Report No. 11295-TU

Republic of Turkey

In-Situ Conservation of Genetic Diversity

Project Document
February 1993

CURRENCY EQUIVALENTS

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 centimeters (cm)
1 square foot (ft^2)	=	0.093 square meters (m^2)
1 cubic foot (ft^3)	=	0.028 Cubic meters (m^3)
1 mile (mi)	=	1.609 kilometers (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

PRINCIPAL ABBREVIATIONS AND ACRONYMS USED

GEF	-	Global Environment Facility
GET	-	Global Environment Trust
GMZ	-	Gene Management Zones
GOT	-	Government of Turkey
IBPGR	-	International Bank for Plant Genetic Resources
ICARDA	-	International Center for Agricultural Research in Dryland Areas
IUCN	-	International Union for the Conservation of Nature
MARA	-	Ministry of Agriculture and Rural Affairs
MOE	-	Ministry of Environment
MOF	-	Ministry of Forestry
NPGRI	-	National Plant Genetic Resources Institute

GOVERNMENT OF TURKEY FISCAL YEAR

1 January - 31 December

TURKEY

IN-SITU CONSERVATION OF GENETIC DIVERSITY

GRANT PROJECT SUMMARY

Recipient:	Government of Turkey
Beneficiaries:	Ministry of Agriculture and Rural Affairs (MARA) Ministry of Forestry (MOF) Ministry of Environment (MOE)
Amount:	SDR 3.71 million (US$5.1 million equivalent)
Terms:	Grant through the Global Environment Facility
Financing Plan:	Government US$0.6 million (equivalent) GET US$5.1 million (equivalent) US$5.7 million (equivalent)
Economic Rate of Return:	Not applicable
Map:	IBRD 24479R

Part I: Project Summary

TURKEY

IN-SITU CONSERVATION OF GENETIC DIVERSITY

Background.

1. Turkey is an agriculturally diverse and rich nation that is self-sufficient in most foods and a net agricultural exporter. Agriculture accounts for about 18% of GDP, 18% of exports and 45% of employment. Turkey's total area is 78 million ha including lakes and urban areas. Excluding these, it can be broadly divided into cultivated land (21 million ha), forest land (20 million ha, half of which is classified as productive forest), rangeland (12 million ha) and land unsuitable for farming (11 million ha). Natural resources degradation, particularly soil erosion, is the most serious environmental issue facing the sustainability of Turkey's agriculture. This has been caused by overgrazing, deforestation and inappropriate cultivation practices on fragile soils. GOT is aware of the problem; a recently approved Bank funded Agricultural Research Project will address soil management issues, and the Eastern Anatolia Watershed Rehabilitation Project, to which this GET subproject is attached, aims to improve sustainable range, forest and farming management to three provinces in eastern Turkey, in the upper Euphrates watershed.

2. Despite this degradation, Turkey is one of the world's most important centers of plant genetic resources. Of the more than 3,000 plant species in Turkey know to be endemic, several are relatives of important crop species that feed the world (wheat, barley, lentils, chickpeas, pasture plants, and horticultural plants). Many of Turkey's medicinal plants and horticultural and forest trees are also of global importance because of their unique genetic biodiversity. The reason for the extremely wide variation of herbaceous and woody plants in Turkey is the country's location at the junction of three major phytogeographical regions -- the Irano-Turanian, Euro-Siberian and Mediterranean regions. Plant breeders from all over the world use strains of the wild progenitors, primitive forms, and landraces of major crops in Turkey to develop plants that are more productive and that are resistant to cold, drought, salinity, pests and disease.

3. Three broad regions in Turkey have been identified as important centers of biodiversity in wild relatives of cultured crops: (a) Southeastern Anatolia (wheat, barley, oats, chickpeas, lentils, alfalfa, apples, grapevine, melons, cucumber, broad beans, fodder plants); (b) South-Central Anatolia (wheat, barley, oats, rye, apples, almonds, pears, grapevine, lentils, chickpeas, clover, trefoil); and (c) the Aegean region (fruit trees and forage legumes). Turkey also contains unique subspecies of important forest tree species, including red pine, black pine, scotch pine and the Kazdagi mountain fir. Since Turkey is at the southernmost part of the range of major European forest species, the species in Turkey contain unique genetic characteristics such as drought hardiness and insect resistance.

4. The Government of Turkey (GOT) is aware of the unique biological diversity of Turkey's flora. The National Plant Genetic Resources Program was established in 1977, and collects seeds of wild crop relatives and landraces for ex-situ conservation, mostly at the National Plant Genetic Resources Institute (NPGRI) under the Ministry of Agriculture and Rural Affairs (MARA). Other regional research institutes also participate in the program. Forest seeds are also collected for ex-situ conservation by the Ministry of Forestry (MOF), which maintains seed orchards and clone banks. The Ministry of Forestry also manages 55,492 ha of nature conservation areas for ecosystem conservation, 42,000 ha, representing 25 forest tree species, as natural tree stands, and

about 265,000 ha of National Parks. It has extensive experience with land management. There is, however, no specific program for in-situ management of the wild crop relatives or landraces of herbaceous species, even though these exist in gazetted forest areas. The Ministry of Environment was recently established (August 1991) in Turkey and is now responsible for establishment of basic policies and strategies to conserve biological diversity.

5. While ex-situ conservation is an essential element in a biodiversity conservation strategy, there has been increasing awareness that it is not sufficient. Ex-situ conservation is geared principally to a small number of known plants, and it "fixes" the genetic material at the time of extraction. In-situ conservation, or "the maintenance of reproducing organisms in the area where they developed their distinctive properties" (FAO definition), would permit natural genetic evolution and maintenance of biodiversity of species in their habitat. GOT is committed to complement ex-situ programs with in-situ conservation, but lacks experience with this approach, which has not yet been systematically developed in any country.

Subproject objectives.

6. This subproject would seek to identify and establish in-situ conservation areas in Turkey, for the protection of genetic resources and wild relatives of important crops and forest tree species that originated in Turkey. It would provide for sustainable in-situ conservation of genetic resources in cereals, horticultural crops, medicinal plants, forest trees, and pasture grasses and legumes through an integrated ecosystem approach. It would contribute to the broader objective of conserving sustainable farming and forest systems that is a key element of the Watershed Rehabilitation project. It would develop the institutional capacity in Turkey for preparing and implementing a national strategy for in-situ conservation which could include landraces in a second phase project, for which support from the GET will be sought. The aim is to test and develop a new approach to conservation of genetic diversity which has not been tried on a large scale anywhere in the world. Given Turkey's unique biological diversity, particularly in wild relatives of globally significant species such as wheat, the project could potentially be of great benefit to plant breeders in Turkey and worldwide.

