nurseries

The project will supply equipment, watering systems and civil works to develop 6 new nurseries under Forestry management, to produce plant materials for the various interventions. Village nursery development will not be directly supported, because it is too difficult to assure villagers of long-term production contracts for high-quality seedlings of desired species for broadscale planting. However, small village nurseries for fruit tree seedlings, if desired by villagers, will be supported with advice and limited supplies.

5 RESEARCH

Although considerable forest research capability exists in Turkey, activities in the project area will be strengthened by providing some equipment. Current review topics include oak coppice operations, acorn storage, windbreak species composition trial and provenance trials. Numerous topics require adaptive and focussed field research including, in particular: (i) the cost-effectiveness and effects of mechanical site preparation on growth of trees and forage species; (ii) costs and benefits of fertilizers; and (iii) effects of site preparation techniques on erosion control, and soil and water conservation. The project would provide logistical support principally for data analysis. Provincial forestry authorities will also assign improved forest areas on a pilot basis to local communities to manage, adapting from the experience of the Swiss-funded Community Forestry Project. Precise arrangements will vary according to agreements reached with particular communities. Programs will be reviewed at the MTR, and the activity expanded if appropriate.

6. INSTITUTIONAL STRENGTHENING

6.1 Organisation, staffing and operational funding

The forestry components of the project do not require incremental staff and will not support any additional staff members, but it is expected that the organisational framework in which the whole project will operate will improve

staff allocations and work methods, improve inter-agency cooperation and concentrate development cooperatively onto limited areas - the microcatchments - such that agency-villager relationships are made more productive.

As the project lead agency, the Ministry of Forestry, and its constituent Directorates, is highly experienced in all the field operations required for the proposed forestry interventions (see Table A3.1), and is staffed and organised for the proposed tasks of project management, inter-agency and field liaison, nursery development, field implementation of treatments, and monitoring.

6.2 Existing forestry programs and responsibilities

These have been greatly inhibited by the loss of most funds previously allocated from the Forestry Revolving Fund. Now that forestry programs have to be largely funded from regular budgets, which are severely restricted, planned (without-project) programs would be much constrained. The experience exists, however, to carry out programs on a substantial scale.

6.3 Nursery civil works and plant materials production

As discussed above, 6 new dispersed nurseries will be developed with strengthened equipment and facilities. Research on plant materials production will be undertaken, and nursery offices/stores, sheds and housing will be provided.

6.4 Training

Training will include 64 pm of study tours in Turkey, 86 pm of international short-term training, and on-the-job training for technicians (bulldozer operations and nursery persons).

6.6 Vehicles

Field services will be strengthened by the provision of 21 small vehicles (mostly 4WD) for field liaison and field operations in microcatchments (distributed about one-third to each province), six 3-5 tonne tipper trucks for transport of nursery soil, fencing supplies and other field materials (2 each province), six 10 tonne trucks for bulldozer transport (2 each province) and 6 mobile repair vehicles for bulldozer field maintenance (2 each province).

6.7 Field equipment

The project has budgetted for items of forestry field equipment, particularly including: ten 160-180hp bulldozers (about 3 each province, or 1-2 per current MC doing terracing and ripping under SCA treatments); nine 120-140hp bulldozers (3-4 per province, or 1 per current MC doing ripping under other treatments); 6 caravans for on-site supervision; 6 farm tractors (1 per nursery) and other items of farm equipment for each of the 6 nurseries (tipping trailers, ploughs, disc harrows, bed formers, seeders, root cutters).

7. BENEFITS, JUSTIFICATION AND RISKS

7.1 Benefits

The forestry component particularly targets degraded lands in the microcatchments. Benefits will ultimately include reduced soil erosion, improved land management procedures, better soils and soil water retention, and tangible outputs including fuelwood, timber, fodder, livestock, honey, fruits and nuts. An important benefit would be the development of better cooperation and trust between forestry authorities and villagers - which will in due course act as a model for future operations in areas outside the project's immediate zone of influence.

7.2 Justification

The forestry interventions can be amply justified by the expected benefits in (i) land management and planning, (ii) rehabilitation of currently-degraded lands, (iii) increased outputs of numerous woody and non-wood forest products, (iv) increased trust between villagers and Ministry of Forestry, and between Ministry of Forestry and other GOT agencies, and (v) improved social and economic conditions in villages.

7.3 Risks

The normal risks inherent in any forestry project - such as failures, or lower than expected production rates, due to fires, diseases, poor management, weeds and so on - will be minimised due to the widely dispersed nature of operations. The major risks are institutional and organisational - within agencies, between agencies and between villagers and agencies - such that cooperative procedures for planning, implementation and maintenance might not be effectively and sustainably developed. In particular, villagers must become more self-reliant and must fulfil their sides of any actual or implied contractual relationship with MoF.

These socially-related risks will be minimised with full and effective use of the FCPCPS methodology, and subsequent development of sound village-based initiatives for operations and maintenance.

8. ENVIRONMENTAL IMPACTS

8.1 Ecological impacts

The project will not promote or utilise large quantities of substances harmful or toxic to ecosystems. Provided forestry interventions are carefully planned and matched to site conditions, soil erosion and hydrological conditions will not be degraded and should be improved over wide areas. To the extent that management of the forestry interventions succeeds in maintaining sustainable vegetation cover and soil organic matter contents, the environmental impacts will be wholly positive. Wildlife and biodiversity will be improved, and exotic grasses and other species will not be used.

8.2 Social impacts

These should also be generally positive and beneficial to the extent that village incomes are sustainably improved, income-generating activities are created and maintained, women's burdens are minimised and stable village demographic structures are realised.

9. AREAS TO BE ADDRESSED DURING IMPLEMENTATION

9.1 Areas for interventions

The FC-PCPS procedures to be followed will ultimately define the exact locations and extents of areas for the various treatments which comprise the "menu" of interventions. The areas predicated above (Table A3.4) are indicative only and will be refined as the project continues. As work proceeds MC by MC, suitable areas for inteventions will become better understood, which will allow extrapolation with some confidence to the remaining MCs.

9.2 Wage levels and other treatment costs

The labour content of most forestry interventions is high, and the selected wage rates have a severe impact on project costs. Provincial forestry staff will use contracted labors for forestry activities whenever possible, since wage rates for contracted labor, paid through the Revolving Fund Budget, are lower than for labor employed under the General Budget.

9.3 Maintenance of planted areas

Costings for most of the forestry interventions include large sums for maintenance of seedlings for several years after planting. The necessity for, and cost-effectiveness of, expenditure on these activities will be re-examined during implementation.

9.4 Mechanical land treatments

Costings for most of the forestry interventions also include large sums for terracing and ripping. Careful matching of treatments to site conditions will minimise the areas required to be mechanically treated. The proposed field research on the cost-effectiveness of these mechanical treatments should evaluate them and elucidate their environmental impacts.

TABLE A3.1: FORESTRY ACTIVITIES COMPLETED AND SCHEDULED
(without project scenario - '000 ha)

Activity	Pre'87	1987	1988	1989	1990	1991	1992	TOTAL
Soil conservation	2.74	2.73	4.54	8.23	4.62	1.83	1.40	26.09
Range improvement		1.03	1.35	1.95	0.85	1.10	0.70	6.98
Energy coppice	5.50	7.10	7.10	7.39	4.80	6.05	6.15	17.00
Energy coppice renovation		1.40	1.00	0.80	0.50	0.41	0.41	4.52
Plantation	3.02	9.55	3.60	5.90	4.87	4.05	3.93	34.92
TOTAL	8.52	19.08	14.74	18.37	11.02	11.61	11.19	94.53

Developed from replies to questionnaires by provincial authorities.

TABLE A3.2: SELECTION CRITERIA: MECHANICAL LAND PREPARATION

Hydrologic soil group	Slope (percent)	Land erodibility type		
		I	II	III
A	>30	Agroforestry tree crops	Agroforestry tree crops	Virtually no class A soils
	<30	Agricultural field crops	Range rehabilitation	
B	>30	Agroforestry tree crops	Agroforestry tree crops	Virtually no class B soils
	<30	Agricultural field crops	Range rehabilitation	
C	>30	Virtually no class C soils	Forestry terrace (SCA) or range rehabilitation	Rangeland rehabilitation
	<30	Virtually no class C soils	Forestry ripping	Rangeland rehabilitation
D	>30	Virtually no class D soils	Range rehabilitation	Protection and rangeland rehabilitation
	<30	Virtually no class D soils	Forestry ripping	as above

Hydrologic Soil Groups vary in permeability and rate of water infiltration. They range from highly permeable in Group A to virtually impermeable in Group D.

TABLE A3.3: SITE SELECTION CRITERIA

Forestry Activity	Land Erodibility Type	Hydrologic Soil Group	Slope (percent)	Soil Depth (cm)	Other Constraints
Soil conservation afforestation	2	C	30 to 70 (1) 30 to 70 (2)	>35	Environmental Economic Great Soil Group
Conifer plantations Mechanical preparation Manual preparation	 2 2	 C,D C	 <30 30 to 70 (1) 30 to 64 (2)	>35	Environmental Economic great soil group
Oak coppice rehabilitation	-	-	-		
Rangeland rehabilitation Broadcast sowing	-	-	>30	>5	
Fuelwood coppice plantations Mechanical preparation Manual preparation	 2 2	 C<D C	 <30 30-70	>35	Environmental Economic
River bank protection	-	-	-	-	Hydraulic

(1) Elazig and Malatya Provinces. (2) Adiyaman Province

Table A3.4: ESTIMATED PROJECT BASE COSTS OF INTERVENTIONS

Intervention	Cost Table	Area (ha)	Base Costs 1/ (US$) ('000)	Cost/ha 1/ (US$)
Soil Conservation Afforestation	121	10,000	8,840	884
Conifer Plantations	123	4,900	4,390	896
Oak Copppice Rehabilitation	124	17,800	9,904	556
Rangeland Rehabilitation	125	17,800	4,832	271
Gulley Rehabilitation	125	240	95	396
Fuelwood Coppice Plantations	126	11,800	8,838	749
Riverbank Protection	132	140	29	205
TOTALS		62,680	36,928	-

1/ Project costs excluding farmer contribution.

TABLE A3.5: ESTIMATED OUTPUTS

INTERVENTION	TYPE OF OUTPUT	AREA (ha)	NO. OF YEARS OR ACTUAL YEARS	OUTPUT AMOUNT	UNIT/VALUE (US$)
SCA [1/]	FODDER				
	(loss of 300kgDM/ha/yr) [2/]	10000	5	(-15 m kg)	
	increm. of 200kgDM/ha/yr	10000	55	110 m kg	
				95 m kg	0.07/kg
	FUELWOOD (terraces, gullies)				
	1 m3 at yr 10	10000	yr 10	10000 m3	
	26 m3 at yr 20	10000	yr 20	260000 m3	
	1 m3 at yr 30	10000	yr 30	10000 m3	
	40 m3 at yr 40	10000	yr 40	400000 m3	
	40 m3 at yr 60	10000	yr 60	400000 m3	
				1080000	38/m3
	BRANCHWOOD				
	0.25 m3 at yr 10	10000	yr 10	2500 m3	
	6 m3 at yr 20	10000	yr 20	60000 m3	
	0.5 m3 at yr 30	10000	yr 30	5000 m3	
	10 m3 at yr 40	10000	yr 40	100000 m3	
	10 m3 at yr 60	10000	yr 60	100000 m3	
				267500 m3	24/m3
	LEAVES, TWIGS				
	0.8 t/DM at yr 20	10000	yr 20	8000 t	
	1.28 t/DM at yr 40	10000	yr 40	12800 t	
	1.28 t/DM at yr 60	10000	yr 60	12800 t	
				33600 t	8/ton
	FUELWOOD (Oaks)				
	0.5 m3 at yr 5	4000	yr 5	2000 m3	
	5 m3 at yr 10	4000	yr 10	20000 m3	
	50 m3 at yr 20	4000	yr 20	200000 m3	

1/ Soil Conservation Afforestation

2/ Dry matter

INTERVENTION	TYPE OF OUTPUT	AREA (ha)	NO. OF YEARS OR ACTUAL YEARS	OUTPUT AMOUNT	UNIT/VALUE (US$)
	0.5 m3 at yr 25	4000	yr 25	2000 m3	
	5 m3 at yr 30	4000	yr 30	20000 m3	
	50 m3 at yr 40	4000	yr 40	200000 m3	
	0.5 m3 at yr 45	4000	yr 45	2000 m3	
	5 m3 at yr 50	4000	yr 50	20000 m3	
	50 m3 at yr 60	4000	yr 60	200000 m3	
				666000 m3	43/m3
	BRANCHWOOD (Oaks)				
	3 m3 at yr 20	4000	yr 20	12000 m3	
	0.5 m3 at yr 30	4000	yr 30	2000 m3	
	6 m3 at yr 40	4000	yr 40	24000 m3	
	0.5 m3 at yr 50	4000	yr 50	2000 m3	
	8 m3 at yr 60	4000	yr 60	32000 m3	
				72000 m3	24/m3
	LEAVES, TWIGS (Oaks)				
	1.0 t/DM at yr 20	4000	yr 20	4000 t	
	0.25 t/DM at yr 30	4000	yr 30	1000 t	
	2.0 t/DM at yr 40	4000	yr 40	8000 t	
	0.25 t/DM at yr 50	4000	yr 50	1000 t	
	2.0 t/DM at yr 60	4000	yr 60	8000 t	
				22000 t	8/ton
CON [3/]	FODDER				
	(loss of 200kg/ha/yr)	4900	75	(-94.5 m kg)	0.07 kg
	SAWLOGS				
	20 m3 at yr 45	4900	yr 45	98000 m3	
	18 m3 at yr 55	4900	yr 55	88200 m3	
	120 m3 at yr 75	4900	yr 75	588000 m3	
				774200 m3	187/m3
	PEELER LOGS				
	90 m3 at yr 55	4900	yr 55	441000 m3	
	48 m3 at yr 75	4900	yr 75	235200 m3	

3/ Conifer Plantation

INTERVENTION	TYPE OF OUTPUT	AREA (ha)	NO. OF YEARS OR ACTUAL YEARS	OUTPUT AMOUNT	UNIT/VALUE (US$)
				676200 m3	116/m3
	POLES				
	9 m3 at yr 35	4900	yr 35	44100 m3	
	10 m3 at yr 45	4900	yr 45	49000 m3	
	4 m3 at yr 55	4900	yr 55	19600 m3	
	24 m3 at yr 75	4900	yr 75	117600 m3	
				230300 m3	151/m3
	FUELWOOD				
	13 m3 at yr 34	4900	yr 35	63700 m3	
	20 m3 at yr 45	4900	yr 45	98000 m3	
	13 m3 at yr 55	4900	yr 55	63700 m3	
	48 m3 at yr 75	4900	yr 75	235200 m3	
				460600 m3	46/m3
OCR [4]/	FODDER				
	(loss of 200kgDM/ha/yr)	17800	2	(-7.1 m kg)	
	increm. of 200kgDM/ha/yr	17800	58	206 m kg	
				198.9 m kg	0.07/kg
	FUELWOOD				
	(w/o project, total over 10 year = 30 m3/ha, then 0)	17800	(by yr 10)	(-534000 m3)	
	(w/project, assume standing stock =				
	20 m3/ha, cut in yr 1	17800	yr 1	356000 m3	
	0.5 m3 at yr 5	17800	yr 5	8900 m3	
	5 m3 at yr 10	17800	yr 10	89000 m3	
	50 m3 at yr 20	17800	yr 20	890000 m3	
	0.5 m3 at yr 25	17800	yr 25	8900 m3	
	5 m3 at yr 30	17800	yr 30	89000 m3	
	50 m3 at yr 40	17800	yr 40	890000 m3	
	0.5 m3 at yr 45	17800	yr 45	8900 m3	
	5 m3 at yr 50	17800	yr 50	89000 m3	

4/ Oak Coppice Rehabilitation

INTERVENTION	TYPE OF OUTPUT	AREA (ha)	NO. OF YEARS OR ACTUAL YEARS	OUTPUT AMOUNT	UNIT/VALUE (US$)
	50 m3 at yr 60	17800	yr 60	890000 m3	
				3319700 m3	50/m3
	BRANCHWOOD				
	(w/o project, total output over 10 yrs. = 10 m3/ha, then 0)	17800	(by yr 10)	(-178000 m3)	
	(w/project, assume standing stock =				
	5 m3/ha, cut in yr 1	17800	yr 1	89000 m3	
	3 m3 at yr 20	17800	yr 20	53400 m3	
	0.5 m3 at yr 30	17800	yr 30	8900 m3	
	6 m3 at yr 40	17800	yr 40	106800 m3	
	0.5 m3 at yr 50	17800	yr 50	8900 m3	
	8 m3 at yr 60	17800	yr 60	142400 m3	
				409400 m3	35/m3
	LEAVES, TWIGS				
	(w/o project, total output over 10 yrs. = 1t DM/ha, then 0)	17800	(by yr 10)	(-17800 t)	
	(w/project, assume standing stock =				
	0.25 t DM, cut in yr 1	17800	yr 1	4450 t	
	1.0 t at yr 20	17800	yr 20	17800 t	
	0.25 t at yr 30	17800	yr 30	4450 t	
	2.0 t at yr 40	17800	yr 40	35600 t	
	0.25 t at yr 50	17800	yr 50	4450 t	
	2.0 t at yr 60	17800	yr 60	35600 t	
				102350 t	8/m3
RANGE LAND REHABILITAT.	FODDER				
	(loss of 200kgDM/ha/yr)	17800	5	(-17.8 m kg)	
	increm. of 200kgDM/ha/yr	17800	55	195.8 m kg	
				178 m kg	0.07/kg

INTERVENTION	TYPE OF OUTPUT	AREA (ha)	NO. OF YEARS OR ACTUAL YEARS	OUTPUT AMOUNT	UNIT/VALUE (US$)
	FUELWOOD				
	From gully rehabilitation, assume all branchwood				
	3 m3 at yr 20	240	yr 20	720 m3	
	3 m3 at yr 40	240	yr 40	720 m3	
	3 m3 at yr 60	240	yr 60	720 m3	
				2160 m3	38/m3
FCP 5/	FODDER				
	(loss of 200kgDM/ha/yr)	11800	2	(-4.7 m kg)	
	increm. of 200kgDM/ha/yr	11800	58	136.9 m kg	
				132.2 m kg	0.07/kg
	FUELWOOD				
	0.5 m3 at yr 5	11800	yr 5	5900 m3	
	5 m3 at yr 10	11800	yr 10	59000 m3	
	50 m3 at yr 20	11800	yr 20	590000 m3	
	0.5 m3 at yr 25	11800	yr 25	5900 m3	
	5 m3 at yr 30	11800	yr 30	59000 m3	
	40 m3 at yr 40	11800	yr 40	590000 m3	
	0.5 m3 at yr 45	11800	yr 45	5900 m3	
	5 m3 at yr 50	11800	yr 50	59000 m3	
	50 m3 at yr 60	11800	yr 60	590000 m3	
				1964700 m3	50/m3
	BRANCHWOOD				
	3 m3 at yr 20	11800	yr 20	35400 m3	
	0.5 m3 at yr 30	11800	yr 30	5900 m3	
	6 m3 at yr 40	11800	yr 40	70800 m3	
	0.5 m3 at yr 50	11800	yr 50	5900 m3	
	8 m3 at yr 60	11800	yr 60	94400 m3	
				212400 m3	35/m3
	LEAVES, TWIGS				
	1.0 t DM, cut in yr 20	11800	yr 20	11800 t	

5/ Fuelwood Coppice Plantation

INTERVENTION	TYPE OF OUTPUT	AREA (ha)	NO. OF YEARS OR ACTUAL YEARS	OUTPUT AMOUNT	UNIT/VALUE (US$)
	0.25 t at yr 30	11800	yr 30	2950 t	
	2.0 t at yr 40	11800	yr 40	23600 t	
	0.25 t at yr 50	11800	yr 50	2950 t	
	2.0 t at yr 60	11800	yr 60	23600 t	
				64900 t	8/ton
RIVER BANK PROTECTION	POPLAR Sawlogs and poles, assume				
	150 m3 at yr 15	120	yr 16	18000 m3	
	100 m3 at yr 25	120	yr 25	12000 m3	
	150 m3 at yr 40	120	yr 40	18000 m3	
	100 m3 at yr 50	120	yr 50	12000 m3	
	150 m3 at yr 65	120	yr 65	18000 m3	
	100 m3 at yr 75	120	yr 75	12000 m3	
				90000 m3	35/m3
	WILLOW AND OTHER SPECIES Assume all is fuelwood in small sizes				
	60 m3 at yr 10	20	yr 10	1200 m3	
	60 m3 at yr 20	20	yr 20	1200 m3	
	60 m3 at yr 30	20	yr 30	1200 m3	
	60 m3 at yr 40	20	yr 40	1200 m3	
	60 m3 at yr 50	20	yr 50	1200 m3	
	60 m3 at yr 60	20	yr 60	1200 m3	
	90 m3 at yr 75	20	yr 75	1200 m3	
				9000 m3	35/m3

STAFF APPRAISAL REPORT

TURKEY

EASTERN ANATOLIA WATERSHED REHABILITATION PROJECT

GUIDELINES FOR MICRO-CATCHMENT PLANNING

A. Project Area

1. Ten sub-catchments in the middle part of the Firat basin, covering an area of approximately 1.5 m ha have been identified to be in urgent need of treatment. Close to 80% of the area is strongly to severely eroded, vegetation is badly degraded, soils are shallow in many places and soil loss is very high. The main cause of this degradation is overexploitation of range and forest resources by, until recently, a rapidly expanding rural population. Of the ten sub-catchments, three are located in Adiyaman province (Goksu, Kahta, Ziyaret), three in Elazig (Baskil, Kusova, Uluova) and four in Malatya province (Kuru Cayi, Malatya, Siro Cayi, Thoma Cayi). The project would, during a seven year period, plan and initiate works in 54 (about 25%) of the 214 micro-catchments which constitute these 10 sub-catchments. The 54 micro-catchments are estimated to embrace an area of approximately 400,000 ha.

B. Objectives

2. The main objective of the project would be the attainment of sustainable systems of resource use in the upper catchments (i.e. bringing about a better balance between supply and demand for fodder and wood, controlling erosion, and enhancing income and employment) through:

(a) improved productivity of range and forest land (treasury land);

(b) promoting cultivation of fodder and wood and conversion of marginal farm lands to fodder banks to enhance production and conserve soil and moisture;

(c) selected supporting activities designed to increase income and facilitate the adoption of treatments of range and forest lands;

(d) increased responsibility and involvement for local communities in planning and management of their resources.

3. Although the rationale for the project is the need to halt degradation of natural resources, the realization of tangible and immediate benefits for the farm families in the project area is of vital importance for

adoption of treatments and for subsequent protection and maintenance of investments.

4. As project resources only suffice to treat a fraction of the identified needs in the project area (para 1) and degradation of natural resources is a major problem also in other parts of Turkey, the replicability i.e. the cost effectiveness of the treatments will be a major concern. Priority should be given to degraded lands which will give an adequate return to investments. Where there is a choice between more or less expensive but still viable treatments, a judgement about the return per dollar spent should guide the choice.

5. Treating degradation frequently involves changing the ways people manage the land resource. The communal use of rangelands offers a particular challenge. Micro-catchment development must be seen as a process of gradual improvement. People may not accept improved management on the total range area, and even if they do it may be advisable to test the capacity and the commitment of the village on part of the area. The interaction with people thus often dictates phasing of activities and looking at the development efforts as the start of a more continuous process. One of the principal tasks of the technical experts in watershed management and participatory planning to be recruited will be to guide the MC planning and implementation process and provide on-site training to staff.

C. Selection of Micro-catchments

6. The Provincial Forestry Department would (in consultation with other agencies) be responsible for the selection of MCs and those with a larger proportion of range and forest land would be given priority. The criteria for selection of MCs include judgements about:

- the severity of problems in terms of vegetative degradation and soil erosion including the imbalance between the supply and demand for fodder and wood;
- the prospects for achieving an adequate return to the treatments offered under the project; and
- the extent to which the problems are recognized by the MC population and there is a willingness to explore solutions.

7. The selection process thus involves assembling and analyzing available information about population, livestock and land use etc, observing conditions in the area, and an initial presentation of project objectives and interaction about problems of natural resource degradation in MC villages. This assessment of potential interests would have to be based on discussions with the Muhtar, Council of Elders and individuals in each MC village.

8. The project envisages initiating work in total, over a six year period, in 18 MCs in each province. To facilitate implementation, it would be

advisable to concentrate the selection of the three MCs in any given year in one sub-catchment (see para 1).

D. The Treatment Menu

9. The interventions (treatments) that can be funded under the project are summarized in Annex 5. This menu is a basic tool in the MC planning process and the provincial planning team will determine on technical, economic and institutional grounds which treatments are applicable to the situation in a particular MC. These remaining treatments would need to be explained to the MC population in the course of the problem solving discussions (see below). More detailed descriptions of each treatment are included in Annexes 1-3. The provincial MC Planning Team cannot by itself add to or change these treatments but can make suggestions to the Project Coordination Unit. The menu would be revised annually in the right of experience with project implementation.