Project activities.

7. The subproject is designed around the following five components:

(a) Site surveys and inventories. There will be an initial assessment of suitable sites in Turkey for wild crop relatives, focussing on wheat, chickpea, lentils and barley as the priority species, but also including other herbaceous and woody species. Given the state of current knowledge and habitat requirement for wheat, the selection process will focus on areas in Kazdagi National Forest representing the Aegean region, Karacadag Plateau and Ceylanpinar State Farm representing Southeastern Turkey, and a site yet too be identified in Southern Anatolia. Within these sites, ecosystem based surveys will be conducted to determine suitable habitats with regard to representativeness, diversity, naturalness and management considerations for in-situ gene management. Following the surveys, a species-specific inventory will be conducted at each site with regard to species abundance, distribution and management needs. To support a complementary approach between in- and ex-situ conservation, a few select germplasm samples will be collected for ex-situ

preservation.

(b) Gene management zones (GMZs). This component expands the scope of component (a) and will involve the formalization of sites selected into protected areas with specific management requirements, adapted to different species. A series of preserves will be selected to represent the ecogeographic ranges needed for targeted wild relatives in order to support sufficient environmental heterogeneity for both wild crop woody and non-woody species. Monitoring species incidence and diversity will be a key element of this activity, which will also monitor and evaluate different approaches to management of GMZ for particular species and ecosystems.

(c) Data management. This component will build a database for the complex array of information that will be acquired in activities (a) and (b). The data will be assembled at a common site that can be shared between agencies and universities and a data management plan will be developed.

(d) National plan for in-situ conservation. This plan will (i) provide the foundation for review of the project to date; (ii) facilitate coordination of the GMZs into other nature conservation strategies in Turkey; and (iii) outline a strategic and implementation plan for in-situ genetic resource conservation for landraces as well as wild relatives throughout Turkey beyond the life of the project.

(e) Institutional strengthening. This component focuses on professional development and training of staff from the implementing agencies as well as Turkish scientists and students through specialized workshops, technical assistance and training courses, in topics such as conservation biology, biosystematics, survey and inventory techniques and Geographical Information Systems (GIS). Study tours are provided. The project would also finance an international scientific advisory committee comprised of Turkish and international scientists and officials, to provide scientific support to the project.

8. Project costs are estimated at US$4.8 million over a three-year period, or US$5.7 million including physical and price contingencies. The GET grant would cover 89% of total costs, or US5.1 million. In addition to its contribution to project costs, GOT would provide personnel and use of existing research institutes and laboratories. About 67% of project costs are foreign exchange, and 9% are taxes. Schedule A shows a breakdown of costs and the financing plan, while Schedule B indicates methods of procurement and disbursement and the disbursement schedule. A timetable of key processing events is given in Schedule C. A detailed description of the project is given in the Technical Annex entitled "In-Situ Conservation of Genetic Diversity" dated February 9, 1993.

Project implementation.

9. The project would use the complementary strengths of the Ministries of Forestry, Agriculture and Rural Affairs and Environment. The coordinating agency would be the Plant Breeding and Agronomy Department of the General Directorate for Agricultural Research (GDAR) in MARA. The lead institutes would be, for herbaceous species, the NPGRI near Izmir for the work in Kazdagi, with the collaboration of the Ankara Field Crops Central Research Institute for the

work in Central Southern Anatolia, and the Southeast Anatolia Regional Research Institute at Diyarbakir for the work in Southeast Anatolia. Allocation of support to and staff from these institutions has been determined, and all institutes report to the General Directorate for Agricultural Research in Ankara. The Research and Environment Department within the Research, Planning and Coordination Board would be the lead agency for the Ministry of Forestry in Ankara, supported by the regional research institutes in Ankara and Izmir, the Forest Tree and Seed Improvement Research Institute, and the General Directorate of National Parks, Wildlife and Hunting, Forestry, and Reforestation and Erosion Control. The Ministry of Environment (Department of Protection of Nature in the General Directorate for the Protection of the Environment) would have responsibility for preparation of the National Plan for Gene Conservation. Representatives from all these agencies would form a Project Implementation Committee for ongoing coordination of activities at central level, and collaborate with staff who would work together at the relevant regional sites. Project managers would report to an interministerial steering committee with high-level representatives from the three Ministries, and the Scientific Advisory Committee would provide overall technical guidance. A detailed work plan has also been agreed upon, with reporting schedules and monitoring indicators.

Project sustainability.

10. Research institutes are relatively well established and staffed Turkey. The incremental recurrent costs of in-situ gene management would be very small in relation to the existing research establishment (there are 65 research institutes with a staff of over 8,000, and the GET project would require only 11 MSc level staff and 27 BSc or technician level staff, not all full-time). The project aims to build the institutional capacity for in-situ management by existing institutes and staff. GOT are committed to the project, have agreed to allocate the necessary staff and aim to expand the project scope to other areas if it proves successful. Nevertheless, given the global importance of the project, and if GOT's current budgetary difficulties persist, the GEF may consider establishing an Endowment Fund in two to three years, to finance recurrent costs in a second phase of the project. Local NGOs such as the Turkish Foundation for the Protection of Nature (DHKD) have shown an interest in the project.

Lessons from previous Bank/IDA involvement.

11. The Bank has not financed a similar project in Turkey or elsewhere. Agricultural projects in Turkey have suffered from procurement delays, insufficient counterpart funds, and ministerial reorganizations. The proposed Project contains few civil works (a principal cause of delay in earlier Bank-supported projects) and fully funds project activities in this preliminary phase. Under the recently approved Agricultural Research Project, research has been reorganized under one directorate in MARA, while the organizational relationships for research in the MOF are also clear. The institutional environment is now more stabilized.

Rationale for GET funding.

12. The project is the first of its kind in the world and is essential to the conservation of the biodiversity of the wild relatives of important herbaceous and woody species worldwide. It would provide a model for in-situ gene conservation in other countries. It aims to develop the institutional capacity in Turkey for in-situ gene conservation. The data management component and Scientific Review Committee provide the means for monitoring project progress and sharing project

results with the international scientific community (e.g. ICARDA, IUCN, IBPGR). GET funding provides the means for achieving these broader goals.

Agreed actions.

13. GOT have agreed on project content, on an agreed work plan, on organizational arrangements and allocation of necessary staff from existing research institutes, on procurement arrangements, on appropriate accounting and auditing procedures, and on opening a Special Account.

Environmental aspects.

14. The project would have very important environmental benefits due to biodiversity conservation and identification of wild crop relatives, with unique disease or climate resistant qualities, of globally significant species. The present project is limited in scope, will be largely confined to public land, and will not cover land on which local populations depend for their livelihood.

Project benefits.

15. The project would protect in-situ biodiversity and could potentially play a major role in developing new more productive strains of economically important crops and trees. By complementing ex-situ activities, it would develop the institutional and technical mechanisms for a comprehensive strategy for genetic resource conservation in Turkey. Success in these endeavors could provide a model applicable elsewhere.

Risks.

16. The principal risks are institutional. The Ministries of Forestry, and Agriculture and Rural Affairs have limited experience in working together, while the Ministry of the Environment has been only recently established. Mechanisms for cooperation have been set in place. To simplify the project and reduce administrative risks, only wild relatives of agricultural and forest species are being included at this stage. Conservation of landraces, which involves more complex socioeconomic and community participation issues, is inappropriate for this phase.

Attachments

Schedule A

TURKEY

IN-SITU CONSERVATION OF GENETIC DIVERSITY

Estimated Costs and Financing Plan

	US$'000 Equivalent			% of Total	
	Local	Foreign	Total	Foreign Exchange	Base Costs
COMPONENTS:					
1. Inventory/Survey					
a. Inventory and Survey	447	1,411	1857	76	38
b. Germplasm Management	264	238	548	52	11
Sub-Total	711	1,694	2,405	70	49
2. Designation of GMZ	172	0	172	0	4
3. National Plan	238	250	488	51	10
4. Institutional Strengthening	222	809	1,032	78	21
5. Data Management	226	543	768	71	16
Total BASELINE COSTS	1,569	3,296	4,865	68	100
Physical Contingencies	157	330	487	68	10
Price Contingencies	120	201	321	63	7
Total PROJECT COSTS	1,846	3,827	5,673	67	117

Financing Plan
(US$ million equivalent)

	Local	Foreign	Total
GOT	0.6	0.0	0.6
GET	1.3	3.8	5.1
Total	1.9	3.8	5.7

Schedule B

TURKEY

IN-SITU CONSERVATION OF GENETIC DIVERSITY

Procurement Methods and Disbursements

Procurement Methods (US$ million equivalent)

Procurement Element	ICB	LCB	Other	Total
Civil Works			0.4a/	0.4
			(0.35)	(0.35)
Goods	1.9		1.0b/	2.9
	(1.7)		(0.9)	(2.6)
Training & TA			1.7c/	1.7
			(1.7)	(1.7)
Transport & Accommodation			0.2d/	0.2
			(0.18)	(0.18)
Recurrent Costs & Labor			0.4d/	0.4
			(0.27)	(0.27)
Total	1.9		3.7	5.7
	(1.7)		(3.4)	(5.1)

Figures in parentheses indicate amounts financed by GET.

Disbursements

Category	GET Grant Allocation	Amount US$M equiv.	Amount SDR M
Civil Works	88% of expenditures	0.35	(0.25)
Goods	100% of foreign expenditures 100% of local expenditures (ex-factory cost) and 90% expenditures for other items procured locally	2.6	(1.9)
Training & Tech. Assistance	100% of expenditures	1.7	(1.24)
Training & Accommodation	88% of expenditures	0.18	(0.13)
Recurrent Costs & Labor	67% of expenditures	0.27	(0.19)
Total		5.1	3.71

Estimated Disbursement Schedule (US$ million equivalent)

IBRD Fiscal Year	FY93	FY94	FY95	FY96	FY97
Annual	0.2	3.1	1.0	0.6	0.2
Cumulative	0.2	3.3	4.3	4.9	5.1

a/ Force account
b/ Local shopping
c/ IBRD guidelines for procurement of consultants
d/ GOT procedures

Schedule C

TURKEY

IN-SITU CONSERVATION OF GENETIC DIVERSITY

Timetable of Key Processing Events

(a)	**Time to Prepare:**	One year (initial mission 11/91)
(b)	**Prepared by:**	GOT, Consultants & Bank staff
(c)	**First IBRD/GET Mission:**	November 1991
(d)	**Appraisal Mission:**	June 1992
(e)	**Negotiations:**	January 25, 1993
(f)	**Planned Date of Effectiveness:**	April 1993
(g)	**Supervision Plan:**	Two per year to coincide with Eastern Anatolia Watershed Rehabilitation Project. Special skills needed; herbaceous plant geneticist, woody plant geneticist, land management specialist. Incremental supervision requirements: year 1 10 weeks; year 2 10 weeks; year 3 10 weeks (The Eastern Anatolia Watershed Rehabilitation Project supervision missions will include M&E and community participation skills). Reporting requirements and the implementation plan are detailed in Annex 3 of Technical Annex and include detailed 6 monthly progress reports for project monitoring. Scientific Advisory Committee meetings will also allow for project reorientation if necessary.
(h)	**Relevant PCRs:**	Erzurum Rural Development Project, Ln. 2094-TU (PCR 6/92); Corum-Cankiri Rural Development Project, Ln 1130-TU (PPAR No. 6756)

Part II: Technical Annexes

TURKEY

GLOBAL ENVIRONMENTAL FACILITY

IN-SITU CONSERVATION OF GENETIC DIVERSITY

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Map IBRD No. 24479

This report is based on findings of four missions that visited Turkey during 1992. Missions members included Marjory-Anne Bromhead (Task Manager), Meriwether Wilson (Biodiversity Specialist), Calvin Sperling, Stanley Krugman and Ekren Kun (Consultants).