10. The cost sharing arrangements between the government and the beneficiaries during the establishment (investment) phase are also indicated for each treatment in Annex 5 and will be explained to the villagers in the course of selecting priority treatments during the problem solving discussions. The subsequent recurring costs of operation, maintenance and management are generally the responsibility of the farmers concerned.

11. The benefits of the different treatments generally accrue to the person(s) adopting the intervention in question. In the case of the forest treatments, they are, however, shared with the government in the way described in Annex 5, Attachment 1. The aim should be to establish a partnership between the forestry department and the village in question, in which such benefits are matched by village contributions, for example to protection or thinning etc.

12. The adoption of supporting treatments such as irrigation development (ponds, terraces) and rainfed terraces in combination with orchards, grapevines, almond, pistachio, beekeeping and agro forestry must be dependent on village agreement to range management practices and forest treatments (the village should, however, be free to choose among these forest treatments). At most, one third of the total MC cost should be devoted to such supporting treatments.

E. The Preparation of Indicative MC Plan

13. The officers responsible for project implementation in the three provincial departments (Agriculture, Forestry and Rural Services) will each appoint one or more members to the MC Planning Team. The member from the Provincial Forestry Department would be the team leader. Their staff in turn would nominate staff to form a MC group for each particular microcatchment. Subject matter specialists as required and local field staff (Agricultural and Forest Engineer) where available, should form the group. The PDAS have undertaken to nominate one agricultural engineer for each microcatchment. In view of the joint objectives and links between different types of treatments, it is of crucial importance to ensure that the planning becomes a joint effort (as opposed to three parallel efforts). Following selection of the MC, the following

steps in the preparation of the Indicative MC Plan may be distinguished and will be discussed below. A rough indication of time required is given.

(a)	Assemble relevant data	2 weeks
(b)	Village discussion of problems and constraints	1 week
(c)	Rapid Resource Appraisal	1 week
(d)	Village discussion of solutions and priorities	1 week
(e)	Preparation of draft village plans	1 week
(f)	Discussion of draft village plans	1 week
(g)	Finalization of indicative MC plan	1 week
(h)	Approval of indicative MC plan	

14. Present operational procedures obviously include discussion with villagers. These discussions frequently take the form of obtaining village consent to plans drawn up by respective departments. This project, however, aims at not only involvement in approval of plans but active village participation in the formulation and implementation of these plans. Such participation would ensure that the interventions respond to the perceived local needs and priorities and that a genuine commitment to and responsibility for the success of the project is generated. The method used to achieve such participation is the Farmer Centered - Problem Census Problem Solving (FC-PCPS) approach described below. The village is the management unit for rangelands and for resource sharing arrangements with respect to forest lands. The building blocks of the Indicative MC Plan are the village plans formulated through close interaction over problems and solutions (chosen from the treatment menu) in each of the MC villages. The MC boundaries may have to be adjusted to avoid dividing a village and thereby complicating data collection and interaction. Highland pasture areas (yayla) outside the MC cannot be included in the treatment proposals but need to be considered when calculating fodder supply. The time required to prepare the Indicative MC Plan will, to a large extent, depend on the number of villages embraced by the MC but an average estimate of 8 weeks is given above.

15. Assemble relevant data. In preparation for village discussion, the planning group would mobilize available information and survey conditions in the MC villages. An indication of the required information and analysis is provided in Attachment 1.

16. Problem census meetings. Armed with the relevant data and analysis a problem census meeting would be arranged in each MC village in consultation with the Muhtar. Problem census meetings involve all villagers with livestock, land or other agricultural activities. Men and women participants record their individual problems and form small groups to discuss and prioritize these problems. Each small group then reports its prioritized list of problems to the village group in a plenary session which determines and prioritizes a list of problems for the village as a whole. No problem is excluded at this stage. The process is structured and non threatening. Importantly, it initiates the relation between village participants and the provincial planning team by listening to villagers. Once the village group has identified and prioritized problems, the treatment menu suitably adjusted to MC conditions (para 9) is presented to them and the objectives of the project explained. The linkage

between project activities and priority problems are explored and appointments made for problem solving discussions.

17. Rapid resource appraisal. Problem solving activities are initiated with a field assessment of village resources. The appraisal is an attempt to observe resource problems and discuss solutions in the field through a combined effort by the provincial planning team and village participants. Using copies of a 1:25000 topographical map important landscape features are recorded and areas which do not respond to treatment (e.g. areas with unstable geology), which do not need treatment (areas with sustainable production systems) and areas which have already been treated are identified. In remaining areas the main land use features (forest, range and farm land) are noted and problems of degradation and erosion are observed and discussed (livestock trends, fodder and fuelwood shortages, cultivation practices). Having identified target areas it will be important to clarify the users/owners of these areas (e.g. users of range and forest land, owners of marginal crop land, farmers who could benefit from conservation practices). Field appraisal offers an opportunity to explore solutions with such target groups and to explain to participants the linkages between priority problems and possible project treatments. Problems of declining water supply may for example be remedied by efforts to improve vegetation and infiltration. Marginal land may be released from crop production if the owner can enhance productivity elsewhere. Range degradation may be reversed if the stall feeding season can be prolonged through project activities to enhance cultivated forage production. The target areas and groups would be recorded on field maps as a basis for further discussion of solutions.

18. Village discussions of solutions and treatment priorities. On the basis of the outcome of the problem census and the rapid resource appraisal and having given the village a chance to consider the treatment menu the next step in the interaction would be:

(a) Discussion of fodder situation (objectives - subsistence or sale - and trends in livestock keeping; constraints in the form of scarcity of labor and fodder; investments in livestock if fodder constraints were removed; sources of winter fodder and opportunities to enhance availability; range management);

(b) Discussion of fuel wood situation (different sources of energy; quantities used; sale of wood; decreasing inventory);

(c) Agreement on range and forest areas needing treatment; excluding areas which are beyond repair and those that appear to be in relatively good shape or which have already been treated;

(d) Selection of treatment options for selected range and forest areas with due consideration to the needs for fodder and wood;

(e) Discussion of management practices for the selected range and forest areas, the benefit sharing arrangements for forest treatments and phasing of interventions;

(f) Discussion of treatments to promote fodder and wood production on farm land (irrigation, fallow reduction and agro forestry);

(g) Discussion of treatments to transfer marginal farm land to perennial forage production;

(h) Discussion of supporting activities (beekeeping, horticulture in combination with irrigation and rainfed terraces) and how they can be used to facilitate for target groups (range and forest land users, owners of marginal land, etc.) to accept key treatments;

(i) Agreement on a program of demonstrations and pilot work.

19. It should be made clear to the villagers that they will need to choose among treatments to meet their priorities. The resources available under the project for the 54 MCs amount for an average MC of 7,000 ha to US$1.5 million. If more is spent in a particular area, it means either that less will be spent in another MC or that the total project area will be reduced. The latter option would be unfortunate in view of the widespread nature of the degradation problems and the need to find cost effective and replicable solutions (para 4). Viewing watershed development as a continuous process, there is considerable scope to make a good start within this indicative cost frame by varying the area treated, the phasing and selection of treatments. The supporting treatments (irrigation, rainfed terraces, horticulture, beekeeping, trees on field boundaries, etc.) would be linked to the adoption of treatments of the range and forest lands and would be subject to a ceiling of 33% of total treatment cost (para 12).

20. Preparation of draft village plan. Guided by the problem solving discussions (paras 18-19), the MC planning team would prepare the village treatment plan showing the recipients, volumes, phasing and location (map) of different treatments. The phasing of the works may be spread over at most a five year period. Applying the unit costs indicated in the treatment menu the total and average per hectare cost can be calculated (cost would be updated on a annual basis) and the responsibilities of the three implementing agencies determined. The responsibilities of the village and its individual members in terms of management practices and cost sharing should be indicated. A check should be made to ensure that the average cost of supporting treatments per village household does not deviate too much from one village or MC to another.

21. Discussion of draft village plan. The draft will be presented to and reviewed in the village as the frame for the collaboration during the following five years (detailed work plans would be prepared each year in the light of progress and experience - see below). Amendments would be made where necessary and the village should be asked to indicate its agreement by the signatures of the Muhtar and the Council of Elders (range and forest land) and the individual recipients of treatments.

22. Finalization of Indicative MC Plan. An outline of this report is provided in Attachment 2. The report would summarize the results of the

interactive planning process described in the preceding paragraphs and would thus contain sections provided the general characteristics of the MC, the results of the problems census discussions, the rapid resource appraisal and the problem solving discussions as well as a summary of the agreed treatments. The report would provide an aggregation of the village plans and would give the framework within which the three departments would operate. It would also given an indication of the size and phasing of the work of each agency.

23. Approval of Indicative MC Plan. The MC planning team would submit the Indicative Plan via the Provincial Steering Committee to the Project Coordination and Support Unit (PCSU) in Ankara, which would be responsible for quality control (responsiveness to guidelines, completeness and depth of analysis, adequacy of proposed treatments and cost implications) and for approval of the Plan. The approved plan would be submitted to the members of the National Steering Committee for information.

F. Preparation of Annual Work Plans and Budgets

24. The Indicative MC Plan would be elaborated to provide the work program and budget for the first year of implementation. In subsequent years, it would be necessary to review progress made and experience gained as well as possible results from pilot work and demonstrations and the provincial MC planning team would need to interact and agree with the MC villages on the appropriate modifications to the original Indicative Plan. The activities would need to be planned in detail and village workplans and budget requirements would be aggregated for the MC and broken down by Agency. These annual plans and budgets would be reviewed by the Provincial Steering Committee and forwarded to the Project Coordination Unit in Ankara. The provincial budget requirements for each agency would be the sum of the MCs under active implementation and would need to be checked against the availability of funds. This may result in a need for further village consultations and modifications of the MC annual work programs and budgets or alternatively in reallocation of funds between agencies if the National Steering Committee so decides. The Provincial budget request is forwarded by each agency through normal channels. The annual budget process would need to begin in June and requests submitted in August.

G. Implementation

25. The Indicative MC Plan and subsequent annual work programs and budgets would define the role of each agency which would proceed with procurement of necessary equipment and materials (generally through PCSU), assignment of staff, mobilization of machinery services, arrangements for training of staff and villagers (with help from PCSU), and interaction on detailed implementation schedules and the organization of the village contribution to the treatments in question. The agencies are being strengthened under the project to fulfill their planning and implementation tasks.

H. Monitoring and Reporting

26. Leading on from initial FC-PCPS, which will have generated a substantial volume of basic data concerning the MC and the village, a continuous process of monitoring and management information systems will be established. Regular meetings with the village leaders will monitor the progress towards physical and participatory objectives determined during the planning process. A database will be assembled, geared towards measuring progress and assisting future planning. To assist further in the monitoring project impact, selected villagers participating in the project would be asked to maintain their own records through a new system of auto recording introduced by the Provincial Directorate of Agriculture (PDA) with the help of short term TA. Records would include:

- yields, agronomic practices and weather observations;
- livestock management practices;
- water yields from springs; and

Results should be regularly reported by the PDA to the monitoring unit in the Provincial Forestry Directorate. Quarterly summaries would be submitted to the PCSU Ankara, as part of the management information systems. An annual report would be prepared by October each year to assist future planning and implementation.

27. Each provincial agency would monitor physical works and investment costs in each MC against the Indicative MC Plan and against subsequent modifications of this plan introduced during the annual budgeting process. A report providing and commenting upon this information would be submitted quarterly to the provincial monitoring unit with the village-level observations.

28. Each agency would provide a simple quarterly summary of demonstrations, pilot work and adaptive research in the province to the provincial monitoring unit. By November each year they would produce an annual report and suggest possible amendments to the treatment menu and project implementation procedures.

29. The monitoring unit in Provincial Forestry Directorate would maintain the database of information assembled in connection with the original planning as well as information generated subsequently (e.g. through observation, dialogue and the auto recording effort). The monitoring unit would aggregate the information received from the implementing agencies and produce an annual progress report to be submitted to the Project Coordination Services Unit in Ankara through the Provincial Steering Committee by December each year.

30. The PCSU would aggregate the reports from the three provinces and produce a annual progress report for the project as a whole by January each year to be submitted to the National Steering Committee and subsequently to the World Bank.

31. The Regional Research Institutes of Elazig (Forestry), Diyarbakir and Erzerum (Agriculture) and Sanliurfa (Rural Services) would be contracted, if necessary, to monitor the adoption of treatments (technical execution of treatments, the yields, vegetative composition and density in rangelands with and without the different treatments, input use, the effectiveness of protection and management of forest and rangelands, external factors influencing the outcome (e.g. weather, fire, disease, etc.)) for one MC in each of the three provinces. Results should be reported by October each year to the provincial monitoring unit and incorporated in the annual report.

ANNEX 4
Attachment 1

DATA FOR MC PLANNING

A. GENERAL INFORMATION

Topographic map 1:25 000
Soil erosion hazard map 1:1 000 000 (KHGM)
Geological map 1:500 000 (KHGM)
Soil map 1:100 000 (KHGM)
Land use capability map 1:100 000 (KHGM)
Climatic data (PDA)
Agricultural calendar (PDA)
Rainfall erosivity map and tables (KHGM)

B. VILLAGE INFORMATION

Map indicating MC and village boundaries
Population data and trends (employment outside the MC)
Livestock data and trends
Land use (forest, range and farm lands) - area and map
Crop production (rainfed, irrigated) - area and yields
Characteristics of forest lands - vegetation and yields
Characteristics of range lands - vegetation and yields
Highland pastures outside MC - area and yields
Irrigation, Sources - wells, springs/ponds etc. - potential for further development
Livestock production and marketing
Erosion problems (areas threatened, cultivation of marginal lands etc.)
Assessment of fuelwood demand and supply
Assessment of winter fodder demand and supply
Assessment of grazing demand and supply

ANNEX 4
Attachment 2

MC INDICATIVE PLAN - OUTLINE

1. Introduction

2. Basis for selection

3. MC characteristics

   3.1 Physical resources
   3.2 Land use and crop production
   3.3 Human resources
   3.4 Livestock resources
   3.5 Summary table

4. Project Framework (treatment menu adapted to MC conditions)

5. Problem census

6. Rapid resource appraisal

7. Problem analysis and solutions

   7.1 Analysis of key problems in utilization of natural resources
   7.2 Linkages between priority problems and project framework
   7.3 Selection of treatments
   7.4 Linkages between key treatment and supporting activities
   7.5 Management of range and forest land

8. Indicative plan for villages and MC as a whole

9. Summary of forest activities

10. Summary of agricultural activities

11. Summary of village affairs activities

TREATMENT MENU AND COST SHARING

Treatment	Cost Table	Unit	Investment Unit Cost Total Cost $	Project Cost $	Farmer Share 1/ %	Volume	Expected Investment Balance for Average MC $ 000
1. Forest Land (MoF)							825 (55%)
Soil Cons/Affo	121 2/	ha	884	884	0	10000	
Conifer Plant.	123	ha	896	896	0	4900	
Oak Coppice	124	ha	556	556	0	17800	
Range Rehab.	125 2/	ha	271	271	0	17800	
Fuelwood Coppi.	126	ha	749	749	0	11800	
Riverbank Prot.	132	ha	410	205	50	70	
2. Range Land (TEDGEM/TUGEM)							120 (8%)
Range Management	128	ha	10	10	0	58650	
R.M.+fertiliza.	127	ha	73	55	25	30500	
R.M.+fert.+seed	128	ha	132	111	16	20000	
Pilot aer. fert	160	ha	63	63	0	5000	
P.aer.fert+seed	160	ha	123	123	0	2000	
Demonstrations	162	ha	300 3/	200	33	162	
3. Arable Land (TEDGEM/TUGEM)							75 (5%)
Agronomic pack.	129	ha	100	78	20	11667	
Fal.Red.+For.pr.	130	ha	120	95	20	25960	
Demonstrations	162	ha	300 3/	200	33	540	
4. Supporting Activities (TEDGEM/TUGEM) 4/							105 (7%)
Rainf.hort+cons	149	ha	373	179	52	1124	
Irrig.hort+cons	149	ha	460	51	89	2574	
Gully horticult	144	ha	397	240	40	3246	
Trees field bou.	151	km	297	101	66	580	
Irrig. forage	149	ha	206	50	76	7898	
Pist.graft+est.	151	ha	50	40	20	3000	
Beekeeping 5/	142	unit	2256	1128	50	1620	
5. Supporting Activities (KHGM) 4/							375 (25%)
Small irrig.	131	ha	1622	1407	13	10530	
Rainfed terrac.	133	ha	410	390	5	5616	
						Total	1500 (100%)

1/ Farmer contribution to investment usually includes management of range land the cost of which we have been unable to estimate, labor and in the case of horticulture cultivation and fertilizer. The responsibility for subsequent follow-up including operation and maintenance rest with the farmers except for forest treatment for which farmers only contribute some protection.

2/ Includes gully revegetation in forest lands.

3/ The cost of demonstrations only include material and farmer contribution of labor. The extension incremental recurring costs of approx. a further $200 per demonstration is included in cost table 112.

4/ The sum of supporting activities TEDGEM/TUGEM and KHGM should not exceed 33% of the total investment cost for the MC. A check should also be made to ensure that the average cost of supporting treatments per village household does not deviate too much from one village or MC to another.

5/ A unit includes 20 hives. Credit from Orköy or some other source may be available to cover 75% ($846) of the farmer contribution.

BENEFIT SHARING IN FORESTRY TREATMENTS

1. Soil Conservation Afforestation

Fodder:	After 5 years open to cut and carry management or grazing (depending on circumstances). 100% to people.
Fuelwood:	First thinning (year 10) - 100% to people Subsequently: People receive 50% of harvest at 25% of market price.
Branchwood:	100% to people.
Leaves/Twigs:	100% to people.

2. Conifer Plantation

Sawlogs:	People receive 20% of output at 40% of market price
Peeler logs:	People receive 20% of output at 40% of market price
Poles:	100% Government
Fuelwood:	100% Government

3. Oak Coppice Rehabilitation 50-70%

Fodder:	After 2 years - cut and carry management After 7 years - grazing 100% people
Fuelwood:	First thinning (year 10) - 100% people Otherwise: People receive 50% of output at 25% of market price.
Branchwood:	100% people
Leaves/Twigs:	100% people

4. Range Rehabilitation

Fodder:	After 5 years cut and carry management or grazing depending on circumstances - 100% people

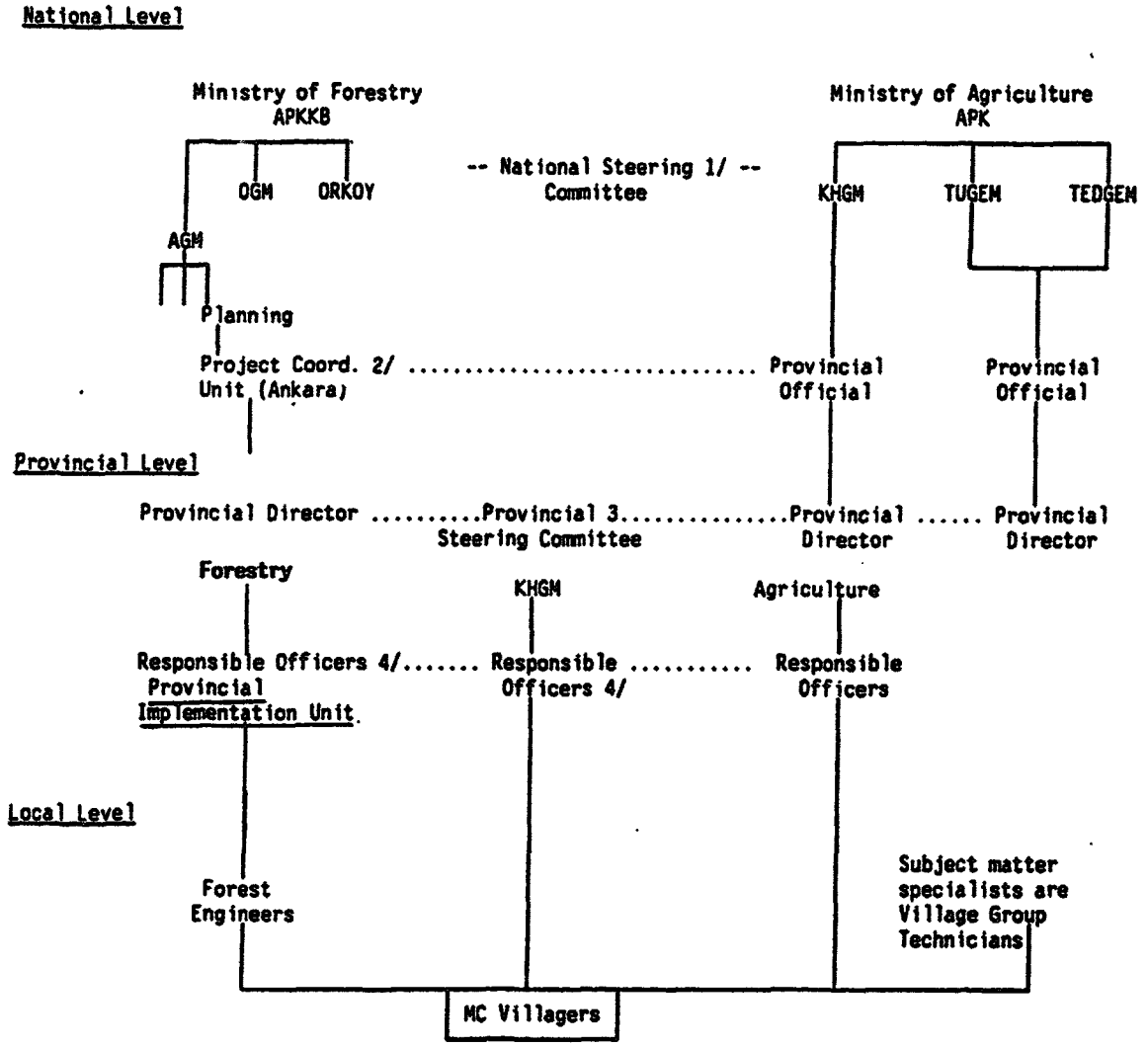
5. Riverbank Protection

Model 1:	Main stream - Government provides free seedlings only - people get 70% of the benefits.
Model 2:	Small stream - Government pays total cost - people get 50% of benefits.

ANNEX 6
Figure 1

EASTERN ANATOLIA WATERSHED REHABILITATION PROJECT

ORGANIZATION CHART



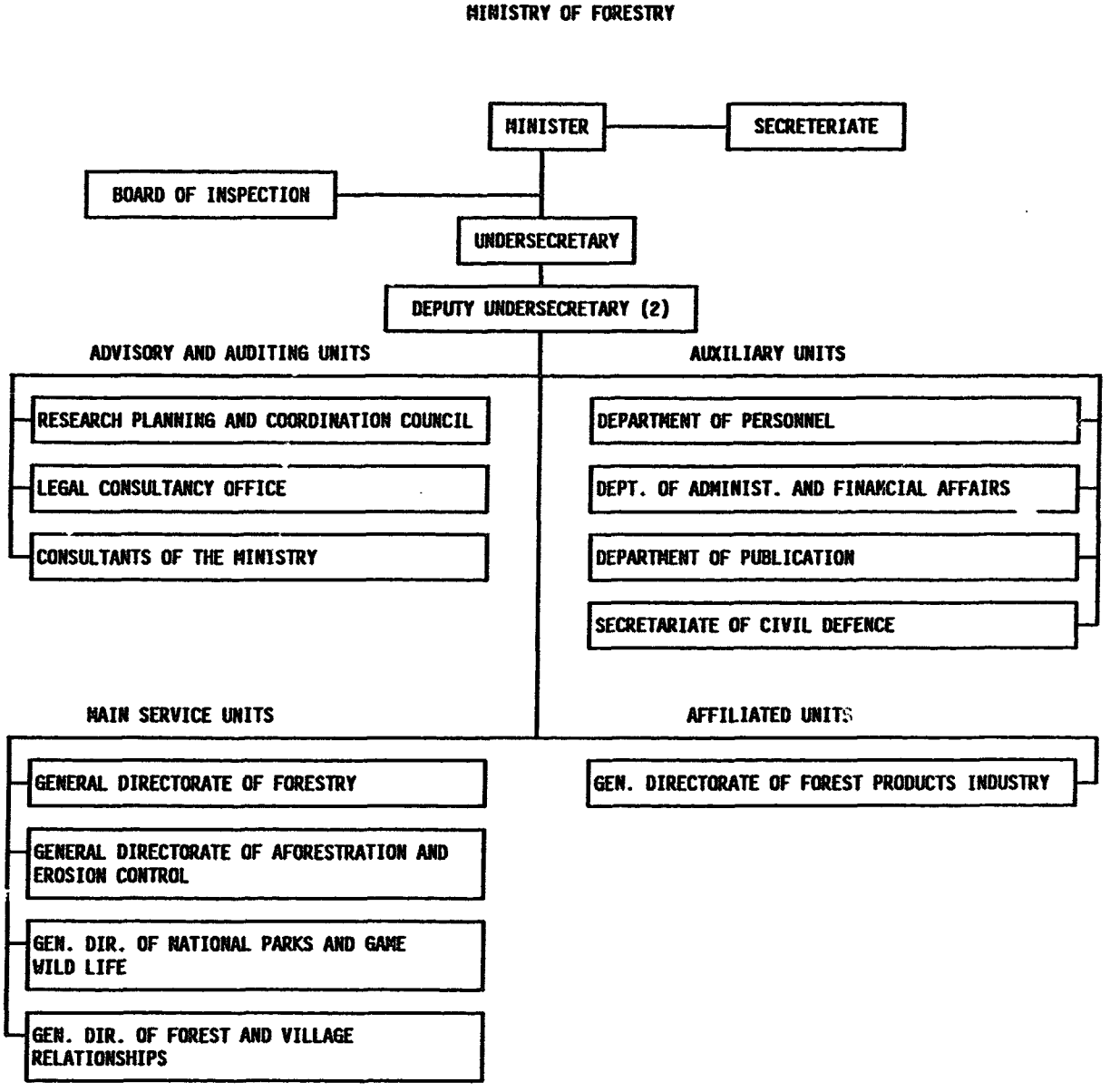
1/ Budget Reallocations, Annual Progress Report, Review Sample of MC Indicative Plans.