TURKEY

GLOBAL ENVIRONMENTAL FACILITY

IN-SITU CONSERVATION OF GENETIC DIVERSITY

I. INTRODUCTION

1.01 The flora of Turkey is exceedingly rich as a temperate flora, comparable to the high species diversity found in tropical climates. Diverse geological and climatic conditions have given rise to a number of unique species represented nowhere else in the world. Over 30% of the 8,800 plant species found in the country are endemic to Turkey. In addition to the diverse geological and climatic conditions, this rich biodiversity is also due to Turkey's location at the junction of several major floristic regions; Europe, the Mediterranean, and Central Asia.

1.02 Turkey is a center of origin and still a source of important genetic diversity for numerous globally important agricultural, horticultural, medicinal and ornamental and woody crop plants. These crops were first domesticated from wild species which still exist in Turkey. The primary wild progenitor non-woody and woody species include: wheat, barley, lentil, chickpea, pear, apple, cherry, walnut, pistachio and chestnut. There are also globally and regionally significant, unique adaptations of woody species, including pine, fir and cedar which are at the extreme limits of their distribution in Turkey and found nowhere else.

1.03 Throughout history Turkey has also been a crossroads at the junction of cultures between Europe, Asia and Africa. Migrations of peoples and cultures in the region have contributed to the diversity of cultivated plants which moved with people as they settled in what is today Turkey. These diverse primitive cultivated varieties, or landraces, have evolved under the influence of natural and human selection pressure.

1.04 These rich plant genetic resources have provided the raw material for much of temperate world agriculture. Primitive landraces and wild crop relatives from Turkey continue to provide new sources of important traits needed to maintain and improve agriculture production and efficiency worldwide. The importance of these wild relatives is usually forgotten in efforts to protect rare species or threatened species as part of biodiversity conservation efforts.

1.05 Centuries of overgrazing have changed the original distribution of wild legumes and cereals. Today, wild progenitors of some of the food legumes, such as chickpea (*Cicer arietinum subsp. reticulatum*) are almost exclusively confined to steep rocky slopes where grazing pressure is not as severe. Some geographic sources of trees are endangered or have already been destroyed from over use. Such is the case with Oriental Spruce (*Picea orientalis*) which is abundant at the higher elevations but now infrequent at lower elevations.

1.06 To date, many nations of the world have undertaken ex-situ conservation programs to preserve samples of crop genetic diversity in gene banks, including wild relatives. Many of these programs have collections representing some of Turkey's unique wild and cultivated flora. However extensive or well managed these programs are, they can only preserve small samples of the overall genetic diversity of the wild crop relatives found in Turkey. Ex-situ programs can not preserve the diverse interactions of plants with their natural pests, predators and the environment and evolutionary processes cease when the genetic resources are placed in ex-situ conditions. Such interactions are necessary to allow natural evolutionary processes to continue and are what have given rise to the plant genetic diversity which has been crucial to crop improvement programs globally.

1.07 In-situ conservation refers to the maintenance of genetic resources in their natural settings. One object of in-situ conservation is to maintain the evolutionary system of useful plants by preserving variable populations in natural habitats. Which contain wild and weedy crop relatives, primitive crop types, pests and pathogens that are agents of natural selection. This requires the maintenance of a sufficiently large habitat to accommodate the greatest variability of wild crop species, trees and other plants, animals and microorganism species that interact in a common evolutionary system.

1.08 Although Turkey has considerable experience with ex-situ conservation, in-situ conservation of wild crop relatives has not been practiced despite the rich genetic diversity of this country. Incidental conservation has inadvertently occurred where wild relatives exist on protected lands such as national parks or national forests. However, no inventories have been conducted to determine what species are preserved or priorities determined as to what species should be protected on state owned lands. It is known that some forests contain wild crop relatives, especially of woody crops such as wild walnut, chestnut, fruit trees, bulbous plants and aromatic herbs. However, representatives of herbaceous crops, particularly the progenitor species of major cereals and important food legumes, are not adequately preserved or managed in any currently protected areas in Turkey.

1.09 Existing biodiversity conservation programs worldwide have generally failed to recognize the significance and need to protect important wild crop relatives in their natural habitat. With some exceptions, such as in Mexico, Brazil and Israel, there are few active national programs designed to protect wild crop relatives in-situ but these have focused on single species only. Thus, there is a well documented justification and need to develop a mechanism to preserve the plant genetic diversity of Turkey in nature (in-situ).

1.10 This Global Environment Facility (GEF) project is the first of its kind in the in-situ world to protect both woody and non-woody wild crop relatives from an integrated multi-species approach. It will do this through conducting eco-geographic surveys and inventories to provide the basis for the establishment of in-situ Gene Management Zone (GMZs) in selected areas that are rich in key wild crop relatives. Since it is beyond the scope of the project to survey and establish conservation priorities for all of the species in the GMZs, highest priority will be given to globally significant non-woody crops including: wild wheat, barley, chickpea and lentis, as well as important woody species such as pear, walnut, chestnut, olive, apple,

pistachio and selected fir tree species. The project aims to make in-situ conservation of wild crop relatives an integral part of existing state-owned lands. It will also initiate and develop a mechanism to foster an ongoing national program for identifying, designating and managing areas specifically for in-situ conservation of nationally and globally significant wild crop relatives.

II. GENETIC RESOURCES AND THE CONCEPT OF IN-SITU CONSERVATION

A. Types of Genetic Resources

2.01 Genetic resources are defined as the different combinations of genetic information of crop and tree species and their relatives. The genetic code that gives rise to the physical characteristics of each individual organism varies naturally across the total population of the organism. The object of conservation programs in agriculture and forestry is to capture this natural variability in order to use it to improve the crops and trees that are planted for food and market. The variability of tree and crop populations is unevenly distributed so that some areas are very rich in different genetic material while others are less rich.

(a) The Genepool Concept

2.02 A crop genepool includes all of the species which can potentially exchange genes with a particular crop species. A refined genepool concept is often used to classify the relative utility of a wild species for use in crop improvement programs. All varieties of a crop (landraces and the wild progenitor species from which a crop was domesticated) can easily form hybrids with the cultivated crop and provide useful genes in crop improvement programs.

2.03 Those cultivated forms and wild species which are closely related to the cultivated forms, are classified as belonging to the primary genepool. Wild species more distantly related to the cultivated crop are classified as belonging to the secondary genepool. They can, with special effort and techniques, exchange genes with the cultivated crop. The tertiary genepool contains those species even more distantly related to the crop and which using present technology can not yet exchange genes with the cultivated crop.

(b) Wild Crop Relatives

2.04 The distribution of wild crop relatives are largely determined by natural conditions, such as soil type, moisture, plant diseases, and physical isolating factors such as mountains. The evolution (changing patterns of genetic characteristics) of wild crop species follows the processes of the rise of variability followed by natural selection. Wild crop relatives may belong to any one of the three levels of genepools outlined above. The wild species that originally gave rise to crops are still found in areas where domestication took place. In many crops, several wild species and subspecies contributed genetic material to domesticated crops. Wild crop relatives still retain the natural ability to exchange genes (hybridize) with domesticated

species. In many species, the diversity of wild relatives is far greater than in domesticated forms, since domestication represents a genetic bottle neck.

2.05 The genetic variability found in wild crop progenitors is increasingly called upon by plant breeders worldwide in their search for increased resistance to disease, stresses and adaptiveness. The importance of these wild crop relatives has driven national and international efforts to preserve samples of their genetic diversity in ex-situ gene bank facilities.

(c) Landraces

2.06 Landraces are genetically heterogenous crop populations, often representing older varieties, that are still cultivated. They are highly variable since they may be comprised of different species and sub-species of domesticated crops as well as numerous local varieties with unique characteristics. Landraces are found in areas where crop species first arose through domestication. These areas are often highly heterogeneous in their environmental characteristics and they are often produced in "traditional" farming systems characterized by small scale farms and subsistence level production. Farmers who maintain these ancient crop populations are often poor and isolated from modern technology and communication means.

2.07 Landraces comprise the most variable populations of cultivated crops and belong to the primary crop genepool. This variation results from the ability of these types of crops to hybridize with wild crop populations, based on the selection for diversity by farmers who work in marginal environments and from generations of crop evolution. The production of landraces may be stable because they are well adapted to local environments, but their yield is usually lower than modern crop varieties.

(d) High Yield Varieties

2.08 Modern high yielding varieties (HYVs) have been developed in the last half of this century. In most places they have replaced landraces because of higher yield or stress resistance. HYVs are genetically more uniform than the heterogenous landraces and belong to the primary genepool. Use of selected genetic diversity in traditional landraces by breeding programs has contributed to the development of modern improved varieties.

(e) Forest Genetic Resources

2.09 Approximately 26% of the land base of Turkey is covered with forests which contains a rich array of plant communities which is especially rich in a diversity of forest ecosystems. The forests have a wide range of values including: watershed management, traditional wood products (lumber, wood fiber, resin and fuelwood), fruit and nut food sources (e.g. woody crop species of walnut, chestnut, pistachio, pear, apple, olive, etc.) and medicinal plant products. Of equal importance is the function of various forest ecosystems to provide habits for wild relatives and landraces of non-woody plants of agricultural value. Forest management strategies are still timber production-oriented and do not incorporate the value of forests from a more comprehensive perspective as genetic resource reservoirs.

2.10 Unfortunately, 56% of Turkey's forested area is now classified as unproductive and the mature forested area is decreasing due to various forms of deforestation. Thus there remains a continuous threat to the maintenance of the native flora of Turkish forested lands.

B. In-Situ Conservation in Perspective

2.11 Preserving the wild progenitors of agricultural and woody wild crop and relatives in their natural habitat (in-situ) is of increasing importance. Preservation of seed samples or other plant parts in a gene bank facility (ex-situ) can only preserve genes and selected genotypes, and does not allow ongoing evolution of those genes with their natural environment. Wild species in nature are part of the complex ecological web involving interactions with pests, predators and pathogens.

2.12 The living laboratory of wild crop progenitors in their environment provides a baseline from which can measure the efficiency and productivity of modern agriculture. Wild populations without the aid of modern crop breeding efforts have developed natural resistance to a multitude of pest predators and pathogens. When new or little known disease epidemics threaten a crop the wild populations can be a source of natural resistance.

2.13 Examples include "wheat take-all disease" (Gaumannomyces graminis) which is a serious threat to wheat cultivation in the Near East. Until recently there was no known resistance in cultivated wheat or any knowledge of where this disease originated. Studies on natural wild populations of wheat in Israel revealed that take-all disease infects wild wheat and indicates that segments of the wild wheat population have natural resistance. Without this living laboratory scientists would lack an understanding of the disease and where natural resistance might be found.

2.14 Not to be overlooked are those wild types of woody plants that are valuable genetic resources as food crops. Because of their resistance to insects, disease and their natural adaptability to an array of sites, such species as chestnut (Castanea sativa), olive (Olea europea) and walnut (Juglans regia) must be protected. It should also be noted that wild relatives of apple (Malus spp.), pear (Pyrus spp.) and plum (Prunus spp.) are also found in the forest. As is often the case, the value of woody shrubs are little appreciated or understood. Such species may well be of value for their secondary products such as industrial chemicals and medicines. The size and extent of these resources are not fully known nor is the genetic value of these resources understood. Their contribution to protecting and even expanding future food supply is little appreciated at this time.

2.15 Also significant are the woody ornamental species found in Turkey. The most northern Mediterranean sources of Cedar of Lebanon (Cedrus libani) occur here. In fact, if there is to be restoration of the once-prized species, much of the seed source must come from Turkey since there are relatively few plants/trees left in the rest of its natural range.

2.16 Turkey also contains some of the more southern sources of important forest tree species. These geographic populations exhibit their own unique genetic structure and could prove invaluable in future forest restoration

activities. Species included in this group are: red pine (Pinus brutia), black pine (Pinus nigra subsp. pallasiana) and scotch pine (Pinus sylvestris). There are also the umbrella pine (Pinus pinea) valuable for its shape and nut production which because of its isolated populations could contribute to a broader genetic base for this commonly planted tree.

2.17 There are two native fir species in Turkey, the Cilician Fir (Abies cilicica) and Caucasian Fir (Abies nordmanniana), both of which are widely distributed elsewhere. However, these species have unique subspecies that are endemic in Turkey. Because of their unique growth forms and their ability to survive in difficult environments these sub-species are a valuable genetic resource for future breeding programs. Abies cilicica subsp. isaurica is found around Antalya and Konya-Bozkir and Uludag Fir (Abies nordmanniana subsp. bornmuelleriana) grows between Samsun and Mt. Uludag and the Kazdağı Mountain Fir (Abies nordmanniana subsp. equitrojani) which grows on the Kazdağı Mountain.