2/ Review and approval of the MC Plans/Budget reallocations, Training, Procurement, Monitoring, Preparation of Annual Progress Report

3/ Review of Indicative MC Plans, Annual MC Workplans and Budget, Annual Provincial Progrsss Reports. Key meetings would be chaired by the Deputy Director.

4/ Preparation of Indicative MC Plans; Anuual MC Work Plans and Budgets.

ANNEX 6
Figure 2



STAFF APPRAISAL REPORT

TURKEY

EASTERN ANATOLIA WATERSHED REHABILITATION PROJECT

MONITORING MIS AND EVALUATION

1. Arrangements for the monitoring and evaluation component would be coordinated by the Project Coordination Support Unit (PCSU) which has been set up in the Ministry of Forestry based in Ankara. PCSU will rely on provincial staff to fulfill the monitoring, MIS and evaluation program, supported by contracting external bodies (e.g. TKV) to undertake special studies as required.

2. The objectives of the exercise would be, firstly to act as a Management Information System (MIS), secondly to document the project in such a way that, should it be replicated in some form in the future, information will be available to improve the planning process; thirdly, it would monitor and attempt to explain the response (adoption rates) of the villages and participants in the project micro catchments; finally, the impact of the project would be measured in terms of the improvements in resource management, yields and income changes resulting from the adoption of the various treatments on offer. At the same time data would be collected for treatments to establish whether they should continue to be included (or modified) in the menu on offer (e.g. pistachio grafting, beehives, woodlots). At all stages, the results of applied research programs also would be closely monitored to see whether the menu should be modified. Detailed data as out migration and other socio-economic indicators such as work patterns, education, health and nutrition would be examined through a series of ad-hoc surveys contracted to outside bodies. The measurement of secondary benefits in terms of run off, soil loss, stream flows and sediment discharge is beyond the scope of the project at this stage.

Actions by the Project Coordination and Support Unit (MOF)

3. Technical assistance would be recruited at an early stage to provide support to the unit: a total of 12 man-months short term input is envisaged over the life of the project. The Project Coordinator would be supported in the work of M&E by existing staff who would be trained in the use of computers for database operation and MIS procedures. A general framework would be drawn up at the PCSU for discussion at provincial level to determine the most appropriate systems to be adopted along with the range of data to be collected. Emphasis would be given to the coordination of data collection between the various agencies and provinces involved in project implementation and individual responsibilities carefully specified. A program of activities would be drawn up together with review and reporting procedures. This program would include regular field visits by the Project Coordinator to provide support and direction to the provincial staff. The Central Unit would be responsible for the collation of information supplied by the Provincial Implementation Units (PUBS) and for the presentation of an annual report with commentary. The PCSU would be responsible for contracting outside institutes or consultants to implement specific requirements of the M&E Program. Specifically, studies would likely be required

prior to the Project Implementation Review and thereafter for ad hoc surveys into specific issues. Towards the end of the project surveys may be necessary in anticipation of a further project phase.

Actions by the Provincial Implementation Units (PUBS)

4. The basis for monitoring by the PUB would be the outline annual work program and budget for each micro catchment against which progress would be measured and appropriate revisions made for future plans.

(a) PUBS would maintain a data bank of information assembled in connection with all micro catchment planning - both those included and those opting out of the project. The data collected would include characteristics of the community as a whole plus data on individuals compiled through auto-recording procedures discussed below;

(b) PUBS would monitor the progress: institutional development (staffing levels and training), MC planning, physical works, investment expenditure per MC and per treatment (inputs and outputs). Simple reports (Activity Monitoring Schedules) would be compiled quarterly to provide management information both to provincial and central management;

(c) PUBS would identify additional data required to improve project planning and implementation and agree with the PCSU how best to plug these gaps. Surveys would be arranged to cover such aspects as attitudes and aspirations, technical constraints, prices and marketing and other issues found to be important for smooth project planning, implementation and impact analysis. These surveys would be contracted to local consultants or institutes who would report to the PUB and PCSU;

(d) PUBS would provide an annual summary of demonstrations, pilot work and adaptive research in the Province and suggest possible amendments to their treatment menu and procedures for implementation;

(e) PUBS would produce a short annual progress report according to a format agreed with the Central Unit to be submitted to the PCSU on which would be based the next year's program.

The Projects and Statistics Unit at each PDA would be responsible for gathering field data to contribute to the MIS. Methodology and content would be coordinated by the PCSU in consultation with the PUBs with advice from the short-term TA.

Actions by the beneficiaries

5. To complement the participatory approach to planning in the MCs, the beneficiaries would be requested to maintain simple records of their activities - auto-recording. This system would be piloted with the help of the short term TA and thereafter introduced throughout the project. Support would be given to the

selected villagers participating in the scheme, in the early stages, by the staff from the provincial Projects and Statistics Units of the Ministry of Agriculture who would collect regularly, verify and analyze the data. Records to be maintained would include:

(a) agronomic practices, yields, weather observations
(b) livestock management and production
(c) labor utilization (on and off farm)
(d) other income generating activities

The continuous auto recording of data would be amplified by periodic surveys of a sample of beneficiaries to collect additional information as requested by management e.g. impact of the project on women, use of veterinary services, use of hired equipment and labor, technical knowledge versus practice.

Support by the Regional Research Institutes

6. The Regional Research Institutes would, as part of their adaptive research tasks, monitor the adoption of treatments and factors constraining adoption of the technical packages. They would respond to a detailed work program set out for them by the project. Comparative data would be collected to assess the impact at field level of the various treatments, catering for the with and without project situation (i.e. data collection from non-participating MCs). Of particular interest would be the social and economic data which affect the response of the community and individuals to the project. Details would be collected to help verify and complement the auto recorded data. The Forestry Institute would have special responsibility for the examination of the effectiveness of forestry treatments in terms of rehabilitation, protection and resource reclamation. Methods used would include the study of vegetation using aerial photographs and ground truthing. Data to be collected would include species counts, growth rates, vegetative regeneration and yields, forest and range management (self policing/cost sharing), and other external factors affecting the outcome of the project. Plans would specify reporting requirements and in particular those for the MTR and PCR.

7. Pricing and marketing data. Little is documented of the pricing and marketing mechanisms of farm level for both inputs and outputs. There is an efficient mix of private sector middlemen, cooperatives and direct trading activity and a better understanding of this sector could assist project planning. Management may decide that more information in this area would promote better decision making at village level. Certainly, accurate price data is needed for the evaluation of project impact. M&E activities by the Projects and Statistics Unit would therefore include the recording of prices at the various stages of the marketing chain for the various outputs. This data would be augmented by studies to collect more detailed information as determined by project management. Money has been budgeted under the project to undertake these studies.

STAFF APPRAISAL REPORT

TURKEY

EASTERN ANATOLIA WATERSHED REHABILITATION PROJECT

PROJECT COST ESTIMATES AND DISBURSEMENT PROFILE

A. Summary Tables

B. Detailed Cost Tables

ESTIMATED DISBURSEMENT SCHEDULE (US$ MILLIONS)

A. EASTERN ANATOLIA WATERSHED REHABILITATION PROJECT

IBRD FY &	Quarter	IBRD Disbursements	Cumulative Disbursements	% of Loan Disbursed
FY93	-4	0.75	0.75	1%
FY94	-1	2.4	3.1	4%
	-2	3.1	6.2	8%
	-3	3.1	9.4	12%
	-4	3.1	12.5	16%
FY95	-1	3.4	15.8	21%
	-2	3.4	19.2	25%
	-3	3.4	22.6	29%
	-4	3.4	25.9	34%
F 96	-1	2.8	28.7	37%
	-2	2.8	31.5	41%
	-3	2.8	34.3	45%
	-4	2.8	37.1	48%
FY97	-1	3.4	40.5	53%
	-2	3.4	43.9	57%
	-3	3.4	47.3	61%
	-4	3.4	50.7	66%
FY98	-1	3.6	54.2	70%
	-2	3.6	57.8	75%
	-3	3.6	61.4	80%
	-4	3.6	64.9	84%
FY99	-1	2.4	67.3	87%
	-2	2.4	69.6	90%
	-3	2.4	72.0	94%
	-4	2.4	74.3	97%
FY2000	-1	0.7	75.1	98%
	-2	0.6	75.7	98%
	-3	0.6	76.3	99%
	-4	0.6	77.0	100%

B. IN-SITU GENE CONSERVATION PROJECT
GET DISBURSEMENTS

	FY93	FY94	FY95	FY96	FY97
Annual	0.2	3.1	1.0	0.6	0.2
Cummulative	0.2	3.3	4.3	4.9	5.1
% of Grant Disbursed	4%	65%	85%	96%	100%

Note: Detailed cost tables and a detailed disbursement profile of the In-Situ Conservation Subproject are provided in the Technical Annex.

Turkey
Watershed Rehabilitation Project

Price Contingency and Exchange Rate Assumptions

	1993	1994	1995	1996	1997	1998	1999
Local	66%	41%	24%	18%	13%	11%	11%
Foreign	3.8%	1.9%	2.7%	3.4%	3.6%	3.6%	3.6%

Turkey
Watershed Rehabilitation Project
Eastern Anatolia
Projects Components by Year

Totals Including Contingencies
US$000

	1993	1994	1995	1996	1997	1998	1999	Total
A. Strengthn'g Agency Capcty								
1. Planning and Management	1640	1164	1149	1124	707	764	412	6961
B. Watershed Rehabilitation								
1. Cropland Soil Moist. Cons	115	178	184	255	264	137	0	1134
2. Cropland Fallow Reduction	302	470	485	669	693	462	0	3081
3. Range-Meadowland Enrichmt	78	135	249	353	421	485	480	2201
4. Rangeland Rehab,Tedm/Tugm	225	428	483	690	793	623	369	3610
5. Fuelwood Coppice Plantn.	860	1590	1796	2336	2557	1654	412	11205
6. Oak Coppice Rehabilitat'n	943	1724	1960	2547	2804	1887	718	12583
7. Soil Cons. Afforestation	990	1660	1790	2352	2515	1580	232	11119
8. Conifer Plantations	430	760	851	1161	1290	846	234	5572
9. Rangeland Rehab., MOF	523	861	950	1277	1369	891	223	6093
10. River Bank Planting	5	5	8	8	5	6	0	36
11. Strength. Field Services	7134	4948	1342	1026	942	614	511	16516
Sub-Total	11607	12757	10097	12674	13653	9184	3178	73150
C. Supporting Activities								
1. Small Scale Irrigation	1929	3068	3207	4388	4596	2543	151	19882
2. Rainfed Terraces	276	428	442	609	631	327	0	2714
3. Apiculture	0	484	752	779	1078	1119	601	4814
4. Horticulture	59	89	156	237	344	317	53	1254
Sub-Total	2263	4070	4557	6013	6649	4306	805	28663
D. Applied Research								
1. Forestry Research	18	1	2	1	0	0	0	23
2. Range & Agric Research	14	200	210	104	229	188	47	992
Sub-Total	32	201	212	105	229	188	47	1016
Total PROJECTS COSTS	15543	18193	16015	19916	21239	14441	4442	109790

Values Scaled by 1000.0 14/12/1992 10:24

Turkey
Watershed Rehabilitation Project
Eastern Anatolia
Summary Accounts by Year

Totals Including Contingencies
US$000

	1993	1994	1995	1996	1997	1998	1999	Total
I. INVESTMENT COSTS								
A. Civil Works	2852	4456	4468	6053	6309	3351	81	27570
B. Plant, Equipment	4824	3906	1123	1184	1197	1190	601	14025
C. Materials	1872	3299	3628	4722	5105	3262	406	22294
D. Vehicles	2025	899	441	468	524	363	259	4979
E. Training	631	699	727	515	400	254	19	3244
F. Technical Assistant	368	675	545	422	283	267	179	2739
G. Labour	2005	3681	4233	5548	6144	4292	1393	27296
H. Project Prepara. Facility	750	0	0	0	0	0	0	750
Total INVESTMENT COSTS	15327	17615	15164	18911	19962	12980	2938	102897
II. RECURRENT COSTS								
A. Incremental Staff Costs	0	0	0	0	0	0	0	0
B. Other Increm. Oper. Costs	216	578	851	1004	1277	1462	1504	6893
Total RECURRENT COSTS	216	578	851	1004	1277	1462	1504	6893
Total PROJECT COSTS	15543	18193	16015	19916	21239	14441	4442	109790

Values Scaled by 1000.0 14/12/1992 10:23

Turkey
Watershed Rehabilitation Project
Eastern Anatolia
Financing Plan by Disbursement Category
US$000

	The World Bank		Government		Total		For. Exch.	Local (Excl. Taxes)	Duties & Tax.
	Amount	%	Amount	%	Amount	%			
A. Civil Works	34173	60	23065	40	57237	52	12452	34028	10758
B. Goods	30152	88	3961	12	34113	31	14844	16342	2927
C. Training & Tech. Assist.	5983	100	0	0	5983	5	4099	1769	115
D. Project Prepara.	750	100	0	0	750	1	617	132	0
E. Other Increm. Oper.	3446	50	3446	50	6893	6	3031	3370	492
F. Apiculture development	2407	50	2407	50	4814	4	953	3259	602
Total Disbursement	76910	70	32879	30	109790	100	35996	58901	14893

Values Scaled by 1000.0 29/1/1993 11:16

Note: During negotiations it was agreed that (a) total World Bank financing would be increased to US$77 million, and (b) a disbursement category "unallocated" would be established amounting to US$3.25 million; the latter amount is obtained (i) by reducing the World Bank disbursements under "civil works" by US$3.16 million, and (ii) by adding US$90,000 increase in total loan amount.

Turkey
Watershed Rehabilitation Project
Eastern Anatolia
Financing Plan by Project Component
US$000

	The World Bank		Government		Total		For. Exch.	Local (Excl. Taxes)	Duties & Tax.
	Amount	%	Amount	%	Amount	%			
A. Planning and Management	6118	88	843	12	6961	6	3998	2612	351
B. Cropland Soil Moist.	1012	89	121	11	1134	1	236	796	102
C. Cropland Fallow	2696	87	385	13	3081	3	1060	1636	385
D. Range-Meadowland	1498	68	703	32	2201	2	1030	1152	19
E. Rangeland	2990	83	620	17	3610	3	1061	2306	243
F. Fuelwood Coppice Plantn.	6310	56	4895	44	11205	10	444	7809	2953
G. Oak Coppice	7305	58	5279	42	12583	11	1210	9365	2008
H. Soil Cons. Afforestation	7254	65	3865	35	11119	10	2191	7915	1013
I. Conifer Plantations	3318	60	2254	40	5572	5	396	3808	1368
J. Rangeland Rehab., MOF	4712	77	1381	23	6093	6	1270	4152	671
K. River Bank Planting	21	58	15	42	36	0	0	26	10
L. Strength. Field Services	13474	82	3042	18	16516	15	12949	1896	1671
M. Small Scale Irrigation	14102	71	5779	29	19882	18	7655	9413	2813
N. Rainfed Terraces	1930	71	784	29	2714	2	1192	1183	339
O. Apiculture	2407	50	2407	50	4814	4	953	3259	602
P. Horticulture	1035	83	219	17	1254	1	185	850	219
Q. Forestry Research	20	88	3	12	23	0	20	0	3
R. Range & Agric Research	708	71	284	29	992	1	146	723	123
Total Disbursement	76910	70	32879	30	109790	100	35996	58901	14893

Values Scaled by 1000.0 29/1/1993 11:16

TURKEY
EASTERN ANATOLIA WATERSHED REHABILITATION PROJECT

FINANCING PLAN BY IMPLEMENTITNG INSTITUTION AND YEAR <1><2><3>

[US$000]

	1993			1994			1995			1996			1997			1998			1999			93-99	
	GOT	WB	Total	GOT	WB	Total	GOT	WB	Total	GOT	WB	Total	GOT	WB	Total	GOT	WB	Total	GOT	WB	Total	GOT	WB	Total
I. MOF TOTAL	2,136	8,814	10,950	3,364	8,907	12,271	3,482	6,647	10,129	4,344	7,887	12,231	4,834	8,086	12,920	3,579	5,567	9,146	1,468	1,819	3,287	23,210	47,730	70,940
of which																								
Prj. Coord. & Support	96	1,544	1,640	120	1,045	1,165	149	1,000	1,149	144	980	1,124	114	593	707	118	646	764	101	311	412	843	6,118	6,961
Field Activities	2,040	7,270	9,310	3,244	7,862	11,106	3,333	5,647	8,980	4,200	6,907	11,107	4,720	7,493	12,213	3,461	4,921	8,382	1,367	1,508	2,875	22,367	41,612	63,979
II. KHGM TOTAL	710	2,147	2,857	1,061	2,783	3,844	1,049	2,483	3,532	1,442	3,309	4,751	1,501	3,437	4,938	792	1,803	2,595	22	33	55	6,576	15,995	22,573
III. TEDGEM/TUDGEM TOTAL	218	1,514	1,732	282	1,797	2,079	366	1,888	2,354	497	2,439	2,936	848	2,734	3,382	633	2,067	2,700	451	649	1,100	3,092	13,186	16,278
GRAND TOTAL	3,064	12,475	15,539	4,707	13,487	18,194	4,897	11,118	16,015	6,283	13,636	19,918	6,983	14,257	21,240	5,004	9,437	14,441	1,941	2,501	4,442	32,879	76,910	109,790

<1> Based on Detailed Cost Tables: Project Costs including Contingencies
<2> Total project cost amount to US$109.7 million of which US$6.9 million (6%) are recurrent cost spread over 7 years
<3> During Negotiations it was agreed that the total WB financing would be increased to US$77 million

Turkey
Watershed Rehabilitation Project
Eastern Anatolia
Table 101. Project Coordination and Support <1>
TA, Equipment, Vehicles, GIS, PPF, Monitoring and Evaluation
Detailed Cost Table
TL000

	Unit	Quantity 1993	1994	1995	1996	1997	1998	1999	Total	Base Costs in US$000 1993	1994	1995	1996	1997	1998	1999
I. INVESTMENT COSTS																
A. PCSU:On job Train.Courses																
Farmer Training	Trainee days	3000	3000	6000	6000	6000	6000	0	30000	30	30	61	61	61	61	0
In-service Training	Trainee days	3760	3900	4110	4210	3720	3720	440	23860	114	118	125	128	113	113	13
Sub-Total										144	149	185	188	174	174	13
B. Technical Assistance																
W/S Reh. Dev. Sp.	person m'ths	4	9	9	2	2	0	2	28	51	114	114	25	25	0	25
Econ,MIS,M&E Int.Recrt Sp	person m'ths	3	3	1	1	1	1	2	12	56	56	19	19	19	19	37
Range Management Special.	person m'ths	3	6	6	2	0	0	0	17	56	112	112	37	0	0	0
PCPS, Partic. Devpt Spec.	person m'ths	3	2	2	1	0	0	0	8	56	37	37	19	0	0	0
Trng/Manpower Devpt Spec.	person m'ths	3	2	2	2	0	0	0	9	0	0	0	0	0	0	0
Locally Recruited Spec.	person m'ths	5	7	7	7	7	4	2	39	15	21	21	21	21	12	6
International Consultants	person m'ths	2	2	2	2	4	3	3	18	37	37	37	37	75	56	56
Adaptive Research Specia.	person m'ths	2	2	1	0	0	0	0	5	37	37	19	0	0	0	0
Sub-Total										309	416	360	159	140	87	125
C. Computers plus Training																
D'top 386. MB:Ram 4,HD 80	no.	3	3	0	0	0	0	0	6	15	15	0	0	0	0	0
L'top:386. MB Ram 4,HD 80	no.	3	3	0	0	0	0	0	6	15	15	0	0	0	0	0
MIS,M&E:486DTop + 150MB <4>	set	2	3	0	0	0	0	0	5	17	26	0	0	0	0	0
Sub-Total										48	56	0	0	0	0	0
D. PCSU Plant and Equipment																
Library incl'g references	sum	0	0	0	0	0	0	0	1	5	15	20	10	0	0	0
Sundry Office/draw'g etc	sum	0	0	0	0	0	0	0	1	20	20	10	0	0	0	0
Sub-Total										25	35	30	10	0	0	0
E. PCSU based Vehicles																
4 WD SW	no.	5	0	0	0	0	0	0	5	109	0	0	0	0	0	0
4 WD TC PU	no.	3	2	0	0	0	0	0	5	60	40	0	0	0	0	0
Sub-Total										169	40	0	0	0	0	0
F. GIS																
Training	person m'ths	0	0	30	30	30	30	0	120	0	0	9	9	9	9	0
Tech. Assistant/Foreign	person m'ths	0	3	3	2	2	0	0	10	0	49	49	32	32	0	0
Tech. Assistant/Local	person m'ths	0	2	12	6	6	6	0	32	0	6	36	18	18	18	0
Equipment		0	0	0	1	0	0	0	1	0	0	91	212	0	0	0
Sub-Total										0	55	185	272	60	27	0
G. PPF																
Training		1	0	0	0	0	0	0	1	217	0	0	0	0	0	0
Technical Assistant		1	0	0	0	0	0	0	1	181	0	0	0	0	0	0
Equipment & Unallocated		1	0	0	0	0	0	0	1	327	0	0	0	0	0	0

Sub-Total										725	0	0	0	0	0	0
H. MIS Monitoring & Evaluat.																	
Research/survey contracts		0	1	0	1	0	1	0	3	0	101	0	101	0	101	0
Operations:fuel,per diems <3>		-	-	-	-	-	-	-	-	10	10	10	10	10	10	10
Sub-Total										10	111	10	111	10	111	10
Total INVESTMENT COSTS										1431	862	771	741	383	399	148
II. RECURRENT COSTS																
A. Personnel <7>																
PCSU Man. W/shed Dev.Spec	no.	1	1	1	1	1	1	1	7	0	0	0	0	0	0	0
PCSU Ass.Man. Training Sp	no.	1	1	1	1	1	1	1	7	0	0	0	0	0	0	0
Procurement Specialist	no.	1	1	1	1	1	1	1	7	0	0	0	0	0	0	0
Econ./MIS/MOE Specialist	no.	1	1	1	1	1	1	1	7	0	0	0	0	0	0	0
Accountant	no.	1	1	1	1	1	1	1	7	0	0	0	0	0	0	0
Sub-Total										0	0	0	0	0	0	0
B. Operation & Maintenance																
Plant and Equipment	sum	-	-	-	-	-	-	-	-	5	5	5	5	5	5	5
Vehicles @15% init.cost/a	sum	-	-	-	-	-	-	-	-	0	39	47	47	47	47	47
Consumables <8>	sum	-	-	-	-	-	-	-	-	0	22	40	40	40	40	40
Bus Hire for Training	sum	0	0	0	0	0	0	0	1	20	20	40	40	40	40	0
Per Diems	sum	0	0	0	0	0	0	0	1	81	81	81	40	40	40	40
Sub-Total										106	168	213	173	173	173	133
Total RECURRENT COSTS										106	168	213	173	173	173	133
Total										1537	1030	984	914	556	572	281

<1> Includes PCSU,Ankara office.
<2> Research;forestry;anim.husb;hort;rangeland;dryland agric.; irrig.agric.
<3> Lump sum per year to pay for provincial fuel,per diems & operation costs
<4> Two computers for PCSU yr1;one per province yr2. Price incl printer.
<7> Personnel seconded from MOF existing staff.
<8> Paper,ribbons,disco,Ankara/Elazig travel
- Values scaled by 1000.0 29/1/1993 11:16

Turkey
Watershed Rehabilitation Project
Eastern Anatolia
Table 111. Ministry of Forestry
Strengthening Field Services
Detailed Cost Table
TL000