In-Situ and Ex-Situ Complementarity

2.18 It is now recognized that ex-situ methods of conservation of genetic biodiversity should be complemented with in-situ conservation methods, especially since the storage of seeds under suitable long or medium term laboratory conditions can have a number of problems if ex-situ is the only type of conservation practiced. Ex-situ conservation: (i) is principally geared towards a small number of known plants; (ii) is not widely used for horticultural, vegetable or ornamental plants; (iii) "fixes" the genetic material of a plant at the time of extraction, which leads to subsequent loss of diversity; and (iv) can conserve only a sample of the total genetic diversity present in a wild species.

2.19 Therefore, there is a general endorsement of in-situ conservation and integration with ex-situ techniques among the inter-national community as well as the external support agencies such as FAO, IBPGR (the International Board for Plant Genetic Resources), United Nations Development Program (UNDP) and the World Bank. Other international institutions that are active in this area include the Consultative Group for International Agriculture Research (CGIAR) specialized centers, the World Conservation Union (IUCN), and various botanical gardens around the world.

C. Existing In-Situ and Ex-Situ Conservation Strategies in Turkey

2.20 Most in-situ conservation in Turkey has been unintentional, with the exception of some areas managed by the Ministry of Forestry (MOF) to protect rare or unique species, and several Specially Protected Areas (SPAs) designated by the Ministry of Environment (MOE) to protect rare species which fall outside the traditional interests of MOF and The Ministry of Agriculture and Rural Affairs (MARA). However, existing lands under the control of MOF or MOE have not been subject to an in-depth inventory or even a cursory survey of wild crop genetic resources preserved on those lands.

MINISTRY OF AGRICULTURE AND RURAL AFFAIRS (MARA)

In-situ Agricultural Conservation:

2.21 MARA, through the Plant Genetic Resources Research Institute (PGRRI), has a program to conserve cultivated and wild species ex-situ yet in does not have a program to preserve wild species in-situ. The priority of PGRRI is to maintain improved varieties, crop landraces and wild relatives of crops primarily of Turkish origin. PGRRI makes genetic resources available for crop improvement programs nationally and internationally. PGRRI utilizes the research staff of the Aegean Agricultural Research Institute (AARI). It has a minimal professional staff with full time responsibilities for conservation.

2.22 PGRRI does not have any assessment of what agriculturally important wild species may exist on the national network of state farms covering 3,765,161 ha. While these farms are mainly managed for production agriculture, there are marginal areas, mostly grazed, that may contain significant wild crop relatives. This is probably the case for farms in the southern half of the country, such as the largest farm, Ceylanpinar (1,693,113 ha total) which has 48,000 ha of rangelands in a region known to have significant wild crop relatives. However, it is not known to what extent significant wild crop relatives occur, the number of sites requiring protection, or the sustainability of state farm lands to contribute to a national in-situ conservation network.

Ex-Situ Agricultural Conservation:

2.23 To date wild crop relatives are preserved only by ex-situ means in Turkey through preservation of a limited amount of germplasm at the various gene bank facilities. PGRRI has the largest collection of wild species in Turkey. These collections have been developed from ecogeographic survey/ collection missions, primarily in the western half of Turkey.

2.24 The Field Crops Research Institute (FCRI) in Ankara also maintains a small collection of field crops, primarily for breeding purposes, as a working collection, and as a security backup for collections of the PGRRI. Their mandate does not encompass the broad range of species for which PGRRI has national responsibility, but does serve as an important safeguard through duplication of PGRRI collections.

2.25 A small gene bank in Ankara, the Osman Tosun Gene Bank (OTGB), is a facility of the Faculty of Field Crops at Ankara University. The collections at the OTGB include cereals and foods legumes collected by faculty of Ankara University and primarily used as a working collection by faculty for research and breeding activities. The collection does contain the significant historical collections of Jack Harlan and Osman Tosun from the 1940s. These and other recent collections are not all duplicated at PGRRI.

2.26 In addition to the above ex-situ efforts, the National Plant Genetic Resources Project was established in 1976 and began work in 1977. National responsibility for collecting and conserving genetic resources for all crops is assigned to PGRRI. Annual collecting trips of the National Crop Genetic

Resource Conservation program are coordinated by the PGRRI. Collections made during surveys are kept as bulk populations in cold storage at PGRRI. Three different storage modes are employed; base collection, active collection, and working collection. The collections are tested for viability according to international standards and regenerated when viability reaches a critically low level.

2.27 There are 18 institutes participating in the National Plant Genetic Resources Program. Some small but minor genetic resource collections are held at sites other than PGRRI, including a small collection of fruit and nut trees maintained at Yalova at the Horticultural Research Institute. However, these institutes do not maintain extensive collections or participate in national surveys for numerous crops as does PGRRI.

MINISTRY OF FORESTRY (MOF)

In-Situ Forest Conservation:

2.28 Turkey has a long established National Parks Program. The protection of some unique forest ecosystems under a Nature Conservation Area Program was initiated in 1987, establishing 23 conservation areas totalling 55,492 ha. These areas protect and maintain a collection of unique flora and woody plant species which represent rare tree species or forest types, but also include important ecosystems. Although these areas are protected, they are not managed for wild crop relatives or biodiversity conservation in the modern sense and the current management system may not, in fact, maintain the complete natural vegetation cover since a degree of disturbance i.e. grazing, may occur. Some smaller biogenetic reserve areas were created as early as 1955 and 42,000 ha have been selected as natural seed stands in 314 locations, representing 25 forest tree species. An additional 894 ha., protecting 11 species in 12 locations, have been established as "gene conservation areas". These latter efforts provide a modest degree of protection for a unified number of seed sources for production forestry, but need to be expanded and need to incorporate in-situ strategies for wild relatives.

Ex-situ Forest Conservation:

2.29 In the forestry sector some 300 tons of seeds of various species are collected yearly and approximately 200 tons are used for production purposes with 75 tons stored for future use. Currently there are also 944 ha of seed orchards and clone banks of 24 species established in 149 locations. Presently, natural regeneration of the forest tree species remains the preferred method of regeneration and to date approximately 100,000 ha have been regenerated. Yet, not all woody species can be rapidly reestablished following harvesting and some problems still exist with firs, spruce, and to some extent with beech. It is apparent that natural regeneration done cannot be entirely depended upon.

MINISTRY OF ENVIRONMENT (MOE)

2.30 MOE was recently established (August 1991) in Turkey and has as one of its responsibilities conservation of biological diversity. MOE sets up the basic policies and strategies to conserve the flora and fauna of Turkey and

has established 12 Specially Protected Areas (SPAs) which have ecological, cultural, scientific and/or aesthetic values but primarily protect endemic and endangered species of flora and fauna. These areas have been created under the Authority for the Protection of Special Areas, which develops plans and projects for the protection and rational management of biological resources in these areas according to national and international criteria.

III. MAJOR REQUIREMENTS FOR IN-SITU CONSERVATION IN TURKEY

A. Rationale

3.01 Protected areas have been established throughout the world to protect rare species of animals, plants, diverse ecosystems and natural landscapes. Special reserves have been established to protect all types of plant species, yet some of the most important plants for human survival have been given no protection in nature. It is significant that no permanently protected areas have been established to preserve the wild progenitors non-woody species, including: wheat, barley, lentils, chickpeas, and woody crops such as pear, walnut, chestnut, apple, as well as a host of other globally valuable wild crop relatives. While habitat conversion, especially overgrazing, is decreasing the abundance of these species, most of them are not immediately endangered with extinction, nor are they likely to be in the near future. The value in establishing in-situ protection for these species is that a much greater range of genetic diversity can be preserved and maintained in its natural environment than in ex-situ collections. In-situ conservation will result in maintenance of living agricultural laboratories where evolutionary processes can continue, where natural pests and pathogens co-evolve with progenitors of the world's most important wild plant species.

B. Designation of Conservation Areas

3.02 In-situ conservation of wild crop relatives and tree species depends on selecting appropriate sites and designating them for permanent protection and management as natural areas. The number, size and distribution of sites must be determined according to the species and seed sources that are selected for conservation. Criteria for site selection should include the possibility to conserve a wide range of genetic diversity in one or a few species at a single site and in some cases the opportunity to preserve many wild crop relatives at a single site. Other criteria should include ecological heterogeneity, the ability to control the site, and ease of access to the site for monitoring and management. For this GEF project it is necessary that greater priority be given to selecting globally significant crop relatives such as wild wheat, chickpea, barley and lentil and woody crops, than to species which are only of local importance.

3.03 The number of protected areas is a function of the numbers and type of species targeted for conservation, as well as the size of the protected sites. In general the larger the area the fewer the number of sites in a particular region. Determining the size, number and distribution of protected sites is one of the principal subjects of current conservation biology research.

3.04 The numerous crop species in Turkey, size of the country and its range over several major biogeographic regions mean that numerous sites for crop and tree species are necessary for an in-situ conservation program. Turkey is conventionally divided into nine major agricultural regions, all of which contain at least some wild crop relatives. Particularly, rich in progenitors of major crops are three of these regions: Aegean, South Central Anatolian and Southeastern Anatolian. Ideally, protected areas should be located in each biogeographic region if significant crop resources are located there. In practice, some regions may be more important for crop relatives and some regions may be so diverse as to require several genetic conservation areas. The number of protected areas will be determined by assessing the distribution of genetic resources at national, regional and sub-regional levels.

3.05 Attachment 4 provides additional detail on site-selection criteria.

C. Conservation Biology Research for Site Management

3.06 As implied above, determining the size, number and distribution of protected sites is one of the principal subjects of current conservation biology research. Conservation biology studies on the dynamics of plant populations is essential for proper management of the site. For example, conservation biology can address questions such as the required size of the site to maintain minimum plant populations for genetic resource conservation. Management issues may include decisions on whether grazing by livestock or natural fires should be allowed. Monitoring the status of targeted plant populations will be an ongoing need. The presence or extent to which alien species will be permitted on a site must also be determined.

3.07 The numerous crop species in Turkey, size of the country and its range over several major biogeographic regions mean that numerous sites for crop and tree species are necessary for an in-situ conservation program. Turkey is conventionally divided into nine major agricultural regions, all of which contain at least some wild crop relatives. Particularly rich in progenitors of major crops are three of these regions: Agean, South Central Anatolian and Southeastern Anatolian. Ideally, protected areas should be located in each biogeographic region if significant crop resources are located there. In practice, some regions may be more important for crop relatives and some regions may be so diverse as to require several genetic conservation areas. The number of protected areas will be determined by assessing the distribution of genetic resources at national, regional and sub-regional levels.

D. Complementarity of In-situ and Ex-situ Conservation

3.08 The PGRRI has considerable experience in ex-situ conservation of crop genetic resources. This activity is an essential part of Turkey's agricultural development program, and it serves an important role in linking Turkey to the global network of genetic resources. The in-situ program is proposed as an additional responsibility of MARA, MOF and MOE. Besides its intrinsic conservation merit, the in-situ program has interested MARA as an important opportunity to complement its ex-situ program. For instance, in-situ research will require a laboratory capacity at PGRRI and MOF (Ankara) to

assess the amount and distribution of genetic diversity at conservation sites. The laboratories could also be used to evaluate ex-situ collections. PGRRI has expressed an interest in this complementarity.

3.09 In-situ conservation will also complement the existing ex-situ gene bank activities at PGRRI. In-situ conservation can be viewed as a type of germplasm acquisition since it results in knowledge of specific sites where a particular species occurs, its conservation status at that site and detailed information on how samples can be obtained by a gene bank curator or scientists. For reasons of security and immediate availability, maintaining small subsamples of a few select wild populations in an ex-situ gene bank can complement in-situ conservation. Should the wild population become extinct or extirpated from the natural site, the population can possibly be reintroduced into nature from the ex-situ gene bank collection.

E. Need for Joint Agricultural and Forestry Government Involvement

3.10 As described earlier, the forests of Turkey contain in addition to a number of valuable timber species, woody species valuable for their food value, such as wild walnuts, wild apple or pear among others. The only sure means of maintaining these sources is under natural conditions or in-situ conservation strategies. Thus the same conservation strategy can be applied to both traditional woody species as well as agricultural species. The normal approach is the establishment of designated gene resource conservation areas. To a limited extent this has been done in the current 23 Nature Conservation Areas managed by MOF. However, such areas do not adequately protect nor maintain the vast array of germplasm requiring protection. Nor is the current level of management adequate to maintain both the woody and non-woody flora.