	Unit	Quantity								Base Costs in US$000							
		1993	1994	1995	1996	1997	1998	1999	Total	1993	1994	1995	1996	1997	1998	1999	Total
I. INVESTMENT COSTS																	
A. Study Tours (Turkey)																	
Silvo Pasture	person m'ths	0	0	4	0	0	0	0	4	0	0	1	0	0	0	0	1
Soil Cons/Aff	person m'ths	5	5	5	5	5	5	0	30	2	2	2	2	2	2	0	9
Rangeland Rehab	person m'ths	5	5	5	5	5	5	0	30	2	2	2	2	2	2	0	9
Sub-Total										3	3	4	3	3	3	0	19
B. Overseas Training																	
Study Tours	person m'ths	12	12	12	12	12	0	0	60	121	121	121	121	121	0	0	607
Short Term Fellowship	person m'ths	6	18	18	6	0	0	0	48	49	146	146	49	0	0	0	388
Management of O'seas Trng <2>	Per Annum	1	1	1	1	1	0	0	5	42	42	42	42	42	0	0	212
Sub-Total										212	310	310	212	164	0	0	1208
C. Infrastructure																	
Nursery Office/Store	m2	50	75	0	0	0	0	0	125	15	23	0	0	0	0	0	38
Nursery Sheds	m2	200	100	0	0	0	0	0	300	12	6	0	0	0	0	0	18
Nursery Housing 100m2	no.	3	3	0	0	0	0	0	6	103	103	0	0	0	0	0	206
Research O/S Office/Store	m2	0	80	80	0	0	0	0	160	0	24	24	0	0	0	0	49
Sub-Total										130	156	24	0	0	0	0	311
D. Plant and Equipment																	
Bulldozers 160-180 HP	no.	5	5	0	0	0	0	0	10	1507	1507	0	0	0	0	0	3014
Bulldozers 120-140 HP	no.	5	4	0	0	0	0	0	9	900	720	0	0	0	0	0	1621
Tractor 4WD 100-120 HP	no.	6	0	0	0	0	0	0	6	607	0	0	0	0	0	0	607
Caravans	no.	6	0	0	0	0	0	0	6	97	0	0	0	0	0	0	97
Rippers RM 3 Tine (B'dz)	no.	8	8	3	0	0	0	0	19	32	32	12	0	0	0	0	77
Tipping Trailer Hydroulic	no.	0	6	0	0	0	0	0	6	0	36	0	0	0	0	0	36
Plow 3 disc RM	no.	6	0	0	0	0	0	0	6	7	0	0	0	0	0	0	7
Harrows disc	no.	6	0	0	0	0	0	0	6	12	0	0	0	0	0	0	12
Root Cutters TD	no.	6	0	0	0	0	0	0	6	4	0	0	0	0	0	0	4
Seedbed formers TD	no.	6	0	0	0	0	0	0	6	4	0	0	0	0	0	0	4
Seeders tractor drawer	no.	6	0	0	0	0	0	0	6	4	0	0	0	0	0	0	4
Nursery water system	no.	6	0	0	0	0	0	0	6	61	0	0	0	0	0	0	61
Research/Survey/Draw. Eq.	sum	-	-	-	-	-	-	-	-	33	6	11	6	0	0	0	56
Computers,software & Trng	no.	10	0	0	0	0	0	0	10	40	0	0	0	0	0	0	40
Lazer & Dot MatrixPrinter	no.	1	3	0	0	0	0	0	4	3	9	0	0	0	0	0	12
Photo copy	no.	2	1	0	0	0	0	0	3	6	3	0	0	0	0	0	9
Base Radio Units	no.	0	0	3	0	0	0	0	3	0	0	10	0	0	0	0	10
Mobile Radios	no.	0	0	3	0	0	0	0	3	0	0	7	0	0	0	0	7
Desk Top Computer + Trng	no.	15	0	0	0	0	0	0	15	76	0	0	0	0	0	0	76
Misc. Office Eg.	no.	3	0	0	0	0	0	0	3	15	0	0	0	0	0	0	15
Sub-Total										3409	2314	40	6	0	0	0	5769

E. Vehicles																	
4WD TC PU	no.	9	0	3	0	0	0	0	12	180	0	60	0	0	0	0	240
Small 4WD PU	no.	6	0	0	0	0	0	0	6	97	0	0	0	0	0	0	97
2WD SW	no.	3	0	0	0	0	0	0	3	67	0	0	0	0	0	0	67
Tipper Truck 3-5 Ton	no.	3	3	0	0	0	0	0	6	152	152	0	0	0	0	0	303
Truck 10 Ton	no.	3	3	0	0	0	0	0	6	303	303	0	0	0	0	0	607
Mobile repair vehicle	no.	6	0	0	0	0	0	0	6	303	0	0	0	0	0	0	303
Sub-Total										1103	455	60	0	0	0	0	1618
Total INVESTMENT COSTS										4858	3238	438	221	167	3	0	8925
II. RECURRENT COSTS																	
A. Veh. Oper. 15% of Inv.	sum	-	-	-	-	-	-	-	-	0	184	272	282	282	282	282	1585
B. Office Supply	sum	-	-	-	-	-	-	-	-	15	15	15	15	15	15	15	106
Total RECURRENT COSTS										15	199	287	297	297	297	297	1691
Total										4873	3437	726	518	464	300	297	10617

<1> Dozer costs include 20% spares & angle blase
<2> Management fee for handling overseas training at 13% total costs.
- Values scaled by 1000.0 14/12/1992 13:26

Turkey
Watershed Rehabilitation Project
Eastern Anatolia
Table 112. TEDGEM/TUGEN: Ministry of Agriculture & Rural Affairs
Strengthening Field Services
Detailed Cost Table
TL000

	Unit	Quantity								Base Costs in US$000					
		1993	1994	1995	1996	1997	1998	1999	Total	1993	1994	1995	1996	1997	1998
I. INVESTMENT COSTS															
A. Agric. Plant Equip.& Mat.															
Sweep Tined Cultivator	no.	7	0	0	0	0	0	0	7	14	0	0	0	0	0
Sweep Footed Drill	no.	7	0	0	0	0	0	0	7	28	0	0	0	0	0
100 HP Tractor	no.	3	0	0	0	0	0	0	3	121	0	0	0	0	0
Tractor trailer	no.	3	0	0	0	0	0	0	3	12	0	0	0	0	0
Holedigger	no.	3	3	3	0	0	0	0	9	1	1	1	0	0	0
Extension - Elazig	set	3	0	0	0	0	0	0	3	24	0	0	0	0	0
Village Rain Gauges	no.	18	27	27	36	36	18	0	162	0	0	0	0	0	0
Demonstration Equipment <1>	no.	6	9	9	12	12	6	0	54	24	36	36	49	49	24
Sub-Total										225	38	38	49	49	24
B. Agric. Overseas S/Tours	person m'ths	4	4	0	4	0	0	0	12	40	40	0	40	0	0
C. Rangeland Plant Mat. & Eq															
Rear Mounted Fert. Spread	no.	3	3	0	0	0	0	0	6	15	15	0	0	0	0
Rangeland Sod Seeder	no.	6	6	6	0	0	0	0	18	42	42	42	0	0	0
Hand Cranked Seeders	no.	100	16	16	17	17	17	0	183	7	1	1	1	1	1
Sub-Total										64	58	44	1	1	1
D. Range Overseas S/Tours	person m'ths	8	8	8	0	0	0	0	23	76	76	76	0	0	0
E. Desk Top+Printer+Trng	no.	6	0	0	0	0	0	0	6	41	0	0	0	0	0
F. Vehicles															
Elazig Demonstration PU	no.	3	0	0	0	0	0	0	3	60	0	0	0	0	0
Planning Team SWB	no.	3	0	0	0	0	0	0	3	65	0	0	0	0	0
Adaptive Research/Demo PU	no.	6	0	0	0	0	0	0	6	120	0	0	0	0	0
Sub-Total										246	0	0	0	0	0
G. Equipment for genetic imp <3>	no.	0	6	9	12	12	6	0	45	0	30	46	61	61	30
Total INVESTMENT COSTS										692	243	203	151	111	56
II. RECURRENT COSTS															
A. Incrementl Extension cost <4>	unit	16663	26242	27752	36067	35829	20304	1532	164389	51	80	84	109	109	62
B. Incrtl demonstration cost <5>	unit	60	108	117	147	156	96	18	702	6	11	12	15	16	10
C. Adaptive Research <6>	Per Annum	-	-	-	-	-	-	-	-	12	12	12	12	12	12
Total RECURRENT COSTS										69	103	108	136	137	83
Total										761	345	311	288	247	139

<1> Demonstration equipment: Moisture meters, scales, measuring tapes etc
<3> Equipment for AI or Bull centre.Improved animals:Bulls,Rams Unit cost$5k
<4> $3 per ha. range and agricultural treatments:fuel,per diem,office supply

<5> $100 per ha of demonstrations for fuel,per,diem, & other overheads.
<6> Costs of research staff:travel,per diems,analyses,supplies,workshops etc
- Values scaled by 1000.0 14/12/1992 13:40

Turkey
Watershed Rehabilitation Project
Eastern Anatolia
Table 113. KHGM
Strengthening Field Services
Detailed Cost Table
TL000

	Unit	Quantity								Base Costs in US$000							
		1993	1994	1995	1996	1997	1998	1999	Total	1993	1994	1995	1996	1997	1998	1999	Total
I. INVESTMENT COSTS																	
A. Plant Equip. & Materials																	
Tractor (100 HP)	no.	3	3	0	0	0	0	0	6	121	121	0	0	0	0	0	243
Caravan	no.	3	3	0	0	0	0	0	6	49	49	0	0	0	0	0	97
Survey Equipment	sum	3	3	0	0	0	0	0	6	162	162	0	0	0	0	0	324
Laboratory Equipment	sum	3	3	0	0	0	0	0	6	35	35	0	0	0	0	0	70
Desk Top Computer/trng	no.	3	0	0	0	0	0	0	3	14	0	0	0	0	0	0	14
Lap Top Computer/trng	no.	3	0	0	0	0	0	0	3	12	0	0	0	0	0	0	12
Dot matrix Printer(wide)	no.	3	0	0	0	0	0	0	3	7	0	0	0	0	0	0	7
Sub-Total										400	367	0	0	0	0	0	767
B. Overseas Studies	person m'ths	8	4	4	0	0	0	0	16	121	61	61	0	0	0	0	243
C. Veh. 4WD PU	no.	6	0	0	0	0	0	0	6	120	0	0	0	0	0	0	120
Total INVESTMENT COSTS										641	428	61	0	0	0	0	1130
II. RECURRENT COSTS																	
A. Veh. Oper. Costs 15% <1>	sum	-	-	-	-	-	-	-	-	0	18	18	18	18	18	18	108
B. Office Supply		-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0
Total RECURRENT COSTS										0	18	18	18	18	18	18	108
Total										641	446	79	18	18	18	18	1238

<1> Vehicle running cost @ 15% purchase cost
- Values scaled by 1000.0 14/12/1992 13:25

Turkey
Watershed Rehabilitation Project
Eastern Anatolia
Table 121. Soil Conservation Afforestation, MOF.
Terrac'g+tree sdlg plantg+acorn soug+fodder s,) & fert brdcst
Detailed Cost Table
TL000

	Unit	Quantity								Base Costs in US$000							
		1993	1994	1995	1996	1997	1998	1999	Total	1993	1994	1995	1996	1997	1998	1999	Total
I. INVESTMENT COSTS																	
A. Planting Material <3>																	
Seedling Trees Yr1	ha	1100	1700	1700	2200	2200	1100	0	10000	48	74	74	96	96	48	0	435
Seedling Trees Yr2	ha	0	1100	1700	1700	2200	2200	1100	10000	0	16	24	24	31	31	16	142
Acorns Include Replants	ha	1100	1700	1700	2200	2200	1700	0	10600	10	15	15	20	20	15	0	97
Gully Seedlings Trees Yr1	ha	23	23	23	23	23	23	0	138	3	3	3	3	3	3	0	20
Gully Seedlings Trees Yr2	ha	0	23	23	23	23	23	23	138	0	1	1	1	1	1	1	5
Sub-Total										61	109	118	144	151	99	16	698
B. Site Preparation <1>																	
Machine Inputs		1100	1700	1700	2200	2200	1100	0	10000	224	346	346	447	447	224	0	2033
Manual Labour		1100	1700	1700	2200	2200	1100	0	10000	223	344	344	445	445	223	0	2023
Sub-Total										446	690	690	892	892	446	0	4056
C. Fodder Species Seed Yr1 <2>	ha	1100	1700	1700	2200	2200	1100	0	10000	41	64	64	82	82	41	0	374
D. Fertil.DAP y1 (100 kg/ha)	ha	1100	1700	1700	2200	2200	1100	0	10000	71	110	110	142	142	71	0	647
E. Cat Fertilis DAP 50g/tree	ha	23	23	23	23	23	23	0	138	1	1	1	1	1	1	0	9
F. Handtools & Bags	ha	1100	1700	1700	2200	2200	1100	0	10000	6	9	9	11	11	6	0	51
G. Labour Terraces and Gully																	
Planting Yr1	ha	1100	1700	1700	2200	2200	1100	0	10000	71	110	110	142	142	71	0	647
Survey	ha	1100	1700	1700	2200	2200	1100	0	10000	3	5	5	7	7	3	0	30
Maintenance terraces Yr2	ha	0	1100	1700	1700	2200	2200	1100	10000	0	0	0	0	0	0	0	0
Replant terraces Yr2	ha	0	1100	1700	1700	2200	2200	1100	10000	0	0	0	0	0	0	0	0
Sowing Acorns Yr1	ha	1100	1700	1700	2200	2200	1100	0	10000	43	67	67	87	87	43	0	395
Replanting Yr2	ha	0	1100	1700	1700	2200	2200	1100	10000	0	11	17	17	22	22	11	101
Maintenance Yr2	ha	0	1100	1700	1700	2200	2200	1100	10000	0	14	22	22	29	29	14	132
Gully Check dams/ha	ha	23	23	23	23	23	23	0	138	2	2	2	2	2	2	0	11
Gully Planting Yr1/ha	ha	23	23	23	23	23	23	0	138	1	1	1	1	1	1	0	9
Gully Replanting/maint y2	ha	0	23	23	23	23	23	23	138	0	0	0	0	0	0	0	2
Gully Maintenance Yr2	ha	0	23	23	23	23	23	23	138	0	1	1	1	1	1	1	6
Gully R. Check Dams	ha	23	23	23	23	23	23	0	138	11	11	11	11	11	11	0	68
Fodder Sowing Yr1	ha	4000	6200	7000	8000	8100	9000	0	42300	55	85	96	109	111	123	0	578
Sub-Total										187	308	333	401	414	308	27	1977
H. Transport																	
Transport Yr1	ha	1100	1700	1700	2200	2200	1100	0	10000	17	26	26	33	33	17	0	152
Transport Yr2	ha	0	1100	1700	1700	2200	2200	1100	10000	0	11	17	17	22	22	11	101
Sub-Total										17	37	43	51	56	39	11	253
I. Fencing	ha	1100	1700	1700	2200	2200	1100	0	10000	22	34	34	45	45	22	0	202
J. Guarding																	
Full Cost	ha	1100	2800	4000	5000	6100	5500	3300	27800	18	45	65	81	99	89	53	450
Half Cost	ha	0	0	0	1100	2800	4500	6700	15100	0	0	0	9	23	36	54	122
Sub-Total										18	45	65	90	121	125	108	572
Total INVESTMENT COSTS										871	1408	1466	1859	1916	1159	162	8840
Total										871	1408	1466	1859	1916	1159	162	8840

<1> Machine costs exclude capital depreciation of $22.90/hr
<2> Sanfoin(TL3000/kg),grass(TL40000/kg),vetch(TL6000/kg)seedmix= $37.0/ha
<3> Input quantities can be found in the Forestry Working papers.
- Values scaled by 1000.0 14/12/1992 13:25

Turkey
Watershed Rehabilitation Project
Eastern Anatolia
Table 123. Conifer Plantations, MOF.
Detailed Cost Table
TL000

	Unit	Quantity								Base Costs in US$000							
		1993	1994	1995	1996	1997	1998	1999	Total	1993	1994	1995	1996	1997	1998	1999	Total
I. INVESTMENT COSTS																	
A. Site Preparation <2>																	
By Machine <1>	ha	550	800	800	1100	1100	550	0	4900	34	50	50	69	69	34	0	307
By Hand	ha	550	800	800	1100	1100	550	0	4900	116	168	168	231	231	116	0	1031
Seedling Cost Yr1	ha	550	800	800	1100	1100	550	0	4900	67	97	97	134	134	67	0	595
Seedling Cost Yr2	ha	0	550	800	800	1100	1100	550	4900	0	17	24	24	33	33	17	149
Fertilizer NP	ha	550	800	800	1100	1100	550	0	4900	15	22	22	30	30	15	0	134
Handtools & Bags	ha	550	800	800	1100	1100	550	0	4900	3	4	4	6	6	3	0	25
Transport Yr1	ha	550	800	800	1100	1100	550	0	4900	8	12	12	17	17	8	0	74
Transport Yr2	ha	0	550	800	800	1100	1100	550	4900	0	6	8	8	11	11	6	50
Access Roads/Tracks	ha	550	800	800	1100	1100	550	0	4900	24	35	35	48	48	24	0	213
Guarding	ha	550	1350	2150	3250	4350	4900	4900	21450	9	22	35	53	70	79	79	347
Fencing	ha	550	800	800	1100	1100	550	0	4900	11	16	16	22	22	11	0	99
Sub-Total										287	449	472	641	671	402	102	3024
B. Labour																	
Survey	ha	550	800	800	1100	1100	550	0	4900	2	2	2	3	3	2	0	15
Planting Yr1	ha	550	800	800	1100	1100	550	0	4900	89	130	130	179	179	89	0	797
Planting Yr2	ha	0	550	800	800	1100	1100	550	4900	0	18	26	26	36	36	18	159
Maintenance Yr2	ha	0	550	800	800	1100	1100	550	4900	0	45	65	65	89	89	45	397
Sub-Total										91	195	223	273	307	216	62	1367
Total INVESTMENT COSTS										378	644	695	914	978	618	164	4390
Total										378	644	695	914	978	618	164	4390

<1> Unit cost assumes 70% area (<30% slope) is mechanically prepared
<2> Input quantities can be found in the Forestry Working Papers.
- Values scaled by 1000.0 14/12/1992 13:25

Turkey
Watershed Rehabilitation Project
Eastern Anatolia
Table 124. Oak Coppice Rehabilitation, MOF.
Aged/degraded oak stands rehab'd+bare areas sown with acorns
Detailed Cost Table
TL000

	Unit	Quantity								Base Costs in US$000							
		1993	1994	1995	1996	1997	1998	1999	Total	1993	1994	1995	1996	1997	1998	1999	Total
I. INVESTMENT COSTS																	
A. Oak,current 50-70% cover <1>																	
Acorns Yr1	ha	2000	3000	3000	3900	3900	2000	0	17800	83	124	124	162	162	83	0	738
Acorns Yr2	ha	0	2000	3000	3000	3900	3900	2000	17800	0	22	33	33	43	43	22	198
Handtools & Bags	ha	2000	3000	3000	3900	3900	2000	0	17800	10	15	15	20	20	10	0	90
Rehabilitation Cutting	ha	2000	3000	3000	3900	3900	2000	0	17800	326	469	489	635	635	326	0	2899
Sowing Acorns Yr1	ha	2000	3000	3000	3900	3900	2000	0	17800	129	194	194	252	252	129	0	1152
Maintenance Yr2	ha	0	2000	3000	3000	3900	3900	2000	17800	0	81	121	121	158	158	81	720
Labour Replants Yr2	ha	0	2000	3000	3000	3900	3900	2000	17800	0	40	61	61	79	79	40	360
Transport Yr1	ha	2000	3000	3000	3900	3900	2000	2000	19800	121	182	182	237	237	121	121	1202
Transport Yr2	ha	0	2000	3000	3000	3900	3900	2000	17800	0	40	61	61	79	79	40	360
Access Roads/Tracks	ha	2000	3000	3000	3900	3900	2000	0	17800	87	130	130	170	170	87	0	774
Fencing	ha	2000	3000	3000	3900	3900	2000	0	17800	40	61	61	79	79	40	0	360
Guarding Full Cost (3yrs)	ha	2000	5000	8000	9900	10800	9800	5900	51400	32	81	129	160	175	159	95	832
Guarding Half Cost	ha	0	0	0	2000	5000	8000	11900	26900	0	0	0	16	40	65	96	218
Sub-Total										829	1461	1601	2007	2129	1379	497	9904
Total INVESTMENT COSTS										829	1461	1601	2007	2129	1379	497	9904
Total										829	1461	1601	2007	2129	1379	497	9904

<1> Input quantities/ha can be found in Forestry Working Papers.
- Values scaled by 1000.0 14/12/1992 13:25

Turkey
Watershed Rehabilitation Project
Eastern Anatolia
Table 125. Rangeland Rehabilitation, MOF
Detailed Cost Table
TL000

	Unit	Quantity								Base Costs in US$000							
		1993	1994	1995	1996	1997	1998	1999	Total	1993	1994	1995	1996	1997	1998	1999	Total
I. INVESTMENT COSTS																	
A. Fodder Sp. Seed																	
Vetch (25 kg/ha.)	ha	2000	3000	3000	3900	3900	2000	0	17800	42	64	64	83	83	42	0	378
Sanfoin (50kg/ha.)	ha	2000	3000	3000	3900	3900	2000	0	17800	36	55	55	71	71	36	0	324
Grass (10kg/ha @ $5/kg)	ha	2000	3000	3000	3900	3900	2000	0	17800	101	152	152	197	197	101	0	900
FertilizeDAP Yr1 100kg/ha	ha	2000	3000	3000	3900	3900	2000	0	17800	93	140	140	181	181	93	0	828
Handtools & Bags	ha	2000	3000	3000	3900	3900	2000	0	17800	10	15	15	20	20	10	0	90
Labour Seedling/Fert. Yr1	ha	2000	3000	3000	3900	3900	2000	0	17800	20	30	30	39	39	20	0	180
Transport Yr1	ha	2000	3000	3000	3900	3900	2000	0	17800	30	46	46	59	59	30	0	270
Transport Yr2	ha	0	2000	3000	3000	3900	3900	2000	17800	0	20	30	30	39	39	20	180
Access - Tracks Yr1	ha	2000	3000	3000	3900	3900	2000	0	17800	59	88	88	114	114	59	0	522
Fencing	ha	2000	3000	3000	3900	3900	3000	0	18800	40	61	61	79	79	61	0	380
Guarding Full Cost	ha	2000	5000	8000	9900	10800	9800	5900	51400	18	46	73	90	98	89	54	468
Guarding Half Cost	ha	0	0	2000	5000	8000	11900	15800	42700	0	0	10	25	40	60	80	216
Sub-Total										451	715	763	990	1022	642	154	4737
B. Gully Revegetation																	
Gully Seedlings Yr1	ha	27	40	40	53	53	27	0	240	4	6	6	8	8	4	0	35
Gully Seedlings Yr2	ha	0	7	10	10	13	13	7	60	0	0	0	0	0	0	0	2
Gully Planting Yr1	ha	27	40	40	53	53	27	0	240	2	3	3	3	3	2	0	16
Fertilizer DAP	ha	27	40	40	53	53	27	0	240	1	2	2	2	2	1	0	11
Gully Maint./Replant Yr2	ha	0	27	40	40	53	53	27	240	0	1	2	2	3	3	1	12
Labour Check Dams	ha	27	40	40	53	53	27	0	240	2	3	3	4	4	2	0	20
Sub-Total										9	15	16	20	21	12	2	95
Total INVESTMENT COSTS										460	730	779	1010	1043	654	155	4832
Total										460	730	779	1010	1043	654	155	4832

- Values scaled by 1000.0 14/12/1992 13:25

Turkey
Watershed Rehabilitation Project
Eastern Anatolia
Table 126. Fuelwood Coppice Plantation
Detailed Cost Table
TL000

	Unit	Quantity 1993	1994	1995	1996	1997	1998	1999	Total	Base Costs in US$000 1993	1994	1995	1996	1997	1998	1999	Total
I. INVESTMENT COSTS																	
A. Site Preparation <1>																	
By Machine	ha	1300	2000	2000	2600	2600	1300	0	11800	82	125	125	163	163	82	0	740
By Hand	ha	1300	2000	2000	2600	2600	1300	0	11800	274	421	421	547	547	274	0	2483
Survey	ha	1300	2000	2000	2600	2600	1300	0	11800	4	6	6	8	8	4	0	36
Planting Yr1	ha	1300	2000	2000	2600	2600	1300	0	11800	170	261	261	339	339	170	0	1540
Replanting Yr2	ha	0	1300	2000	2000	2600	2600	1300	11800	0	63	97	97	126	126	63	573
Seedling Cost Yr1	ha	1300	2000	2000	2600	2600	1300	0	11800	79	121	121	158	158	79	0	716
Acorns Costs Yr1	ha	1300	2000	2000	2600	2600	1300	0	11800	18	28	28	37	37	18	0	167
Seedling Costs Yr2	ha	0	1300	2000	2000	2600	2600	1300	11800	0	18	28	28	37	37	18	167
Acorns Costs Yr2	ha	0	1300	2000	2000	2600	2600	1300	11800	0	4	6	6	8	8	4	36
Maintenance Yr2	ha	0	1300	2000	2000	2600	2600	1300	11800	0	63	97	97	126	126	63	573
Handtools& Bags	ha	1300	2000	2000	2600	2600	1300	0	11800	7	10	10	13	13	7	0	60
Transport Yr1	ha	1300	2000	2000	2600	2600	1300	0	11800	20	30	30	39	39	20	0	179
Transport Yr2	ha	0	1300	2000	2000	2600	2600	1300	11800	0	13	20	20	26	26	13	119
Fencing	ha	1300	2000	2000	2600	2601	1300	0	11800	26	40	40	53	53	26	0	239
Guarding Full Cost	ha	1300	3300	5300	6600	7200	6500	3900	34100	21	53	86	107	117	105	63	552
Guarding Half Cost	ha	0	0	0	1300	3300	5300	7900	17800	0	0	0	11	27	43	64	144
Access Roads/Tracks	ha	1300	2000	2000	2600	2600	1300	0	11800	57	87	87	113	113	57	0	513
Sub-Total										756	1346	1466	1836	1937	1207	289	8837
Total INVESTMENT COSTS										756	1346	1466	1836	1937	1207	289	8837
Total										756	1346	1466	1836	1937	1207	289	8837

<1> Input quantities/ha. for all forestry interventions see Working Papers.
- Values scaled by 1000.0 14/12/1992 13:25

Turkey
Watershed Rehabilitation Project
Eastern Anatolia
Table 127. Range Management & Fertilisation(Treasury Land),TEDGEM/TUGEM
Fertilizer is broadcast (existing seed population adequate).
Detailed Cost Table
TL000

	Unit	Quantity 1993	1994	1995	1996	1997	1998	1999	Total	Base Costs in US$000 1993	1994	1995	1996	1997	1998	1999	Total
I. INVESTMENT COSTS																	
A. Fertilizer																	
DAP R'ld 100kg/ha	ha	2223	3333	3333	4444	4444	2223	0	20000	52	78	78	103	103	52	0	465
TSP R'ld 100kg/ha	ha	600	1200	1900	1900	2500	1900	0	10000	9	18	29	29	38	29	0	152
DAP M'ld 250 kg/ha	ha	15	30	47	48	62	48	0	250	1	2	3	3	3	3	0	14
TSP M'ld 150 kg/ha	ha	15	30	47	48	62	48	0	250	0	1	1	1	1	1	0	6
Sub-Total										62	98	110	136	146	84	0	637
B. Tractor/Fertilizer	ha	2823	4533	5233	6344	6944	4123	0	30000 .	1	2	2	3	3	2	0	12
C. Labour (farmer contribut) <2>																	
Rangeland 1.5 pd/ha	ha	2820	4530	5230	6340	6940	5230	0	31090	0	0	0	0	0	0	0	0
Meadow land 6 pd/ha	ha	30	60	95	95	125	95	0	500	0	0	0	0	0	0	0	0
Sub-Total										0	0	0	0	0	0	0	0
D. Ripping	ha	450	900	1425	1425	1875	1425	0	7500	6	11	18	18	23	18	0	93
Total INVESTMENT COSTS										69	111	130	156	172	104	0	741
II. RECURRENT COSTS																	
A. Fertilizer																	
DAP R'ld Yr3 100 kg/ha	ha	0	0	2820	4530	5230	6340	6940	25860	0	0	66	105	122	148	161	602
DAP R'ld Yr6 100 kg/ha	ha	0	0	0	0	0	2820	4530	7350	0	0	0	0	0	66	105	171
DAP M'ld 250 kg/ha	ha	0	15	45	92	140	202	250	744	0	1	3	5	8	11	14	41
TSP M'ld 150 kg/ha	ha	5	15	45	92	140	202	250	749	0	0	1	2	3	5	6	17
Sub-Total										0	1	69	113	133	229	287	831
B. Tractor/Fertilizer	ha	0	2823	7356	12589	18933	25877	30000	97578	0	1	3	5	8	10	12	39
C. Labour(farmer contribut) <3>																	
Rangeland 0.75 pd	ha	0	2823	7356	12589	18933	25877	30000	97578	0	0	0	0	0	0	0	0
Meadow Land 6 pd	ha	0	30	90	185	280	405	500	1490	0	0	0	0	0	0	0	0
Sub-Total										0	0	0	0	0	0	0	0
D. Transport M'ld	ha	0	30	90	185	280	405	500	1490	0	1	4	7	11	16	20	60
Total RECURRENT COSTS										0	4	76	125	152	256	319	931
Total										69	115	206	281	324	360	319	1673

<1> Rec costs(Except labor) paid by project because new technical concept.
<2> Farmers invest labour worth:$5.3/ha rangeland; $48/ha on meadowland.
<3> Recurrent labour input from farmers:$3.33/ha rangeland;$30/ha meadowland
- Values scaled by 1000.0 14/12/1992 13:25

Turkey
Watershed Rehabilitation Project
Eastern Anatolia
Table 128. Rangeland Seed and Fertilizer,(TEDGEM/TUGEM) Treasury Lands.
(1)Manage, fertilise & seed (2)Range Mangement alone <4>
Detailed Cost Table
TL000

	Unit	Quantity								Base Costs in US$000							
		1993	1994	1995	1996	1997	1998	1999	Total	1993	1994	1995	1996	1997	1998	1999	Total
I. INVESTMENT COSTS																	
A. Fertilizer <2>																	
DAP 100 kg/ha	ha	2223	3333	3333	4444	4444	2223	0	20000	52	78	78	103	103	52	0	465
TSP 100 kg/ha	ha	2223	3333	3333	4444	4444	2223	0	20000	34	51	51	67	67	34	0	303
Sub-Total										85	128	128	171	171	85	0	769
B. Range Management Alone <3>	ha	0	6500	9775	9775	13050	13050	6500	58650	0	66	99	99	132	132	66	593
C. Tractor/Fertilizer	ha	2223	3333	3333	4444	4444	2223	0	20000	1	1	1	2	2	1	0	8
D. Farmer contri:Labor$12/ha	ha	2223	3333	3333	4444	4444	2223	0	20000	0	0	0	0	0	0	0	0
E. Seed																	
Alfalfa 10 kg/ha	ha	2223	3333	3333	4444	4444	2223	0	20000	26	39	39	51	51	26	0	231
Sanfoin 50 kg/ha	ha	2223	3333	3333	4444	4444	2223	0	20000	32	48	48	64	64	32	0	289
Seed Pelleting	ha	2223	3333	3333	4444	4444	2223	0	20000	45	67	67	90	90	45	0	405
Sub-Total										103	154	154	206	206	103	0	925
F. Ripping <1>	ha	556	833	833	1111	1111	556	0	5000	9	13	13	18	18	9	0	81
Total INVESTMENT COSTS										198	363	396	495	528	330	66	2376
II. RECURRENT COSTS																	
A. Fertilizer																	
DAP Yr3 100 kg/ha	ha	0	0	0	2223	3333	3333	4444	13333	0	0	0	52	78	78	103	310
DAP Yr6 100 kg/ha	ha	0	0	0	0	0	2223	3333	5556	0	0	0	0	0	52	78	129
Sub-Total										0	0	0	52	78	129	181	439
B. Farmer lab contr:$8.33/ha	ha	2223	3333	3333	4444	4444	2223	0	20000	0	0	0	0	0	0	0	0
Total RECURRENT COSTS										0	0	0	52	78	129	181	439
Total										198	363	396	547	606	459	247	2816

<1> Ripping only on a quarter total area.
<2> Input costs incurred because it is treasury land
<3> Cost of demarcation, occasional fencing, assignment certificates etc.
<4> RANGE MANAGEMENT ALONE:SEPARATE TREATMENT,LOW COST, VILLAGE SUPPORT
- Values scaled by 1000.0 14/12/1992 13:25

Turkey
Watershed Rehabilitation Project
Eastern Anatolia
Table 129. Improved agronomic packages (TEDGEM/TUGEM)
Improved Varieties & Management
Detailed Cost Table
TL000

	Unit	Quantity								Base Costs in US$000							
		1993	1994	1995	1996	1997	1998	1999	Total	1993	1994	1995	1996	1997	1998	1999	Total
I. INVESTMENT COSTS																	
A. Improved Inputs/Practices																	
Improved Cultivars	ha	1296	1944	1944	2593	2593	1297	0	11667	47	71	71	94	94	47	0	425
Fertilizer DAP	ha	1296	1944	1944	2593	2593	1297	0	11667	28	42	42	57	57	28	0	255
Fertilizer ammon. nitrate	ha	1296	1944	1944	2593	2593	1297	0	11667	25	38	38	50	50	25	0	227
Farmer Labour <1>	ha	1296	1944	1944	2593	2593	1297	0	11667	0	0	0	0	0	0	0	0
Sub-Total										101	151	151	202	202	101	0	907
Total INVESTMENT COSTS										101	151	151	202	202	101	0	907
Total										101	151	151	202	202	101	0	907

<1> Farmer provides labor free; receives inputs from project as incentive.
- Values scaled by 1000.0 14/12/1992 13:24

Turkey
Watershed Rehabilitation Project
Eastern Anatolia
Table 130. Fallow Reduction (TEDGEM/TUGEM) by legumes & forage prodn.
Detailed Cost Table
TL000

	Unit	Quantity								Base Costs in US$000							
		1993	1994	1995	1996	1997	1998	1999	Total	1993	1994	1995	1996	1997	1998	1999	Total
I. INVESTMENT COSTS																	
A. Incremental Inputs																	
Seed <1>	ha	1680	2520	2520	3360	3360	2520	0	15960	86	128	128	171	171	128	0	814
Fertilizer <2>	ha	1680	2520	2520	3360	3360	2520	0	15960	65	97	97	129	129	97	0	613
Farmer Labour <3>	ha	1680	2520	2520	3360	3360	2520	0	15960	0	0	0	0	0	0	0	0
Sub-Total										150	225	225	300	300	225	0	1427
B. Perennial Forage Bank																	
Seed	ha	1111	1667	1667	2222	2222	1111	0	10000	39	59	59	79	79	39	0	354
Sowing <4>	ha	1111	1667	1667	2222	2222	1111	0	10000	51	76	76	101	101	51	0	455
Fertiliser DAP	ha	1111	1667	1667	2222	2222	1111	0	10000	26	39	39	52	52	26	0	233
Sub-Total										116	174	174	232	232	116	0	1042
Total INVESTMENT COSTS										266	399	399	532	532	341	0	2469
Total										266	399	399	532	532	341	0	2469

<1> Seed requirement: 130 kg/ha x 2500 TL
<2> Fertilizer : 80 kg/ha DAP x 1540 TL (unsubsidised)
<3> Farmers provide labor ($25/ha) but get inputs free from project 1st yr.
<4> Sowing: Seedbed prepn. & broadcasting (2 sweeps @TL15000)
- Values scaled by 1000.0 14/12/1992 13:24

Turkey
Watershed Rehabilitation Project
Eastern Anatolia
Table 131. Small Scale Irrigation
KHGM
Detailed Cost Table
TL000

	Unit	Quantity								Base Costs in US$000							
		1993	1994	1995	1996	1997	1998	1999	Total	1993	1994	1995	1996	1997	1998	1999	Total
I. INVESTMENT COSTS																	
A. Low Irrigation Terraces <1>																	
Construction	ha	1170	1755	1755	2340	2340	1170	0	10530	966	1449	1449	1932	1932	966	0	8692
Stone Clearg:farmer contr	ha	54	81	81	108	108	54	0	486	0	0	0	0	0	0	0	0
Sub-Total										966	1449	1449	1932	1932	966	0	8692
B. Minor Irrigation																	
Diversion Channels:3km/MC	Km	18	27	27	36	36	18	0	162	36	55	55	73	73	36	0	328
Small Water Basins	no.	30	45	45	60	60	30	0	270	121	182	182	243	243	121	0	1092
Tertiary Canals(8km/MC)	Km	48	72	72	96	96	48	0	432	340	510	510	680	680	340	0	3059
Sub-Total										498	747	747	995	995	498	0	4479
C. Tractor & Equipment Yr1 <2>	ha	1170	1755	1755	2340	2340	1170	0	10530	47	71	71	95	95	47	0	426
D. Tractor & Equipment Yr2	ha	0	878	1316	1316	1755	1755	878	7898	0	18	27	27	36	36	18	160
E. Labour (for construction) <3>	ha	1170	1755	1755	2340	2340	1170	0	10530	118	178	178	237	237	118	0	1065
Total INVESTMENT COSTS										1629	2461	2470	3285	3294	1665	18	14822
Total										1629	2461	2470	3285	3294	1665	18	14822

<1> Construction is $816/ha. Stone clearing ($215/ha) done by farmer free
<2> Alfalfa-Establish. cost, paid for by project see Table 149
<3> Tedgem/tugem activities costed in Table 149
<4> See Table 149 for TEDGEM/TUGEM financed establishment costs.for yr 1.
<5> Project bears recurrent costs to year 2
- Values scaled by 1000.0 14/12/1992 13:24

Turkey
Watershed Rehabilitation Project
Eastern Anatolia
Table 132. River Bank Protection
Total 140 ha; 70ha village labour, 70 ha MOF
Detailed Cost Table
TL000

	Unit	Quantity								Base Costs in US$000							
		1993	1994	1995	1996	1997	1998	1999	Total	1993	1994	1995	1996	1997	1998	1999	Total
I. INVESTMENT COSTS																	
A. 70 Ha by MOF (Material)	ha	10	10	15	15	10	10	0	70	1	1	2	2	1	1	0	7
B. Villagers' Material	ha	10	10	15	15	10	10	0	70	0	0	0	0	0	0	0	0
C. Labour <1>	ha	10	10	15	15	10	10	0	70	3	3	5	5	3	3	0	22
Total INVESTMENT COSTS										4	4	6	6	4	4	0	29
Total										4	4	6	6	4	4	0	29

<1> Farmer contribute labour half the area(70ha) free,worth another $308/ha
- Values scaled by 1000.0 14/12/1992 13:24

Turkey
Watershed Rehabilitation Project
Eastern Anatolia
Table 133. Rainfed Terraces and Check Structures
KHGM
Detailed Cost Table
TL000

	Unit	Quantity								Base Costs in US$000							
		1993	1994	1995	1996	1997	1998	1999	Total	1993	1994	1995	1996	1997	1998	1999	Total
I. INVESTMENT COSTS																	
A. Construct Rainfed Terrace <1>	ha	624	936	936	1248	1248	624	0	5616	218	327	327	436	436	218	0	1960
B. Check Structures																	
Plant and Equipment	no.	624	936	936	1248	1248	624	0	5616	25	38	38	50	50	25	0	227
Labour (farmer contribut) <1>	no.	624	936	936	1248	1248	624	0	5616	0	0	0	0	0	0	0	0
Sub-Total										25	38	38	50	50	25	0	227
Total INVESTMENT COSTS										243	365	365	486	486	243	0	2187
Total										243	365	365	486	486	243	0	2187

<1> Planting materials provided for 20% of the area by project.See Table 149
<2> Farmer contribution ($20/ha) labor.
- Values scaled by 1000.0 14/12/1992 13:24

Turkey
Watershed Rehabilitation Project
Eastern Anatolia
Table 142. ORKOY: Apiculture
Tedgem/Tugem
Detailed Cost Table
TL000

	Unit	Quantity								Base Costs in US$000							
		1993	1994	1995	1996	1997	1998	1999	Total	1993	1994	1995	1996	1997	1998	1999	Total
1. INVESTMENT COSTS																	
A. Bee Hives <1>	no.	0	180	270	270	360	360	180	1620	0	133	200	200	267	267	133	1200
B. Swarms <2>	no.	0	180	270	270	360	360	180	1620	0	200	300	300	400	400	200	1799
C. Equipment Sets <3>	no.	0	180	270	270	360	360	180	1620	0	78	117	117	155	155	78	700
Total INVESTMENT COSTS										0	411	616	616	822	822	411	3699
Total										0	411	616	616	822	822	411	3699

<1> There are 20 beehives per kit.
<2> Twenty swarms per kit
<3> One set of equipment per kit. $427, includes sugar & drugs for first yr.
- Values scaled by 1000.0 14/12/1992 13:24

Turkey
Watershed Rehabilitation Project
Eastern Anatolia
Table 144. Gully Horticulture TEDGEM/TUGEM
Fruit trees and vines in gullies and on slopes.
Detailed Cost Table
TL000

	Unit	Quantity 1993	1994	1995	1996	1997	1998	1999	Total	Base Costs in US$000 1993	1994	1995	1996	1997	1998	1999	Total
I. INVESTMENT COSTS																	
A. Fruit Trees in Gullies																	
Seedlings <1>	ha	140	108	240	480	864	814	0	2646	25	19	42	85	153	144	0	468
Seedlings Replants <2>	ha	0	140	108	240	480	864	0	1832	0	5	4	8	17	31	0	65
Labour (farmer contribut) <3>	ha	140	108	240	480	864	814	0	2646	0	0	0	0	0	0	0	0
Sub-Total										25	24	46	93	170	175	0	533
B. Grapevines																	
Planting 5%farmer contrib <5>	ha	50	100	150	200	100	0	0	600	0	0	0	0	0	0	0	0
Deep Ploughing + Cultivat <7>	ha	50	100	150	200	100	0	0	600	0	0	0	0	0	0	0	0
Replant Materials	ha	0	50	100	150	200	100	0	600	0	4	8	11	15	8	0	46
Fertiliser <7>	ha	100	300	600	500	300	0	0	1800	6	19	38	32	19	0	0	115
Grafting plus material	ha	0	0	50	100	150	200	100	600	0	0	7	14	21	28	14	85
Sub-Total										6	23	53	57	56	36	14	245
Total INVESTMENT COSTS										31	47	99	151	225	211	14	778
Total										31	47	99	151	225	211	14	778

<1> Assumes 140 seedlings/ha total cost $175.
<2> 20% replanting requirement Y2
<3> 20 mandays labor planting
<4> Replanting 4 mandays (25%)
<5> Planting: include marking (50000 TL/ha) holes (60000) rootstock (800000)
<6> Fertiliser: manure+ commercial fertiliser (200000) including labour
<7> Deep ploughing & cultivation is a farmer contribution worth $75/ha.
- Values scaled by 1000.0 14/12/1992 13:24

Turkey
Watershed Rehabilitation Project
Eastern Anatolia
Table 149. Support Activities Budgetted for Table 133&131 Tedgem/Tugem <1>
(1)Rainfed Hortic+consv.(2)Irrig.Hort+consv.(3)Irrig.Forage
Detailed Cost Table
TL000

		Quantity								Base Costs in US$000							
	Unit	1993	1994	1995	1996	1997	1998	1999	Total	1993	1994	1995	1996	1997	1998	1999	Total
. INVESTMENT COSTS																	
A. Rainfed Horticulture+Cons <2>	Microcatchmt	125	187	187	250	250	125	0	1124	22	33	33	45	45	22	0	201
B. Table 131: Seedlings	no.	234	351	351	468	468	468	234	2574	42	63	63	84	84	84	42	461
C. Table 131 Irrig Alfalfa	ha	0	878	1316	1316	1755	1755	878	7898	0	45	67	67	90	90	45	404
D. Transport to village	Microcatchmt	6	15	24	36	48	54	0	183	2	6	10	15	19	22	0	74
tal INVESTMENT COSTS										67	147	173	210	238	218	87	1140
Total										67	147	173	210	238	218	87	1140

> Costs include both Small Scale Irrig and Rainfed terrace activities
> Planting materials
Values scaled by 1000.0 14/12/1992 13:24

Turkey
Watershed Rehabilitation Project
Eastern Anatolia
Table 151. Trees on Field Boundaries (TEDGEM/TUGEM)
(1)Fruit Trees (2)Pistachio Grafting & Establishment
Detailed Cost Table
TL000

	Unit	Quantity								Base Costs in US$000							
		1993	1994	1995	1996	1997	1998	1999	Total	1993	1994	1995	1996	1997	1998	1999	Total
I. INVESTMENT COSTS																	
A. Fruit trees on boundaries <1>																	
Seedlings	Km	80	80	80	90	90	80	80	580	7	7	7	8	8	7	7	50
Seedlings Replants	Km	0	80	80	80	90	90	90	510	0	1	1	1	2	2	2	9
Sub-Total										7	8	8	9	9	8	8	59
B. Pistachio Grafting & Est. <2>																	
Planting material	ha	333	500	500	667	667	333	333	3333	13	20	20	27	27	13	13	135
Total INVESTMENT COSTS										20	28	28	36	36	22	22	194
Total										20	28	28	36	36	22	22	194

<1> Fruit trees planted 12m intervals=85 trees/km. Farmer cont.labour$195/km
<2> Farmer contribution $110/ha
- Values scaled by 1000.0 14/12/1992 13:24

Turkey
Watershed Rehabilitation Project
Eastern Anatolia
Table 160. Pilot Aerial Seeding & Fertilizing of Rangelands
(1) Fertilisation; (2) Seeding and Fertilisation
Detailed Cost Table
TL000

	Unit	Quantity								Base Costs in US$000							
		1993	1994	1995	1996	1997	1998	1999	Total	1993	1994	1995	1996	1997	1998	1999	Total
I. INVESTMENT COSTS																	
A. Aerial Fertilisation only																	
Flying Costs	ha	0	2000	2000	1000	0	0	0	5000	0	20	20	10	0	0	0	51
DAP fertiliser (100kg/ha)	ha	0	1000	1000	0	0	0	0	2000	0	20	20	0	0	0	0	40
TSP fertiliser (100kg/ha)	ha	0	1000	1000	1000	0	0	0	3000	0	13	13	13	0	0	0	39
Labour	ha	0	2000	2000	1000	0	0	0	5000	0	10	10	5	0	0	0	26
Sub-Total										0	64	64	28	0	0	0	156
B. Aerial fertilisation+seed																	
Flying costs	ha	0	1000	1000	0	0	0	0	2000	0	10	10	0	0	0	0	20
Alfalfa seed (10kg/ha)	ha	0	1000	1000	0	0	0	0	2000	0	10	10	0	0	0	0	20
Sanfoin seed (50kg/ha)	ha	0	1000	1000	0	0	0	0	2000	0	14	14	0	0	0	0	28
Seed pelleting with fert.	ha	0	1000	1000	0	0	0	0	2000	0	20	20	0	0	0	0	40
Labour	ha	0	1000	1000	0	0	0	0	2000	0	5	5	0	0	0	0	10
Sub-Total										0	60	60	0	0	0	0	120
Total INVESTMENT COSTS										0	124	124	28	0	0	0	276
II. RECURRENT COSTS																	
A. Aerial Fertilisation only																	
Flying cost	ha	0	0	0	0	2000	2000	1000	5000	0	0	0	0	20	20	10	51
DAP fertiliser (100kg/ha)	ha	0	0	0	0	1000	1000	0	2000	0	0	0	0	21	21	0	41
TSP fertiliser (100kg/ha)	ha	0	0	0	0	1000	1000	1000	3000	0	0	0	0	13	13	13	40
Labour	ha	0	0	0	0	2000	2000	1000	5000	0	0	0	0	10	10	5	26
Sub-Total										0	0	0	0	65	65	29	158
B. Aerial fertilisation+seed																	
Flying cost	ha	0	0	0	0	1000	1000	0	2000	0	0	0	0	10	10	0	20
Alfalfa	ha	0	0	0	0	1000	1000	0	2000	0	0	0	0	12	12	0	23
Sanfoin	ha	0	0	0	0	1000	1000	0	2000	0	0	0	0	15	15	0	30
Seed Pelleting	ha	0	0	0	0	1000	1000	0	2000	0	0	0	0	20	20	0	40
Labour	Person Days	0	0	0	0	1000	1000	0	2000	0	0	0	0	5	5	0	10
Sub-Total										0	0	0	0	62	62	0	125
Total RECURRENT COSTS										0	0	0	0	127	127	29	283
Total										0	124	124	28	127	127	29	558

- Values scaled by 1000.0 14/12/1992 13:24

Turkey
Watershed Rehabilitation Project
Eastern Anatolia
Table 161. Applied Research
Forestry Research Institute Capital purchase support
Detailed Cost Table
TL000

	Unit	Quantity								Base Costs in US$000							
		1993	1994	1995	1996	1997	1998	1999	Total	1993	1994	1995	1996	1997	1998	1999	Total
I. INVESTMENT COSTS																	
A. Plant and Equipment	unit	-	-	-	-	-	-	-	-	6	1	2	1	0	0	0	10
B. Computing																	
PC Desk Top,DM Printer	<1>unit	1	0	0	0	0	0	0	1	5	0	0	0	0	0	0	5
C. Photocopiers	unit		0	0	0	0	0	0	1	5	0	0	0	0	0	0	5
Total INVESTMENT COSTS										16	1	2	1	0	0	0	20
Total										16	1	2	1	0	0	0	20

<1> Includes Software and training as part of package. Dot Matrix printer.
- Values scaled by 1000.0 14/12/1992 13:24

Turkey
Watershed Rehabilitation Project
Eastern Anatolia
Table 162. Demonstrations, Adaptive Research - Rangeland & Agriculture
Materials per demonstration <1>
Detailed Cost Table
TL000

	Unit	Quantity								Base Costs in US$000							
		1993	1994	1995	1996	1997	1998	1999	Total	1993	1994	1995	1996	1997	1998	1999	Total
I. INVESTMENT COSTS																	
A. Rangeland Demonstration <2>	ha	18	27	27	36	36	18	0	162	4	5	5	7	7	4	0	33
B. Agric. Demonstrations <2>																	
Early <3>	ha	42	63	63	84	42	0	0	294	8	13	13	17	8	0	0	59
Subsequent <4>	ha	0	18	27	27	36	36	18	162	0	4	5	5	7	7	4	33
Sub-Total										8	16	18	22	16	7	4	92
C. Adaptive Research <5>																	
Rangeland <6>	unit	0	3	3	3	3	0	0	12	0	6	6	6	6	0	0	24
Agriculture:forage/pulses <7>	unit	0	9	9	9	9	0	0	36	0	18	18	18	18	0	0	73
Sub-Total										0	24	24	24	24	0	0	97
Total INVESTMENT COSTS										12	46	48	54	47	11	4	222
Total										12	46	48	54	47	11	4	222

<1> $200/haseed+fert accdg.to site;Farmer labor($100/ha);FTE cost in Tab 112
<2> Management practices,fertilisation,seeding, to continue for 3-4 years.
<3> Conservn tillage,peren forage,fallow redn pulses/forage,agron pkgs,irrig
<4> Continued adap res & solns to location specific probs. To be determined.
<5> Cost $100 materials per experiment;research specialists costs Table 112
<6> Range treatments for diffnt eco conditions:fert,seed,management,species.
<7> Forage and pulse crop agronomy,tillage practices,herbicides,management.
- Values scaled by 1000.0 14/12/1992 13:24

STAFF APPRAISAL REPORT

TURKEY

EASTERN ANATOLIA WATERSHED REHABILITATION PROJECT

ECONOMIC ANALYSIS

A. Economic Rate of Return

1. Economic rates of return in projects of this nature, where the take-up of improved technologies is very difficult to predict, are best interpreted as an order of magnitude. On the basis of assumptions considered plausible, the project has an economic rate of return of 17%. This is from an incremental project expenditure of US$97 million excluding price contingencies but including physical contingencies. Excluded from the analysis, however, are the direct and associated costs and benefits of training (US$2.7 million), research (US$0.8 million). Further excluded are the Technical Assistance direct costs (US$2.4 million) and half the costs incurred under the Project Preparation Facility (half US$750,000) which were spent on TA and training. If no exclusions are made the ERR drops less than one percentage. The analysis is also conservative - it assumes there is no fall in yield without the project, despite significant evidence to the contrary.

B. Cost Exclusions

2. Exclusions may be justified as follows. Training Costs: The PCSU and field services of the ministries associated with the project will contribute a major role in the training and development of provincial staff where at present there is a reported annual staff turnover of some 30%. The turnover is in part due to Government policy of regular relocation and in part due to resignations because of the difficulties of working in the region. Technical Assistance: The local and foreign Technical Assistance recruited for the PPF and to the project have an important role in on-the-job training which, along with the provisions for additional formal training and study tours, will help to create a cadre of staff prepared to continue and consolidate activities beyond the investment and establishment phase of the project. In addition, a considerable reservoir of expertise will be created on which to draw for future development in the region and elsewhere.

3. Research: The costs of applied research have been omitted (US$801,000 of which some 75% is for the aerial seeding experiment) because it is difficult to quantify the benefits which will accrue, yet they are assumed to be positive. Applied research is an essential element, however, of the project concept of continuing to identify solutions to the agricultural problems of the micro catchment. The costs of demonstrations have been included because they contribute directly to identifiable project benefits.

4. Yields: These are assumed to remain constant in the without project situation though a decline would likely occur on much of the more marginal land which will be rehabilitated under the project. The exception to this assumption is where in the absence of the project, the oak coppices are projected to last only ten years.

C. Economic and Financial Considerations

5. The economic rate of return calculation excludes price contingencies and is worked using the base costs plus physical contingencies less taxes and the exclusions stated above. The opportunity cost of the capital applied to the project is assumed to be 10%.

6. Labor. The project development activities will increase localized demand for labor and thus formal employment of daily wage labor by the project has been priced to reflect recent (July 1992) increases in the statutory wage rates which now range between US$9.50-US$12.00 or US$4.50-US$6.00 per day net of taxes. At the same time it is assumed that farmers benefitting from project interventions will provide labor free of charge as part of the investment and establishment costs though this is costed in the economic analysis. This means that a quarter of total project costs go to the payment of hired labor. To calculate the ERR, farm labor has been priced according to its estimated marginal value (US$2.50 per day) with variation to reflect the seasonal fluctuation which peaks (US$5.00 per day) during harvest.

7. Pricing. The Turkish Lira is freely convertible and there are no major trade restrictions on agricultural goods to deflect market prices widely from border economic values. Where fiscal measures are applied to imports (e.g. vehicles and equipment) or goods (VAT) the economic analysis has deducted such transfers from the costs. Wheat producers benefit from a floor price in Turkey which is approximately 50% higher than the import parity price of (US$110) as estimated by TMO. Fertilizer is produced locally at a cost competitive with import parity and for the ERR it has been priced accordingly (US$198 per ton for DAP and US$132 per ton for TSP); the consumer benefits from some 47% subsidy on the factory gate price. The valuation of fuelwood is at the current market prices; it is freely traded and achieves a price per cubic meter of US$20-US$60 depending on type/quality. Other timber outputs have been valued at market prices: sawlogs US$87/$m^3$; peeler logs US$116/m^3; poles US$151/$m^3$. Fodder currently achieves a price equivalent to $70/tonne DM regardless of the quality, but as the project progresses and improved fodder species are introduced, it is likely that differentials will emerge. However, for the purposes of the economic analysis a uniform price of $70/tonne is assumed.

8. Cost Reduction and Cost Sharing. Cost reduction and cost sharing are achieved where the participants at village level provide labor free of charge; substantial project cost savings have been achieved where it has been agreed that the farmer should provide his labor at no charge. In some cases though, largely where labor is part of construction activities, savings are precluded by government regulations or the strength of the local labor unions, which stipulate the payment rates and labor component for various activities. There is scope for

negotiation and any resultant reduction in unit costs would allow the savings to be spent elsewhere and hence permit a wider coverage by the project and hence achieve greater benefits. This approach also coincides with the project philosophy of greater participation by the beneficiaries. For example, where at present the MOF has a policy of paying forest guarding costs indefinitely, it has been agreed that these costs will be phased out over a seven year period to be replaced by "self-policing" which is effectively zero cost to the project.

9. Where the project expects to introduce technology new to the villagers, such as improved range management, the project will bear all costs during the investment establishment phase, effectively treating the activities as large scale demonstrations. Earlier direct participation and cost sharing by the villagers would reduce overall costs, releasing the cash for alternative use. Management should constantly review treatments in terms of the allocation of project funds and encourage the early handover of responsibilities where appropriate in order to save costs and promote cost sharing.

D. Technology and Adoption Rates

10. The technology packages (menu of treatments) on offer by the project are, by and large, proven to be technically sound and environmentally sustainable either in Turkey or in an environment similar to that of the project area. Demonstrations of improved promotion and management techniques will be mounted in each microcatchment selected for project activities. The underlying principle of the project is one of active participation by the villagers who then decide which treatments they wish to adopt.

11. During the process of consultation they will be offered a "menu" of possibilities which will comprise various treatments some of which will be conditional on, and must be adopted in, association with another. This is to encourage the adoption of and participation in both long-term and short-term measures: long-term benefits (forestry, range, conservation activities) with less immediate appeal, along with the high yielding treatments with short or medium term benefits (irrigated crops, fallow reduction, fruit trees, etc.). To encourage adoption of the treatments which have only long term benefit (forests) or short term disbenefit (range management with no initial access to range under treatment) the project will finance the initial investment and establishment phase of these supporting activities. Despite these incentives the overall rate of project development may be slower than anticipated because of the need to integrate treatments. (The Sensitivity Analysis below indicates that a slower uptake of activities does not adversely affect the rate of return to any great extent.)

12. Flexibility. Flexibility in implementation is a key requirement for project success. The interactive approach of the project depends on the ability of the villagers firstly to identify problems to which the project can supply a solution and then to respond positively to the options. Because of this approach there is some uncertainty over the adoption patterns which will ensue. It is quite possible that some problems will be identified for which solutions have not been anticipated but which could be facilitated by the project. The economic

analysis is therefore indicative of the returns which can be anticipated and but cannot pretend to represent a blueprint solution. What is assumed is that solutions to new problems will have at least the same or better rate of return to those already anticipated.

13. During project implementation phase it is imperative that project management keep close contact with developments and that it maintain the flexibility needed to respond to the needs of the villagers. A project Monitoring and Evaluation facility has been provided for to assist in this aim (see Annex 7). Only by being responsive will the project be able to maintain the momentum needed to encourage the full participation of the villages and hence to achieve the flow of benefits envisaged in this analysis.

14. The willingness of villagers to participate in some areas may be affected by the land tenure and usufruct rights to the land in question. In some districts cadastral surveys have been carried out and cultivable areas belonging to the village are clearly established. Elsewhere formal clarification may be sought before treatments are accepted. The intensity and effectiveness of participation by villagers will depend to an important extent on commitment and ability of local project staff to establish trust and confidence with the farmers.

15. Inter-Agency Cooperation. The integrated approach to the problem solving of the villages will require the close cooperation of the various agencies involved in the project, both at field level and centrally. The projections used in the economic analysis assume that this collaboration will help ensure the coordinated development of the treatments envisaged. The failure to achieve close cooperation would jeopardize the orderly and combined implementation of the treatments selected and thus threaten the rate of return of the project.

E. Project Benefits from Forestry

16. On completion of the investment and establishment phase, the project will have effected a range of activities: forestry, livestock, wheat, fruit, and honey production. On plausible assumptions, forestry interventions would take place over 57,000 hectares with an expected value of output broken down as follows:

	Period (years)	Total Value (US$million)	Area (hectares)
SCA (incl. fodder)	60	231	17,800
Conifers	75	178	9,800
Oak Coppice	60	189	17,800
Fuelwood Coppice (incl. fodder)	60	134	11,800
Total		732	57,200

This represents a little over 1,000 hectares per microcatchment of rehabilitated or replanted forest resource. Over half the area contributes directly to improved fodder production for livestock and this accounts for almost 10% of the value of output. The details of output of woody biomass are provided in the attachment to Annex 3.

17. In the early years of the project there is a considerable output of wood due to the clearfelling operations undertaken as part of the oak coppice rehabilitation. Following the project period, thinning activities on newly established stands could maintain annual incremental output of about 38,300 cubic meters over the next five years. Harvested output then rises over the next five years (average 9931m^3/year) before steadily increasing further to an average of 155,000 cubic meters over the next 25 years, finally achieving over 210,000 cubic meters per year from year forty five. In practice, the changes in annual output will vary more gradually than indicated by the theoretical yield projections. The more gradual changes will be dictated by differing maturity dates and also by demand. Detailed estimates of the yeilds and contribution of the different treatments are given in Annex 3.

In order to achieve the outputs indicated it is important that the stands are allowed to mature and that extraction is carefully controlled.

F. Project Benefits from Crops and Livestock

18. The project would affect livestock activities largely through the greatly improved production of fodder but in addition some 2,700 cows are expected to receive artificial insemination or benefit from bull barns during the life of the project. Increased fodder production is anticipated at almost 117,000 tons of Dry Matter per year valued at US$70 per ton achieved as follows:

	Tons DM	Value (US$'000/year)
SCA (see above)	3,560	(249)
Fuelwood coppice fodder output (see above)	2,360	(165)
Range rehabilitation	5,430	380
Range and meadow improvement	13,500	945
Range seeding and fertilization	6,000	420
Wheat straw	3,560	249
Sainfoin	35,000	2,450
Vetch	21,550	1,508
Alfalfa	26,030	1,822
TOTAL	116,990	5,952

Production of almost 117,000 tons per year is achieved through better management and improved technology. The annual value of this production (excluding that from SCA and the Fuelwood Coppice areas counted above under forestry output) is almost US$6 million. In total it is sufficient for some 58,000 head of cattle or their equivalent in sheep/goats. The improved output will greatly relieve the pressure on the range areas which at present suffer from severe overgrazing and erosion.

20. Wheat production increases by over 30,000 tons per year as a result of the project despite a reduction in the overall area planted to wheat. The net increase in production of wheat is the result of improved cultivars and generally better technology. The reduced area planted to wheat is the result of taking the sloping lands, marginal to wheat production, and converting them to fodder production which is less susceptible to erosion.

21. Fruit production is expected to increase by some 42,000 tons as a result of the project. Over half of this is expected to be apricots grown under irrigation provided by the project. The full breakdown is as follows:

	Tons	Price (US$)	Value ($'000)
Apricots	22,930	500	11,465
Mixed Fruit	11,740	500	5,870
Almonds	4,930	1,200	5,916
Grapes	2,400	250	600
TOTAL	42,000		23,851

22. Honey production, a technology already well-known in the project areas, is expected to be very attractive to farmers provided they can get access to hives and swarms of bees. Increased production is expected to be in the order of 648,000 kg per year by the end of the project which is estimated to have an average value of US$5.20 per kilo (to include wax and honey). Detailed cost and output assumptions for the treatments are provided in the Working Papers for the Economic Analysis.

G. Sensitivity Analysis

24. The ERR of 18% per cent is robust as is shown by the following table:

Internal Rates of Returns of Net Streams

	BTOTAL	UP 10%	UP 20%	UP 50%	DOWN 10%	DOWN 20%	50%
CTOTAL	17.3	18.8	20.3	24.4	15.7	14.0	7.8
UP 10%	15.8	17.3	18.9	22.4	14.7	13.1	6.7
UP 20%	14.6	16.0	17.3	21.0	13.0	11.5	5.7
UP 50%	11.5	12.8	14.0	17.3	10.1	8.7	3.1
DOWN 10%	19.0	20.7	22.2	26.4	17.3	15.5	9.2
DOWN 20%	21.0	22.7	24.3	28.9	19.2	17.3	10.7
DOWN 50%	30.0	32.5	34.6	40.5	28.0	25.6	17.3

	BTOTAL	LAG 1	LAG 2	LAG 3
CTOTAL	17.3	15.2	13.6	12.3
UP 10%	15.9	14.0	12.5	11.3
UP 20%	14.6	13.3	11.9	10.9
UP 50%	11.5	10.7	9.6	8.8
DOWN 10%	19.0	16.6	14.8	13.3
DOWN 20%	21.0	18.2	16.2	14.6
DOWN 50%	30.0	25.5	22.3	19.8
LAG 1	-	17.3	15.2	13.6
LAG 2	-	-	17.3	15.2
LAG 3	-	-	-	17.3

25. The ERR of 17% obtains over a plausible mix of interventions, with widely-varying returns. The inclusion of low return treatments is essential to the multi-faceted approach to the problem of rehabilitation of the micro catchments. Their secondary benefits, such as less runoff and erosion, have not been quantified, but these arise in the form of improved long term production from the treatments adopted as part of the overall package in the lower areas of the micro catchment. Similarly, there are developments taking place elsewhere in Turkey such as the introduction of community forests which, if successful, could be introduced during the project.

STAFF APPRAISAL REPORT

TURKEY

EASTERN ANATOLIA WATERSHED PROJECT

SOCIOLOGICAL CHARACTERISTICS

A. Demography

1. A major proportion (about 50%) of the population in the project area provinces remains rural. The percentage is highest in Adiyaman (57%) and lowest in Elazig (45%). In Malatya and Elazig rural population, however, decreased by about 1% annually between 1985 and 1990, while there was 1.5% annual increase in Adiyaman. Although project area specific data on incomes are not available, rural per capita incomes in Eastern Turkey are estimated at about 40% of the average for Turkey, and infant mortality rates of 95/1000 are 50% higher than the average for Turkey. There are no concrete data to verify mobility patterns; however, it is apparent that seasonal out-migration is a frequent form of labor movement. The general pattern in Elazig and Malatya is one of supporting younger male members of the household to get established in non-agricultural activities outside the village while seasonal migration in Adiyaman takes the form of agricultural labor. Often entire families are contracted to work on adjacent irrigation schemes. The main reason for migration is the difficulty in securing an adequate livelihood from farming rather than the attractiveness of urban living. It is quite apparent that the majority of migrants would prefer to remain if opportunity would arise. Indeed it is very rare that an entire family disposes of its land and moves away permanently. Rural literacy rates in the three provinces amount to about 60% but are considerably lower for women. Tribal and kinship affiliations are strong and language presents a barrier for communication with the external community particularly in the case of women.

B. Village structure

2. The smallest administrative unit in Turkey is defined as a village. A more descriptive term, however, especially in Eastern Turkey is a "muhtarlik" (office of headman). A Muhtarlik contains a core village and a number of smaller settlement units. On average, there are some 3 units per muhtarlik in the project area provinces and the average population varies from 400 (Elazig) to 800 (Adiyaman). A survey of 20 villages revealed variations from 200 to 1,750 people per muhtarlik. The average size of a family is estimated at 6 persons giving the average muhtarlik size of about 100 families in the project area.

3. The muhtarlik lacks autonomous authority rendering it dependent on central government for most rural services. The Muhtar (Headman) is an elected position. The muhtar is the representative of the central government and in that

capacity is responsible for security, keeping military and population records, collecting taxes, and notifying authorities about health problems. The central administration through the provincial and county governors has direct control over the actions of the headman. The muhtar is, however, also in spite of potential conflicts expected to represent the village and defend its interests. The muhtar is a significant linkage point for development efforts. The actual leadership role of the headman is, however, curtailed not only by government controls over his actions but also by the internal power structure of the village. In the project area, the influence of tribal chiefs, landlords and sheikhs may exceed that of the muhtar. The village also has an elected council of elders which includes two non-elected members vis. the teacher and the imam (religious leader). The council can play an important role and has authority to delegate duties to members, to specify contributions in labor and money and to penalize those who do not abide by its regulations. The council, like the muhtar is accountable to the provincial and county governors. There are three sources of village income, salme, imece and grants. Salme is a form of income tax collected by the muhtar. The ceiling for collection is set very low and with inflation it is now impossible to meet village needs. Imece is a contribution of unpaid labor for specified activities. The council of elders is responsible for organizing imece and although presently an unpopular practice, it has a certain potential for participatory development. The village also retains 15% of state taxes collected from the village and may have certain other income such as rents of communal property, gifts, etc.

C. Land tenure

4. Crop land is privately owned and average farm size is estimated at 6.5 ha, although 62% of farms are under 5 ha in size. In the micro catchments average farm size is estimated at approximately 3 ha. In the plains and particularly in Adiyaman, there is a considerable concentration of land ownership and consequently also significant landlessness among the rural population. There is no reliable information about land distribution for the parts of the provinces which will be embraced by the project (mostly excluding the plains) but smaller surveys indicate that ownership is less skewed, landlessness thus less prevalent and that the main problem is an increasing fragmentation of holdings though inheritance. Tractor cultivation has become almost universal and has had the unfortunate side effect of increasing erosion, as it is mostly undertaken along rather than across the slope. Rangelands are state owned (treasury land) to which the village has usufruct rights. Such land can legally not become private property or be used beyond its designated purpose. Where cultivable such rangeland has, however, in practice frequently been ploughed and converted into cropland. Although each village appears to have exclusive user rights to its rangeland, there is very little management of this resource which over time with increasing population and livestock pressure has become severely degraded. The village may also have access to an area of highland pasture (Yayla) which is used during the summer with the help of permanent dwellings or temporary camps. A yayla may be shared by more than one village.

D. Role of women

5. Apart from child rearing and their traditional domestic tasks, women are play a major role in agriculture. This is more pronounced in the smallholder households and when the husband has outside employment. By and large, the sexual division of labor is not rigid but women tend to do more of the labor intensive and traditional types of activities, while the activities of men are more market oriented and concern external relations. Mechanized agricultural activities are male responsibilities. The feeding and milking of livestock are female chores, but women also make significant contributions to crop production. Male migration mostly implies more work for the women as only sporadic and low paid employment is available. The income from outside employment is only rarely sufficient to cater for family needs. Past development efforts have frequently resulted in increased female workload, but women tend to be concerned about water supply and health facilities and in village job opportunities for their men.

E. Livestock production

6. Most households keep cattle, sheep and goats mainly for subsistence purposes. A few, often landless households, have a more limited range of livestock. The livestock population has decreased as a result of insufficient productive pasture land. Many would like to expand their livestock keeping but are constrained by the non-availability of pasture and labor and the cost of purchased feed. While milk is an important element in the diet, livestock reared for meat are considered principally as a marketable commodity, especially sheep. So long as range management advice includes information about appropriate herd size and carrying capacity, range improvements should not be threatened by excessive increase in livestock numbers.

F. Some development conclusions

7. The following key conclusions for the development work have been suggested:

(a) Settlement is scattered and villages are not very homogeneous (varying tribal affiliation, kinship lines, poverty status) necessitating a broad participation by different groups in the planning of the development effort and in sharing the benefits. The involvement of women is crucial.

(b) Agriculture and livestock are becoming secondary sources of livelihood for some rural households. Although there has in some places been a reduction in the livestock population, this trend has not yet resulted in any substantial relief in the pressure on natural resources since almost all families continue to cultivate their farms and productivity has remained stagnant. Over time it is likely to result in some permanent transfer to other occupations, change of family residence and consequently in increasing farm size and improved prospects for the remaining farming population as well

as for environmental sustainability. It will be important to avoid discouraging the transition that is now under way, while assisting those that expect to remain in agriculture to raise the productivity.

(c) The lack of autonomous authority of the village administration has created a dependency on central government services and handouts. This is an obstacle in promoting village responsibility for improved management of rangelands and for developing a partnership in the management of forest lands. Genuine village participation in planning the development efforts and in sharing the costs and benefits will require sustained efforts.

STAFF APPRAISAL REPORT

TURKEY

EASTERN ANATOLIA WATERSHED REHABILITATION PROJECT

TRAINING AND TECHNICAL ASSISTANCE

1. There is limited experience within Turkey of "Integrated Watershed Development" involving collaboration between different Ministries and Departments in planning and implementing a coordinated effort of natural resources rehabilitation. A key feature of successful watershed development is the close involvement of the people who use the resources in question. Unless the program responds to their priorities and requirements and brings quick and substantial benefits, the improvements are unlikely to be sustained. This kind of "participatory" or "interactive" planning is also to a large extent new to Turkey. Little attention has in the past been given to the rehabilitation and improvement of communally used rangelands. The treatment of such lands will be of major importance in the watershed development efforts. The training and technical assistance component of the project is designed to overcome these gaps in the domestic experience and to upgrade the technical skill of the staff in the three provinces who will be involved in project execution. A complicating factor is the present quick turnover of staff. It will be important to counter this by emphasizing the innovative, path-breaking nature of the project, participation in which may open up new career opportunities when the approach is replicated in other parts of Turkey. Some turnover will, however, be unavoidable and will need to be considered in the design of the training program.

A. Training

2. Throughout implementation the micro catchment planning process will introduce project objectives, the participatory mode of operation, the technical treatment options and their estimated effects on production, the local responsibilities for management of range and forest lands and the cost sharing arrangements to the concerned villagers. This can be done through study trips to adjacent micro catchments (at later stages of the project), through visits to sites where different treatments have been implemented, and through more formal training sessions in local schools and other facilities. During implementation, it would be desirable to reinforce the management aspects by discussing, for example, the shepherds' grazing practices and how they can be modified. The project area may be estimated to embrace some 40,000 families. The aim would be to expose 25% of these families to a three-day training. 30,000 training days at an average cost of US$10 would be required. The training would include senior members of the village, in particular the teacher, imam, muhtar and village elders, who would also receive initial training in a separate session. Provincial staff would work together from KHGM, MOF and PDA to serve as teachers and the project would

rent buses for the study trips. The training would in summary cover the following topics:

- project objectives and participatory MC planning;
- study trips to adjacent MCs and treatment sites;
- rangeland treatments;
- forest land treatments;
- supporting treatments;
- village responsibilities in the management of range and forest lands.

Detailed training programs would be worked out with the help of a training specialist, recruited as short-term technical assistance.

3. Existing facilities (including schools and universities) would be utilized for training. The training would be undertaken by specialists at the provincial level. Ankara based specialists and the technical assistance provided under the project would prepare the provincial staff for these tasks and conduct some of the training. A manpower development and training officer at the PCSU would be responsible for the planning and monitoring of the program, assisted initially by short-term technical assistance. The average cost per training day is estimated at US$30. The proposed courses amount to about 24,000 training days as specified below:

(a) inception course for project staff (3 days x 100 staff; repeated each of the following six years for 20 new employees) = 660 training days;

(b) information day for non project staff (1 day x 3 provinces x 20 officials x 6 years) = 360 training days;

(c) annual workshop for project staff (2 days x 3 provinces x 100 staff x 6 years) = 3,600 training days (at the Forestry training institute in Elazig which has accommodation for 50 people; remaining staff would be accommodated at government resthouses elsewhere in the city);

(d) technical training in forest, range and supporting treatments (5 days x 100 staff; repeated each of the following five years for 30 new staff) = 1,250 training days;

(e) special training:

(i) design and analysis of demonstrations (5 days x 10 staff x 3 occasions) = 150 training days (at Diyarbakir or Erzurum agricultural research institutes);

(ii) monitoring and evaluation (10 days x 10 staff x 6 occasions) = 600 training days;

(iii) computer operators (9 days x 50 staff x 10 occasions) = 4,500 training days (contracted to private training companies to support supplier training purchased with the equipment and software);

(iv) nursery management (10 days x 25 staff x 4 occasions) = 1,000 training days (Elazig or Eskisehir school for nursery men);

(v) tractor operations (7 days x 25 staff x 4 occasions) = 700 training days; (the course would take place at the Forest Training Center in Kahmaranmaras)

(vi) bulldozer operators (part of training provided by supplier; twice 5 days x 50 staff x 3 occasions) = 1,500 training days (the course would take place at the Forest Training Center in Antalya);

(vii) there is provision equivalent to 5,000 training days to be allocated as the need arises.

(f) Language training (80 days x 50 employees) = 4,000 training days (in Ankara and the three provinces through private courses).

4. The two main objectives in establishing a definitive program of overseas studies would be to arrange study trips to and short term training in (a) watershed development approaches including participatory planning and common property resource management (Thailand, India, Pakistan, Philippines, Australia, etc.), (b) range management (Australia, New Zealand and Western USA), and (c) some outside experience of coppice rehabilitation, silvipasture and of involving local villages in the protection and management of forest land would be worthwhile (e.g. South Korea, Germany, Switzerland, Sweden) Finally, (d) study tours would also include exposure to different methods of soil conservation (Italy, Australia, New Zealand, France, Morocco, Tunisia). Forage production and agroforestry on farm land could also be of interest. Some 60 person months of study tours and 48 person months of short-term fellowships have been budgeted. In addition, 64 months of study tours within Turkey to review natural resource management programs are envisaged. (Note: This training excludes GIS related training). Overseas training would be administered by a specialist contractor, through a separate technical assistance contract.

B. Recruitment of Technical Assistance

5. In order to help develop a cadre of planners and implementators of watershed rehabilitation, the project envisages Technical Assistance (TA). The job descriptions for the various long term and short term TA specialists required are in Sections D through I. A key role of the team to be recruited will be to train and work very closely with national government staff (see training above). TA is identified as being both national and international

and recruitment would be carried out accordingly. Terms of reference for specific experts follow after para 11.

6. TA recruitment would be under one major contract, including Turkish specialist TA, with additional local contracts for research, monitoring and social surveys separately. The advantages of letting a single contract are that with one consultancy company in charge, the Government would be assured of coordinated technical and administrative support for the entire TA team. For the two best companies, at least the Watershed Rehabilitation Specialists, who will be the effective team leader for the TA, would be interviewed in Turkey. (The visit would be financed by the company bidding; any additional candidates interviewed would be funded by the project.)

7. The Government would initiate an annual procedure of Technical Assistance evaluation. The evaluation is a two way process that would also allow staff to identify specific achievements as well as areas of difficulty. Such evaluation would form part of the annual planning process whereby individuals would set themselves professional goals which would then be reviewed at year end. The annual staff evaluation would be discussed and acted upon with the consultancy company providing the TA.

8. The exception to using the single company approach to TA recruitment might be the Monitoring and Evaluation Specialist who theoretically should be independent of the main project implementation and TA team. However, the need to work closely together for successful project implementation, indicates that to appoint an independent individual would cause friction. It is recommended the tender process invite bids for all positions but that the Government reserve the right to appoint an independent MIS/M&E specialist should an acceptable candidate be identified.

C. Timetable

9. The recruitment of the TA would take approximately five months.

Activity	Activity time (weeks)	Total weeks elapsed
1. Create and notify Committee for TA selection	1	1
2. Preparation of bid documents, TOR, LOI and ratification by Government and Bank, selection of shortlist	3	4
3. Invitation to 4-6 shortlisted companies	6	10
4. Opening and Evaluation of bids	3	13
5. Interviews for shortlisted TL candidates	1	14
6. "No objection" procedure with the Bank	1	15
7. Contract negotiation and signature	1	16
8. Arrival of first TA in the field	5	21

10. The recruitment of the TA would take some 21 weeks as shown above and although some improvements can be made, it is unlikely to take less time if the full procedures are observed. Indeed, it would be prudent to allow an additional four weeks for unforeseen slippage to allow for delays.

11. The technical assistance would report to the Project Coordination Unit (PCSU) in Ankara and would provide on the job training to counterpart staff within that unit and in the provinces, when TA would be based. The TA would also help to locate and design local and international training courses for project staff. In all, 97 months of international technical assistance (unit cost US$18,500 per month for short-term, US$12,500 per month for long term) and 39 months of domestic consultancy services (unit cost US$3,000 per month) are provided for as specified below: (the breakdown between foreign and local consultants is an estimation only: actual consultants' proposals may differ substantially from this). Terms of reference are specified in sections D through I. In addition, a lump sum of US$384,000 is provided for specialized studies to be determined during the project period (e.g. impact analysis prior to the project implementation review, plus supporting ad hoc surveys in year 4, and project preparation for a second phase in year 6).

	YEAR							
	1993	1994	1995	1996	1997	1998	1999	TOTAL
Watershed Rehabilitation Specialist	4	9	9	2	2	0	2	28
Monitoring/MIS/Economist	3	3	1	1	1	1	2	12
Training Expert (int.)	3	2	2	2	0	0	0	9
Range Management	3	6	6	2	2	1	1	21
Participatory Planning Specialist	3	2	2	1	0	0	0	8
Adaptive Research Consultancies	2	2	1	0	0	0	0	5
Short-term Consultancies (int.)	2	2	2	2	2	2	2	14
Short-term Consultancies (dom.)	5	7	7	7	7	4	2	39
TOTAL	25	33	30	17	14	8	9	136

Note: excludes T.A. associated with GIS, see Section I.

D. Watershed Rehabilitation Specialist

Duties

12. The Watershed Development and Rehabilitation Specialist would work closely with Project counterparts, participating line agencies, and trainees to develop management plans for priority micro-catchments. In so doing, the incumbent would provide on-the-job training in watershed development and rehabilitation, as well as help establish the format and trend of watershed planning during the initial years of project implementation.

Scope of Work

13. Working closely with counterparts, participating line agency staff, and trainees, the specialist would assist Project staff to formulate work plans to guide watershed planning and implementation in the project area.

14. The incumbent would assist participating line agencies and staff to assemble baseline data including maps, aerial photos, satellite imagery, statistical output data, land-use data, climatic data, streamflow and sediment

discharge data, etc. In collaboration with participating agencies, the specialist will actively work in the micro-catchments listed for implementation. The specialist will assist participating staff in the methodologies and principles of watershed rehabilitation and development planning. These plans will follow the guidelines and concepts presented in Annex 5.

15. He would play a key role in helping project staff assemble the skills they require to implement the project. While many of these skills are technical, they also involve helping participating staff gain proficiency in village-level, participatory group communications. The technical skills the specialist would help staff planners acquire would initially focus on traditional survey methods such as pacing, compass, and transit; but would introduce the practical application of computerized resource information systems being developed by the PCSU.

Qualifications and other Experience

16. The incumbent would hold a degree in either watershed management, agricultural science, or forestry. He would possess at least 10 years of experience in soil and water resource planning, some of which should have been gained in sociological and agro-ecological environments similar to those in the project area. In addition he would be versed in each of the following technical skills:

(a) Computer literate in wordprocessing and use of standard spreadsheets;

(b) Soil sampling, soil survey, land use capability, and soil classification;

(c) Soil loss and run-off estimation procedures including for non-agricultural lands;

(d) Runoff estimation procedures;

(e) Participatory land use planning procedures;

(f) Soil and water conservation;

(g) Small-scale irrigation design;

(h) Mapping skills, aerial photo interpretation, and the practical aspects of GIS and GPS.

17. In addition, the incumbent should be capable of working on steep slopes under difficult conditions.

Place of Duty

18. Elazig, Malatya and Adiyaman provinces in eastern Turkey.

Duration of Contract

19. Twenty eight months over the period of the project: 4 months in year 1, 9 months in years 2 and 3, followed by 2 months in years 4 and 5. He will provide a final 2 months in year 7.

E. Rangeland Management Specialist

Duties

20. The Rangeland Management Specialist would work with provincial project staff to help them develop a better understanding of rangeland productivity assessment, rangeland rehabilitation and rangeland management in the project area. He or she would focus on means of assessing rangeland productivity at different times of the year, and management strategies to maintain or increase rangeland productivity. He or she would help prepare rehabilitation plans, help design adaptive research trials for rangeland sites and develop techniques for range productivity assessment and self-monitoring.

Scope of Work

21. The Rangeland Management Specialist would work with provincial extension and forestry staff and farmers to strengthen their capabilities in rangeland management. This would include developing strategies to facilitate formation of village rangeland management groups. He or she would work with project staff to develop management strategies to maintain or increase rangeland productivity and facilitate their inclusion in rangeland management plans developed and implemented with village groups.

22. The Specialist would work with project staff to develop means of assessing rangeland productivity at different times of the year. Once developed, these would be linked to management strategies for sustainable rangeland grazing. These strategies would be extended to village groups to help with the formation and implementation of rangeland development plans. The Rangeland Management Specialist would train provincial staff to develop and help implement village rangeland rehabilitation plans and design adaptive research trials for rangeland sites.

23. The Specialist would work with pastoralists and project staff to develop techniques for range productivity assessment and self-monitoring. Auto-recording formats would be determined with pastoralists and the organization and management of data collection and analysis would be developed with the Project Coordination and Unit.

Qualifications and Experience

24. The Rangeland Management Specialist would be an international consultant with qualifications in rangeland science and more than 10 years practical experience in the management and sustainable use of shrub rangelands in Turkey or regions with similar agro-ecological conditions. He or she should be used to working in the field with extension agents and pastoralists and should be able to adapt ideas and technologies quickly to the conditions of the project area. He or she should also be able to demonstrate the ability to develop an understanding of the needs of pastoral communities participating in the project. The Rangeland Management Specialist would be experienced in the use of auto-recording or self-monitoring techniques for collecting rangeland management information with pastoral communities. He or she should have practical experience in the rehabilitation and management of rangelands using extensive techniques. The Specialist will speak and write fluent English.

Place of Duty and Duration of Contract

25. The Rangeland Management Specialist would work with provincial PUBs throughout the project area. The duration of the contract would be 3 months in year 1, 6 months in years 2 and 3, 2 months in years 4 and 5, and 1 month each in years 5 and 6. Assignments would be during the spring and summer months.

F. Economist/MIS/Monitoring and Evaluation Specialist

Duties

26. The specialist would be required to work closely with project management to develop practical Management Information Systems and to devise a program for monitoring and evaluation acceptable to Government and the Bank. As required, from time to time, the specialist would assist management in the analysis of specific components of the project and help with the forward planning of project activities.

Scope of Work

27. The specialist would work closely with project counterparts, in particular the Central Unit established in the MOF and other participating line agencies. Training counterparts would form an important component of his/her work. The specialist would work closely with the teams preparing the micro catchment development plans and would advise on the economic viability of proposals. He/she would devise systems and sources for the collection and analysis of technical and financial parameters for he treatments on offer to the villagers in the MCs as well as data on potential treatments. The database so created would be continuously updated so that the MC development plans can be accurately reviewed as low cost, technically viable and with an acceptable rate of return.

28. The tools and approach to the participatory approach to MC planning (discussion, presentation, the menu of treatments, mutually exclusive options, explanatory variables etc.) would be constantly under review and the MIS specialist would assist management to devise ever more transparent means of explanation of the options. The constantly evolving approach would streamline the planning process and help identify bottlenecks. At the same time the specialist would help devise systems for monitoring activities in the MCs to assist management in the smooth planning and implementation, with modifications, as appropriate.

29. The specialist would develop a micro catchment model which would be gradually refined to reflect the technical, economic and climatic differences between the regions within the project. The models would be used to:

(a) measure the pre-project situation for each village;

(b) measure the project impact on each village in the MC;

(c) prepare an aggregate model of project activities and impact for each treatment, in each province and for the project as a whole;

(d) allocate project resources, and determine cash flow requirements, both annually (project budget) and implications for expenditures up to and beyond the life of the project;

(e) develop key socio-economic indicators of project impact (qualitative and quantitative): regional, provincial, sub-catchment, micro catchment, and individual level.

30. The M&E program would be devised to coincide with the planning cycle so that information on past activities could be assimilated into the next planning cycle. In this way, the methodology of both collecting and using the data would be progressively to updated and refined as an effective management information system with wide application. The specialist would also help develop the data base in such a way as to facilitate the planning of activities beyond the present project.

31. The specialist would work closely with and train national staff to fulfill the activities outlined above. Particular emphasis would be given to the need to involve multi-disciplinary skills in the planning process and formal procedures would be established to bring together the expertise of the project as represented by technical assistance and other senior project staff. Emphasis would be given to crating close links between the participating line agencies to improve coordination in planning and to stimulate efficient decision making. While work will be carried out mainly at regional level, the specialist will help strengthen the capacity of the Central Unit so that it will play a greater direct role in future planning activities. The specialist would review annually his/her assignment with project management and senior officials of the participating line agencies.

Qualifications and experience

32. The Economist/MIS/Monitoring and Evaluation specialist would hold a degree in agricultural economics and relevant experience extending over at least ten years. He/she would demonstrate and ability to work with multi-disciplinary teams and competence to set up successful operational procedures. The appointment will involve much reciprocal training and learning for which an aptitude should be demonstrated. Technical skills would include:

(a) computer literacy with experience in setting up large database systems, using spreadsheets and word processing;

(b) ability with Bank software: PCCOSTAB, COSTBEN and FARMOD;

(c) micro project planning and economic and financial feasibility analysis;

(d) ability build quantitative models with specific application to management information systems and forward planning;

(e) skills in preparing annual budget requirements;

(f) knowledge of farm survey systems and the scope for data capture from rural populations.

Experience of working in eastern Turkey would be an advantage.

Place of duty

33. The Economist/MIS/Monitoring and evaluation specialist would work directly for the PCSU with extensive fieldwork throughout the project area. He/she would work very closely with the Central Unit based in MOF Ankara.

Duration of contract

34. Twelve person months over the project period are budgeted in the project costings. Input would be provided at intervals with three months per year in the first two years, one month per year for four years and two months in year seven.

G. Participatory Development Specialist

Duties

35. The Participatory Development Specialist would work with the provincial project staff to implement initial Farmer Center Problem Census and Problem Solving (FC-PCPS) field work and other socio-economic studies required for preparing micro-catchment plans to be implemented in the first three years of the project. He or she would also develop a cadre of Community Development Specialists (CDS), from existing provincial staff, to work as the

project CDS with each provincial Project Implementation Unit (PUB). This person would adapt FCPCPS techniques to the project area and carry-out FCPCPS training courses.

Scope of Work

36. The Participatory Development Specialist would work with provincial PUBs to facilitate the conduct of problem census meetings during planning of village and micro-catchment plans. Similarly, the Specialist would conduct problem solving activities in collaboration with technical staff working on the project from MoF, PDA, and KHGM.

37. Whilst conducting FCPCPS work and facilitating micro-catchment planning, the Specialist would train selected staff from project institutions in participatory development and FCPCPS techniques. In particular, he or she would develop the skills of one existing staff member in each provincial PUB to become the provincial community development specialist (CDS) working in each project province.

38. Whilst conducting community development work in the field and contributing to the preparation of micro-catchment plans, the Specialist would adapt problem census and problem solving techniques to increase their appropriateness to the objectives of the project and the needs of participating communities. He would develop a procedure normal for participating watershed planning and implementation.

Qualifications and Experience

39. The Participatory Development Specialist would have international and Turkish experience and agricultural or rural development qualifications and experience in participatory development in rural development projects. He or she will have experience in implementation of participatory watershed development projects. He or she will have practical experience in the adaptation and use of FC-PCPS techniques for watershed development projects, and the participation of community groups in natural resource management. The Participatory Development Specialist would speak and write fluent English with, at least, good working Turkish.

Place of Duty and Duration of Contract

40. The Participatory Development Specialist would be based in the project area and would work throughout the project area in field and office locations as required by the provinces. The assignment would be for 8 months, 3 in year 1, 2 in years 2 and 3 and a final 1 month in year 4.

H. Adaptive Research Specialist

Duties

41. The Adaptive Research Specialist would work with provincial project staff to establish adaptive research programs and develop a cadre of Adaptive Research Specialist (ARS), from existing PDA staff, to work with each provincial PUB. This person would design adaptive research techniques, suitable for the project area.

Scope of Work

42. The Adaptive Research Specialist would work with provincial PUBs and Directorates of Agriculture to facilitate the conduct of adaptive research in priority sub-catchments. He or she would develop strong linkages between regional research institutions relevant to the project and project institutions at provincial, county and village levels. Key institutions would include: Eastern Anatolian Regional Agricultural Research Institute in Erzurum; Southeastern Anatolian Regional Agricultural Research Institute in Diyarbakir; Field Crops Research Institute in Ankara; Rural Affairs Regional Research Institute in Şanliurfa; and Rural Affairs Regional Research Institute in Erzurum, and Forestry Regional Research Institutes in Elazig.

43. Whilst undertaking initial adaptive research work and facilitating micro-catchment planning, the Specialist would train three PDA staff in adaptive research techniques and develop networks between these staff and research scientists in relevant research institutions.

44. The Adaptive Research Specialist would work to develop detailed curricula for adaptive research and participatory technology development courses. He or she would present these courses during the first project year. Subsequent courses would increasingly be presented by the provincial ARSs trained by the Specialist.

Qualifications and Experience

45. The Adaptive Research Specialist would have agricultural qualifications and post graduate training in crop production. He or she will have more than 10 years field experience in the planning and implementation of adaptive research in the field - at least some of which should have been gained in eastern Turkey. The Adaptive Research Specialist would speak and write fluent English and a working knowledge, at least, of Turkish would be an advantage.

Place of Duty and Duration of Contract

46. The Adaptive Research Specialist would be based in the project area. The assignment would be for 2 months in years 1 and 2, and 1 month in year 3.

I. Thematic Mapper/GIS/GPS Specialist

47. Financial provision in year 3 of the project has been made for provision of a simple GIS system, hardware, software, training and technical assistance. The precise form the GIS would take has not yet been finalized.

48. A total of 10 person-months of international and 32 person-months of Turkish technical assistance has been envisaged in the GIS component, together with on-the-job training. The initial contract of the GIS specialist would be for 3 months. During this time, he would determine detailed needs for further technical assistance, assess the skills of provincial staff and design and adapt appropriate technologies and training programs. His/her assignment would be likely to be lengthened by a further seven months spread over the following three years.

49. The specialist would work initially in Ankara to design, establish and implement a computer-based database for use in physical planning and project management at the MC, provincial and project levels. The database would include a simple GIS, probably (IDRISI) with the ability to create and interpret thematic maps and to use Global Positioning System (GPS) inputs from fieldwork. The specialist would conduct in-house training at several levels, and would prepare all relevant training materials. The specialist would commission three similar systems (one in each project province) and continue training activities. An important task at this stage would be to ensure that coordination procedures between the provinces and Ankara were functional.

50. The specialist would have a university postgraduate degree in the design and/or use of computer-based information systems used in processing spatially-related data. He or she would have extensive recent practical experience in relevant fields and complete fluency in English.

J. Training Specialist

51. The Training Specialist would work with the Project Coordination and Support Unit in the Ministry of Forestry and with the three provincial Project Implementation Units to identify the specific training needs of provincial and county level staff from the provincial Departments of Agriculture, Forestry and Village Affairs. The Specialist would prepare a plan for in country training, detail outlines of the different courses and determine the resource requirements for execution of the plan.

Scope of Work

52. The Training Specialist would:

(a) plan farmer training (SAR Annex 11, para 2);

(b) review or together with responsible officers develop job descriptions for staff in the three agencies concerned with the planning, implementation and monitoring of the project;

(c) review staff experience and capacity for carrying out these assignments;

(d) plan in country staff training to improve capacity to execute the tasks assigned in respective job description (see also SAR Annex 11, para 3); due to high staff turnover repeater courses will be required;

(e) plan the organization, resource requirements (including teachers) and venues for the training efforts; and

(f) guide the efforts to develop training material.

Qualification and Experience

53. The Training Specialist would be an international consultant with a degree in agriculture or forestry and post graduate qualifications in adult education. The Specialist should have at least five years experience in preparing and implementing adult training programs associated with development projects and should be fluent in English.

Place of Duty and Duration of Contract

54. The Specialist would work in field and office location in Adiyaman, Elazig and Malatya for three months in the first year, and two months in each of years two, three and four (total 9).

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ADAPTIVE RESEARCH

1. On-farm adaptive research and demonstrations would be conducted in the project micro-catchments. Adaptive research in each province would be facilitated by an Adaptive Research Specialist. This person, selected from existing PDA staff, would work with the Watershed Management Specialist (WMS) and staff from each provincial institution implementing project components to establish demonstrations and to carry out on-farm adaptation trials in selected micro-catchments. The ARS would act as the link between villages, the Provincial Implementing Unit (PUB), the Regional Agricultural Research Institutes in Erzurum and Diyarbakir, the Rural Affairs Research Station in Şanliurfa and the Forestry Research Station at Elazig. Regional research institutes as well as relevant universities have expressed support and have confirmed their willingness to work with the ARS to service the adaptive research needs of this project.

A. Agriculture

Demonstrations and Applied Research

2. The project would finance the following demonstrations for which indicative areas are given below.

(i) Demonstration, on a total of 5 dekars in each of the 54 project micro-catchments, of conservation tillage practices on the contour using sweep tined cultivators instead of mouldboard ploughs. Sites would be selected in each village with arable land having slopes in excess of 4 per cent.

(ii) Demonstration on a total of 5 dekars in each of the 54 project micro-catchments on the effects of sowing time of wheat, chickpeas, lentils, Hungarian Vetch, and sainfoin on productivity and soil management. Autumn sowing would be promoted in all micro-catchments but in extreme areas, spring sowing of some pulses and forage legumes would also be demonstrated.

(iii) Demonstration on 5 dekars in each of the 54 project micro-catchments of the yield effect of different rates and application times of fertilizer.

(iv) Demonstration on 5 dekars in each of the 54 project micro-catchments of HYV wheat. These demonstrations would promote the replacement of traditional wheat varieties with high yielding varieties grown with recommended husbandry. Demonstrations would be designed to convince both farmers and VGT of the impressive potential for increasing

cereal productivity in the project area and to take wheat production away from the more marginal erosion prone areas.

(v) Demonstration of irrigated vegetable and fruit production on a total of 5 dekars in each project micro-catchment where irrigation is developed. Irrigated production demonstrations would focus on efficient water application, soil-crop-water relationships and production of high value horticultural crops.

(vi) Demonstration of fallow reduction techniques using conservation tillage and production of chickpeas and lentils on a total of 5 dekars in each project micro-catchment. This component would complement TUYAP II in Adiyaman and Malatya.

Adaptive Research

3. Adaptive research programs not included in the Agricultural Research Project would be implemented in one or more of the 10 sub-catchments for dryland agriculture. A budget of $6,000 has been allocated per province for adaptive research each year to identify appropriate packages for:

(i) sustainable seedbed preparation on slopes between 4 and 15 per cent slope to be implemented on project micro-catchments in Adiyaman, Elazig and Malatya;

(ii) sainfoin (Elazig and Malatya), alfalfa (Elazig, Malatya and Adiyaman) and Hungarian vetch (Elazig, Malatya and Adiyaman) agronomy on marginal cereal lands on project micro-catchments;

(iii) the use of herbicides as an improved management tool for minimum tillage with field crops; and

(v) runoff and erosion measuring plots to calculate soil loss.

B. Rangelands

4. The project would fund the following demonstrations and adaptive research:

Demonstrations

(i) Demonstration on a total of 10 dekars in each project micro-catchment on rangeland to encourage adoption of the general prescription of 5 kg N/da and 7 kg P_2O_5/da using diammonium phosphate (DAP at 25kg/da on 5 dekar) and triple super phosphate (TSP at 15 kg/da on 5 dekar).

(ii) Demonstration on a total of 10 dekars in each project micro-catchment on enrichment seeding using a mix of sainfoin *(Onobrychia viciifolia* of 30 kg/ha), alfalfa cv Kayseri (*Medicago sativa* at 10 kg/ha), *Andropogon cristatum* (at 10 kg/ha), and *Bromus inermis* (at 10 kg/ha).

(iii) 10 dekar demonstrations in each project micro-catchment of grazing management.

(iv) Demonstrations on perennial forage bank development and management on marginal cereal land and appropriate rangeland sites. Species would be sainfoin (*Onobrychis vicilifolia*) sown in a mix at 50 kg/ha and alfalfa (*Medicago sativa*), cv Kayseri, sown in a mix of 10 kg/ha, with appropriate grasses, principally *Agropyrin cristatum* sown in a mix at 10 kg/ha and *Bromus intermis* sown in a mix at 10 kg/ha. 150 kg/ha diammonium phosphate fertilizer would be applied at establishment. Other legumes such as annual medics (especially *Medicago rigidula and M. minima*) could be tested in Elazığ and Malatya.

Adaptive Research

5. (i) Adaptive research programs in each province to assess fertilizer and seeding treatments under grazing conditions on mer'a and yayla. Research is needed in Eastern and SE Anatolia to define fertilizer and seeding response for both mer'a and yayla under grazing conditions. The importance of phosphatic fertilizers in encouraging and maintaining legume content of rangelands is particularly important. Range species composition would also be assessed.

(ii) The impact of increased fodder on livestock productivity and soil management will be the focus of fertilizer work. Least cost packages of maintenance fertilization after rehabilitation need to be developed, especially for marginal range. Research design would be developed based on experience derived from the Erzurum Pilot and Range Development and Forage Project. It would complement the forage legume adaptive research.

(iii) Adaptive research would be carried out with runoff and erosion measuring plots to calculate soil loss from representative rangeland soil and slopes in each province. This would be led by the KHGM regional research institutes in Erzurum and Şanliurfa. Plots would be established on 3 land erodibility types in each province and include replicated treatments representing ungrazed range, fertilizer enriched range.

(iv) Pilot aerial seeding and fertilization of 5,000 ha of severely degraded range using appropriate range grass and legume species pelleted with DAP fertilizer (250 kg/ha), relevant rhizobial inoculants and a yellow dye to facilitate monitoring. Seed would be pelletized prior to aerial sowing. Pellet size would be designed to protect the seed from seed collecting range ants and rodents. The seed mix would be sown in October-November and include *Onobrychis sativa*, (sown in a mix at 40kg/ha), and *Medicago sativa* cv Kayseri (sown in a mix at 15 kg/ha). These could be mixed with appropriate grasses, principally *Agropyron cristatum* (sown in a mix at 10kg/ha) and *Bromus inermis* (sown in a mix at 10kg/ha).

Suitable trial sites exist in Göksu, Hekimhan, Kahta, Kusuova, Pütürge, and Tohma sub-catchments.

C. Forest Land

6. An active and relevant program of adaptive research will advance the progress and success of forestry in the region. While the necessary institutional structure exists, it requires strengthening and focus. Project sponsored research would include the following topics and be implemented in each of the three provinces:

- Quantification of the impacts associated with Soil Conservation and Afforestation (SCA) bench terraces and ripping on the water balance and soil loss;

- Comparative survival and growth of trees under mechanically treated and untreated conditions on similar sites. This would include a comparison of direct seeding and container grown trees.

- Quantification of comparative growth and survival of fertilized and non-fertilized trees including those established by direct sowing.

- Pilot management of rehabilitated forest area by local communities, adapting from the model developed under the Swiss Funded Community Forest Project.

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DOCUMENTS AVAILABLE IN PROJECT FILE

1. Preparation Report — February 1992

   Vol. 1 Main Report
   Vol. 2 Technical Appendices on
   - Agriculture
   - Rangeland
   - Forestry
   - Soil Conservation
   - Reservoir Sedimentation
   - Hill Slope Hydrology
   - Sociology
   - Megra Deresi Micro-Catchment Plan

2. Detailed Project Costs — October 1992

3. Detailed Economic Rate of Return Calculations — October 1992

4. FAO Report on GIS Requirements for the S.E. Turkey Watershed Rehabilitation Project TCP/TUR/2251 — June 1992

5. Draft Final Micro-Catchment Plans — November 1992
   on the following 6 micro-catchments:

   1. Piran/Temte (Elazig)
   2. Sahsuvar (Elazig)
   3. Kamincayi (Malatya)
   4. Hancayi (Malatya)
   5. Sogutlubahce (Adiyaman)
   6. Beskoz (Adiyaman)

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MICRO-CATCHMENT PLANS FOR FIRST YEAR PROJECT IMPLEMENTATION

Introduction

1. Following appraisal and agreement on guidelines for MC planning (Annex 4) in July of 1992 each province organized a planning team with members from the three implementing agencies. The objective was to prepare 2 MCs in each province to train staff in the new participatory and integrated approach to planning, to allow the project a good start in 1993 and to check the cost estimates and the balance between different types of treatment. The experience was also expected to result in further refinement of the MC planning guidelines (now inserted in Annex 4). A small consultant team assisted the three provinces in this task. The provincial teams are themselves engaged in the preparation of a third MC in each province which may also be implemented 1993.

Selection of MCs

2. The selection reflects the priority given to upland areas, and MCs or part of MCs with stable production systems and unstable geology which do not respond to treatment have been excluded. The selected MCs are concentrated in one sub-catchment in each province to facilitate implementation.

General Characteristics

3. Available data on the number of households, land use, crop production and livestock population are summarized in Table 14.1 below. The number of households in the 6 MCs (30 villages) amount to 2734 or on average 455 per MC and 91 per participating village. It should be emphasized, however, that there are wide differences between microcatchments.

4. The average area per MC amounts to 6,913 ha which if extrapolated to the 54 MCs would give a total project area of about 373,000 ha, slightly less than the 400,000 estimated in the SAR. The average farm size (arable land per household) is close to 4 ha and the range area (within the MC) per household is about 3.5 ha. The land use characteristics are summarized below. The 6 MCs have a larger proportion of forest land than the 54 MCs selected for land use clarification purposes and summarized in Annex Table 16 of Annex 1A.

Average Land Use in Selected MC

	6 MCs % 1/
Forest land	39
Range land	24
Arable land	26
Unproductive land	11

1/ Source: calculated from 6 MC plans (see Annex 13); Table 14.1

About 16% of arable land is irrigated and 34% is devoted to horticulture in the six MCs which have been planned so far.

Table 14.1: General Characteristics
(ha)

	Piran/T.	Sahsuvar	Kamincayi	Hancayi	Sogutl.	Beskoz	Total 6 MC
Households	540	420	121	412	533	744	2770
No. of villages	5	4	3	4	5	10	31
Household/village	108	105	40	103	107	74	89
Land Use							
Forest land	3405	1662	1722	1961	3982	3516	16248(39%)
Range land	1850	2000	1159	1314	785	2670	9778(24%)
Arable land	1750	911	289	1121	1872	4804	10747(26%)
- Rainfed	1120	360	146	692	1010	2070	5398
- Irrigated	491	255	87	245	196	392	1666
- Horticult.	109	296	56	169	666	2342	3638
- Meadow	30	0	0	15	0	0	45
Unproductive	35	100	95	244	1989	2245	4708(11%)
Total	7040	4673	3265	4640	8628	13235	41481(99)
Crop Production							
Wheat	317	270	123	569	810	1177	3266(30%)
Barley	182	51	39	165	225	270	932(9%)
Maize	0	0	8	15	26	0	49(0.5%)
Pulses	40	16	30	60	205	82	433(4.0%)
Forage incl. meadow	43	4	17	26	12	8	110(1.0%)
Tobacco	0	0	11	51	0	0	62(0.5%)
Vegetables	45	31	10	64	10	114	274(3.0%)
Sugar Beet	0	0	0	2	0	0	2(0%)
Fruit trees	82	96	21	83	636	2387	3305 (31%)
Grapes	27	109	30	86	34	587	873(8%)
Fallow/	1014	336	0	0	240	565	2155(20%)
Area doublecropped	0	0	0	0	-326	-406	-732(-7%)
Total	1750	913	289	1121	1872	4784	10729(100%)
Livestock							
Cattle - Impr.	340	580	0	0	0	460	1380
- local	805	215	739	912	925	625	4221
Sheep	1190	6550	2800	4650	2150	4210	21550
Goats	136	340	1200	1250	1800	1000	5726
Total	2471	7685	4739	6812	4875	6295	32877

5. Out of arable land 30% is devoted to wheat production and 9% to barley. Fruit trees cover 31% of the area and grapes 8%. About 20% of the land is unused or fallowed. Very little forage is grown (1%) and 7% of the area is double cropped.

6. There are on average 2 cattle and 10 sheep and goats per MC household. 25% of the cattle are improved. Sheep and goats are owned by a few families who as the main users of range and forest land should form the major target group for project interventions and who need to be clearly identified. There are slightly fewer than 3 sheep and goats per ha of range within the MC but many villages have outside grazing areas.

The Problem Census

7. After assembling available data, sessions were held in the MC villages to get a priority ranking of the types of problems encountered by the population and to launch the dialogue envisaged through the participatory approach. At this stage one village in each of four MCs opted for remaining outside the project apparently because of concerns about the forestry treatments. 708 persons participated in the problem sessions in the remaining villages of whom 39% were women. If one assumes that all men and half of the women represented separate families the attendance was roughly 20% of the households in the 6 MCs. Given that interaction took place at harvest time, and the project was not yet a "reality", this rate is reasonable. The participation ratio in future planning work will increase as results on the ground become known. The project has also made provisions for farmers' training, including visits by farmers to other microcatchments. Several hundred farmers have made written commitments, even at this early stage, to change agronomic practices and to improve management of rangelands.

8. Among the problems (Table 14.2) within the project mandate, lack of irrigation, steep land, lack of income and employment opportunities, low range production, poor returns in livestock production, fodder shortages (particularly winter) had a high profile. The absence of wood shortages from the list is explained by the fact that because of a draw down of the forest inventory wood may still be relatively freely available. The priority problems outside the project mandate mainly referred to include poor road connections, lack of drinking water and poor Government services.

Table 14.2: Problem Census (Priority Ranking)

	Piran/T	Sahsuvar	Kamincayi	Hancayi	Sogutl.	Beskoz
Problems outside project mandate						
Poor road	3	3	3	5	5	3
Drinking water	7	6	6	2	2	1
Poor govt serv	8		9		4	7
Poor return poultry		7				
Health/Educ.				9		
Agr. credit				10		
Livestock health					12	
Problems within project mandate						
Irrigation	1	2	1	1	1	2
Steep land	2		2	3	11	11
Income	4	4	7		3	5
Local work opportunities	5	1		7	13	12
Range prod.	6	5		4	6	6
Poor return to livestock	9	9	8		7	4
Low agric. yields		8			9	
Winter livestock feed.			4			
Soil erosion			5		8	8
Forest degradation				8		
Poor extension				6	10	9

9. It is important to realize that the census is the starting point for the dialogue and that at subsequent stages it will be necessary to check both the problem inventory and particularly to promote more depth in the analysis of crucial aspects such as livestock trends, fodder and wood shortages.

Rapid Rural Appraisal

10. Existing information about soils and land use was mapped and relatively homogeneous so called "development suitability domains" were identified as a basis for the problem solving discussions. During this phase the areas which do not need treatment (sustainable land use), those that do not respond to treatment, and the areas which have already been treated were identified and marked on the map. A village input into this part of the process is crucial in subsequent planning.

Problem Solving

11. At this stage the extent to which the priority problems indicated by the village could be addressed by selections from the treatment menu offered by the project was established. The result of this process in terms of the area which is proposed to be treated is given in Table 14.3. In relation to the total area of the six MCs 41% of forest land, 27% of the range land and 26% of arable lands are proposed for treatment. 11% of arable land are also proposed to be developed by KHGM for irrigation or improved conservation.

12. Extrapolating from the 6 MCs of the total of 54 MCs to be covered by the project would give somewhat lower treatment volumes than those assumed in the SAR for rangelands and for arable land. This may be expected at an early stage of the project when people have insufficient information about project

objectives. Furthermore, the selected MCs have a relatively high proportion of forest land. The unit costs of different treatments were verified and are indicated in Annex 5. ERRs were calculated for the six microcatchments and vary from 12% to 17%, with an average of 14.5%. The slightly lower ERR than the SAR estimate is justified by the fact that, for their first micro-catchment, the local population are relatively cautious about committing themselves to changes in land use.

Table 14.3: Treated Areas
(ha)

	SAR Projection	Piran/T.	Sahsuvar	Kamincayi	Hancayi	Sogutl.	Beskoz	Total 6 MC
Min. of Forestry	ha (%)							ha (%)
Soil Cons/Aff.	10000(16)	592	506	325	738	255		2416(37)
Conifer	4900(8)	50	100					150(2)
Oak Coppice	17800(29)	50		405		72	686	1213(18)
Fuelwood Coppice	11800(19)	200	210		434	100		944(14)
Range Rehab.	17800(29)	585	648	368	276			1877(28)
Riverbank	140(-)	10						10(-)
Total	62440(100)							6610(100)
								41% of forrest area
KHGM								
Rainfed terr.	5616(35)	250	160	35	108	157	33	743(64)
Irrig. terr.	10530(65)		165	38	145	60	6	414(36)
Ponds (units)	270(-)	7	6	5	6	15	13	52
Total	16146							1157(100)
								11% of arable land
Min. of Agr.								-(0)
Range M.	58650(46)							
RM + fert.	30500(24)			210	105			315(12)
RM+fert+seed	20000(16)	100	150	100	40	240	180	810(31)
Closure	10165(8)		100					100(4)
Aerial fert/seed	7000(6)			890	520			1410(54)
Total	126265(100)							2635(100)
								27% of range
Fallow red.	25960(54)	202	65	26	125	151	200	1769(27)
Agr. Package	11667(24)	246	79	32	152	185	245	939(32)
Rainf	1124(2)	20	41	22	72	148	95	398(14)
Irrig.	2574(5)	21	31	40	124	4	3	223(8)
Bound	580(1)	4	3	20	23		10	60(2)
Gully	3246(7)							
Pistachio	3000(6)					500	12	512(18)
Total	48151(100)							2901(100)
								26% arable l.
Beekeeping(units)	1620	90	92	40	37	38	40	337

Table 14.4: Treatment Costs (US$000)

	SAR Base Costs	Piran/T	Sahsuvar	Kamin-cayi	Hancayi	Sogutl.	Beskoz	Total 6 MC	Est. Total 54 MC
Min. of Forestry									
Soil Cons/Aff.	8840	621	525	342	774	267	-		
Conifer	4390	70	94	-	-	-	-		
Oak Coppice	9904	28	-	227	-	40	383		
Fuelw. Coppice	8837	258	269	-	562	129	-		
Range Rehab.	4832	93	110	59	44	-	-		
Riverbank	30	4	-	-	-	-	-		
Subtotal	36833	1074	998	628	1380	436	383	4899	44091
KHGM									
Rainfed terra.	2187	113	72	16	49	70	15		
Irrigation	14822	134	315	135	277	272	235		
Checkdams		20	40	16	6	16	24		
Subtotal	17009	267	427	167	332	358	274	1825	16425
Min. of Agr.									
Range Seed/fert.	2816	46	74	62	29	61	46		
Range Fert.	1673	-	-	-	-	-	-		
Fallow Red.	2469	9	3	1	6	7	9		
Agronomic Pack	907	22	7	3	14	17	22		
Horticulture	1140	8	11	26	44	59	20		
A.I.	228	-	3	-	-	8	2		
Pistachio	194	-	-	-	-	-	1		
Dem. Range	57	3	3	3	3	3	3		
Dem. Agr	165	9	9	7	9	8	8		
Aerial Seed	558	-	-	18	10	-	-		
Apiculture	3699	180	184	80	60	76	80		
Subtotal	13906	277	294	200	175	239	191	1376	12384
Total	67748	1618	1719	995	1887	1033	848	8100	72900
Average Cost/MC									
Area	400000	7040	4543	3265	4640	8628	13235	41548	373932
Cost per ha	$189	230	374	305	407	120	64	195	

Conclusions

13. The six MC Indicative Plans represent a commendable effort by the three provincial planning teams. During the detailed planning of the 1993 work program one should give increased attention to:

- ways and means of broadening the local participation;
- the identification of priority target groups (particularly the range and forest land users);
- the analysis of fodder and wood situation and livestock trends;

- the promotion of further interaction on forestry resource sharing, range management and cost sharing; and

- the level of supporting treatments per household.

The present plans represent a very good first attempt and an adequate basis for proceeding with the implementation in 1993.

STAFF APPRAISAL REPORT

TURKEY

EASTERN ANATOLIA WATERSHED REHABILITATION PROJECT

IMPLEMENTATION PROGRAM 1993

The project is expected to become effective in the middle of 1993. In view of the expectations created through the participatory planning process and to capitalize on the established momentum it is however essential to get underway before then and thereby utilize the 1993 growing season and thus to initiate activities in the spring of 1993. Retroactive financing would be available assuming procurement procedures acceptable to the Bank have been followed. Successful launching of the project will require careful planning of tasks to be performed, assignment of staff, training of staff and farmers, procurement of necessary goods and equipment and adequate budgetary allocations. These aspects have been reviewed and an implementation schedule for the start up period has been established by each agency as indicated below.

Attachment 1: Provincial Departments of Agriculture.
Implementation Program 1993.

Attachment 2: Forestry Treatments:
Timing of Works.

Attachment 3: KHGM Working Plan for 1993

Attachment 4: Project Coordination and Support Unit:
Working Program for 1993

Provincial Department of Agriculture
Implementation Schedule (Elazig, Adiyaman & Maletya)
1993

	1992 Dec	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept	Oct	Nov	Respons
Planning Data Coll./Pc	—	—	—	—	94 —								FTE
Indication Plani	—	93 —				—	94 —						FTE
Work Plan	—	—	—	93 —		—	93 —					94 —	FTE
Budget Preparation							—	—					
Approval			—										
Procurement Vehicle													PCSU
Equipment													PCSU
Fertilizer	—	—				—	—						PCSU
Seed	—	—				—	—						PCSU
Seedlings						—	—						PCSU
Training Study trips		—			—								
Workshop Techn	—												
Staff			—										
Farmers				—	—								
Implementation Agr. Demons.			—	—	—	—	—	—	—	—	—		FTE
Range Demons.			—	—	—	—	—	—	—	—	—		FTE
Range Treatm.			—	—	—	—	—	—	—	—	—		FTE
Fallow Red.			—	—	—	—	—	—	—	—	—		FTE
Agr. Prodt.				—	—	—	—	—	—	—			FTE
Trees Bound			—	—	—	—	—	—	—	—	—		FTE
Hortic. Rainf.				—	—	—	—	—	—	—			FTE
Hortc. Irrig.				—	—	—	—	—	—	—			FTE
Pistachio			—	—	—	—	—	—	—	—	—		FTE
Monitoring	—	—	—	—	—	—	—	—	—	—	—	—	

FORESTRY TREATMENTS: TIMING OF WORKS

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Soil Conservation Aff. Site Preparation			—	—	—	—			—	—	—	
Fencing						—	—					
Seedsowing										—	—	
Planting										—	—	
Fertilizing									—	—		
Conifer Plantation Site Preparation					—							
Planting										—		
Fertilizing										—		
Energy Forestry Rehabilitation Cut										—	—	
Fencing						—	—					
Road							—					
Broadleaf Plantations Site Preparation				—	—					—	—	
Fencing						—						
Road								—				
Seedsowing										—	—	
Planting										—	—	
Gallery Plantation Planting			—	—								
Range Seedsowing			—	—							—	
Planting			—	—							—	
Oak Coppice Rehabilitat. Rehabilitation Cut		—	—								—	—
Fencing			—	—								
Road										—	—	
Fuelwood Conifer Plantat. Site Preparation			—	—	—							
Planting										—	—	

KHGM Working Plan for 1993

		Dec 92	Jan 93	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Selection of 1994 MC	(1 with PUB)			—										
FCPCPS: Problem Identification	(1 with PUB)			—										
FCPCPS: Problem Solving	(1 with PUB)				—									
Final Meeting with Villages	(1 with PUB)					—								
Final MC Plans	(1 with PUB)					—								
Surveying of 1994 MCs	(1)						—	—						
Supplementary Surveys for 1993 MCs	(1)	—												
Detailed Designs	(1)		—*					—	—**					
Summary Project Plans	(1)		—*						—**					
Approval of Designs/Project Plans	(2)			—*										
Project Implementation Manual	(2 with PCSU)			—										
Draft Tender Documents	(2)				—									
Finalize Tender Documents	(2)					—								
Invitation to Bid	(2)						—							
Bid Evaluation	(2)							—						
Submission/Approval of Bid to/by WB	(2)								—					
Submission/Approval of Bid to/by MoFinance	(2)								—					
Signing of Contracts									—					
Construction of Works	(Contractor/KHGM)									—	—	—	—	
Supervision of Works	(2)									—	—	—	—	
Monitor Linkages, Adoption Rates	(2)					—								
Discuss Linkages, Adoption Rates with Villages	(2)						—							

(1) Provincial KHGM
(2) Central KHGM
PUB Provincial Implementing Unit

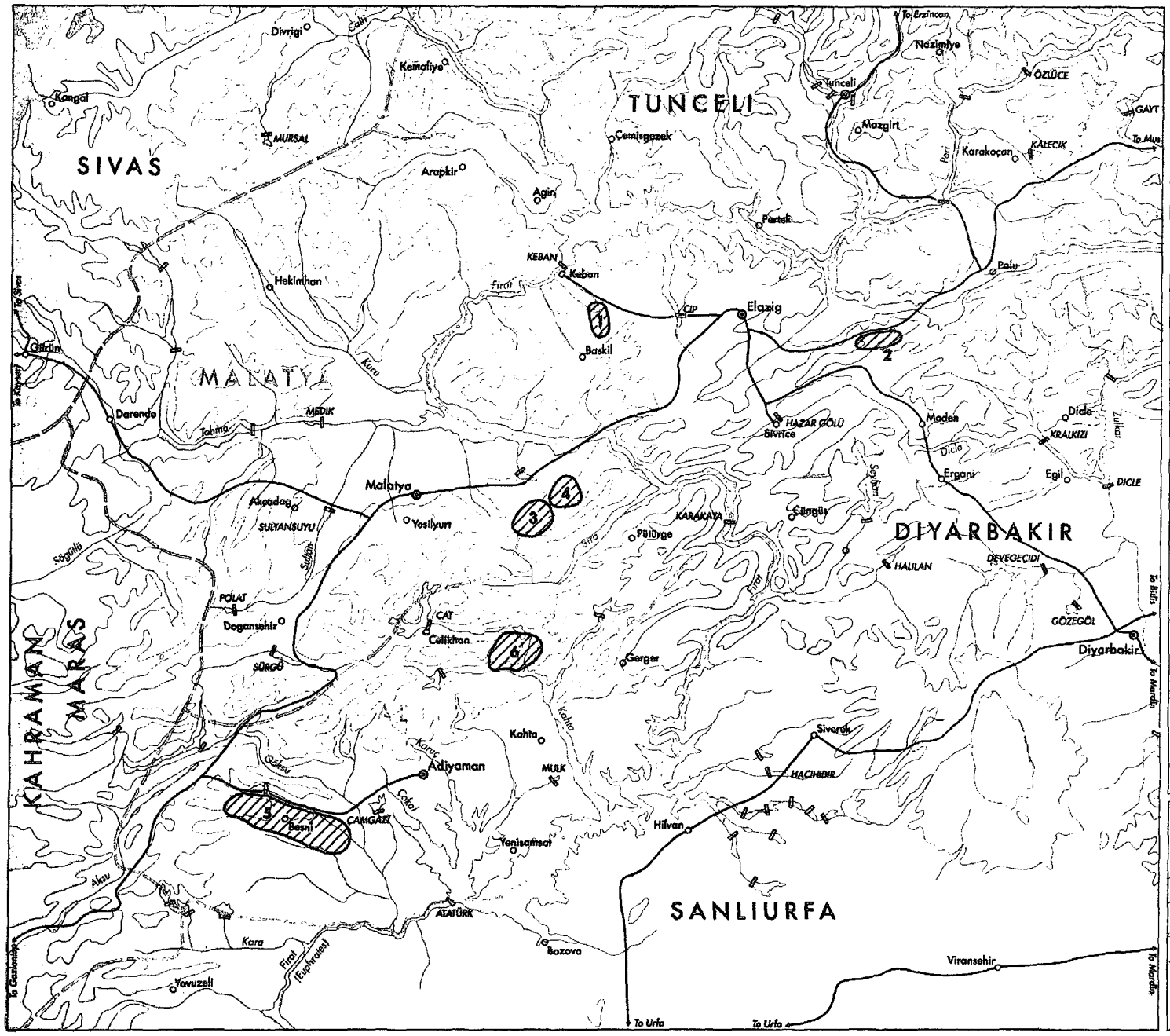
* 1993 MCs
** 1994 MCs.

PCSU: Working Program for 1993

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Completion of PPF - Tech. Assist. for Implement. Manual, etc.			—	—	—							
- Study Tours	—	—										
- Procurement of Vehicle & Equipment	—											
Equipment Procurement - Technical Specs.		—	—	—								
- Invitation				—								
- Evaluation/Contract						—						
Materials Procurement - Determination of Quantities			—		—							
- Package							—					
Civil Works Contracts - Detailed Design/Specs.				—								
- Invitation					—							
- Evaluation/Contract									—			
Technical Assistance - Finalize TOR		—										
- Shortlist			—									
- Invitation					—							
- Evaluation/Contract							—					
Training - Establish. of initial training program				—								
- Initial in-country training				—	—							
- Establishment of year 1 Trainging program										—	—	
Monitoring/Evaluation/MIS - Provincial Plan		—										
- Field Visits			—									
- Database				—	—	—	—	—	—	—	—	—
Management of Prov. Prog. - Initiate MC Plan for 94			—	—	—				—	—	—	
- Supervise MC Plan implementation			—	—	—	—	—	—	—	—		

MAP SECTION

IBRD 24166



TURKEY
EASTERN ANATOLIA WATERSHED REHABILITATION PROJECT

ELAZIG PROJECT PROVINCES

PROJECT MICROCATCHMENTS TO BE REHABILITATED IN 1993:
1. PIRAM / TEMTE
2. ŞAHSUVAR
3. HANÇAYI
4. KÂMINCAYI
5. BEŞKOZ
6. SÖĞÜTLÜBAHÇE

RESERVOIRS:
- EXISTING OR NEAR COMPLETION
- PLANNED

RIVERS

MAIN ROADS

COUNTY CAPITALS

PROVINCE CAPITALS

PROVINCE BOUNDARIES

ELEVATIONS IN METERS:
- 2000
- 1500
- 1000
- 0

INTERNATIONAL BOUNDARIES

0 20 40 60
KILOMETERS

DECEMBER 1992