3.11 Although the same area may house a valuable mix of germplasm, there is still a need to identify and apply an array of conservation strategies to ensure sustainability of the genetic resources being conserved. To insure that a mix of strategies will prove successful for both forestry and agriculture a carefully planned and applied integrated approach must be adopted.

3.12 The Government of Turkey (GOT) is committed to an in-situ conservation program and has requested GEF funding for this purpose. Linkages between MOF and MOE's conservation activities and those of MARA are needed. In-situ conservation would be integrated with the National Plant Genetic Resources Project (NPGRP). Training local personnel and strengthening existing institutions would be supported through the GEF together with identification and establishment of Gene Management Zones. Forestry, agricultural and environmental agencies would all assume an active role in coordinating in-situ conservation efforts.

F. Public Involvement

3.13 Two types of public involvement are essential to the sustainability of in-situ conservation, technical and popular support. Technical support in conservation biology and nature preserve management will be an important asset to complement the work at Ministry facilities. The support of environmental interest groups will help build a national consensus for in-situ conservation.

3.14 Universities are logical institutions to bring into this project for a number of reasons. Their staffs have scientific skills and capabilities that are lacking at ministry facilities. They are effective in disseminating knowledge about the value of in-situ conservation. Universities are essential to train new generations of scientists who will be necessary for long-term conservation programs.

3.15 Environmental interest groups and non-governmental organizations (NGO) are the other major type of private group that could be brought into this program. For example, The Turkish Association for Conservation of Nature and Natural Resources (SACNNR - based in Ankara) and the Turkish Society for Protection of Nature (DHKD - based in Istanbul) are active in the conservation of biological diversity. These groups can be very valuable in building public relations for this program and in community development activities supporting the conservation of biological diversity. Possible activities for these groups include education campaigns in conjunction with extension efforts of the Ministries and as ad hoc advisors to the project.

G. Policy Design for Long-Term In-situ Conservation

3.16 In-situ conservation will require a sustained effort beyond the three year life of the project. Additional sites will need to be identified and protected, ongoing management and monitoring activities are necessary. Training in conservation management should continue, and staff and facility support for in-situ conservation activities will require funding. The institutional development for addressing these policy issues will be part of project activities. If this project proves successful, GEF could consider establishment of an endowment fund to finance the recurrent costs of continuing the program.

3.17 Conservation of strains with key drought, disease and pest resistance could play a major role in protecting the world's food supplies. Alternative sources of financing are not available. The activities would be of long-term global rather than short-term national benefit, and do not generate short-term revenues for Turkey.

IV. THE PROJECT

A. Summary Description

Project Objectives

4.01 This project would seek to identify and establish in-situ conservation areas in Turkey, for the protection of genetic resources and wild relatives of important crops and forest tree species that originated in Turkey. It would provide for sustainable in-situ conservation of genetic resources in cereals, horticultural and ornamental crops, medicinal plants, forest trees, and pasture grasses and legumes. It would develop the institutional capacity in Turkey for preparing and implementing a national strategy for in-situ conservation which could include landraces in a second phase. The aim is to test and develop a new approach for the conservation of

genetic diversity which has not been tried on a large scale anywhere in the world. Given Turkey's unique biological diversity, particularly in wild relatives of globally significant species such as wheat, chickpea, lentil, barley, plus valuable woody crops, the project could potentially be of great benefit to plant breeders in Turkey and worldwide.

Project Overview

4.02 The global scope of this project necessitates that the major focus be on in-situ conservation of wild species, with an emphasis on the following wild relatives: (a) non-woody species - wheat, chickpea, lentils and barley; and (b) woody species - pear, apple, walnut, chestnut and pistachio because these are the most globally significant genetic resources found in Turkey. The project will also address the management of woody species from an ecosystem approach rather than a species-specific approach. Therefore, important associated forest germ plasm, such as fir, cedar and pine will be incorporated into the project scope.

4.03 Landraces will not be a major focus of this project. Conservation of landraces involves complex social, biological and policy issues which are beyond the scope of the GEF to conserve wild species in nature. There is, as yet, no proven method to promote conservation of land-races in the communities where they are cultivated. Currently, the institutions involved do not have the expertise to undertake a program which would require linking economic incentives with cultivation of traditional varieties. In-situ conservation of landraces could, however, be a key element at a second phase of this project.

4.04 Research is an essential part of any conservation program, therefore researchers will continue to be strong proponents of conservation and monitors of the project status.

4.05 The project is designed around the following five components:

(1) Site Surveys and Inventories: First there will be an initial assessment of suitable sites in Turkey for wild crop relatives, focusing on wheat, chickpea, lentils and barley as the priority species, but also including other herbaceous and woody species. Given the state of current knowledge and habitat requirements for these species, the selection process will focus on areas in the Kazdagi National Forest representing the Aegean region, the Karacadag Plateau and the Ceylanpinar State Farm representing Southeastern Turkey, and a site yet to be identified in Southern Anatolia. Within these sites, ecosystem based surveys will be conducted to determine suitable habitats with regard to representativeness, diversity, naturalness and management considerations for in-situ gene management. Following the survey, a species-specific inventory will be conducted at each site with regard to species abundance, distribution and management needs. To support a complementary approach between in- and ex-situ conservation, a few select representative germplasm samples will be collected for ex-situ preservation.

(2) Gene Management Zones (GMZs): This component expands the scope of Component 1 and will involve the formalization of sites selected into protected areas with specific management requirements, adapted to different species. A series of preserves will be selected to represent the ecogeographic ranges needed for targeted wild relatives in order to support sufficient environmental heterogeneity for both wild crop woody and non-woody species.

(3) Data Management: This component will build a database for the complex array of information that will be acquired in Components 1 and 2. The data will be assembled at a common site that can be shared between agencies and universities and a data management plan will be developed.

(4) National Plan for In-Situ Conservation: This plan will (i) provide the foundation for review of the project to date; (ii) facilitate coordination and cooperation of the GMZs into other nature conservation strategies in Turkey; and (iii) outline an implementation plan for continued in-situ genetic resource activities for landraces as well as wild relatives throughout Turkey beyond the life of the project.

(5) Institutional Strengthening: This component is integral to the above and will support all of the above components. This component focuses on professional development and training of staff from the implementing agencies as well as Turkish scientists and students through specialized workshops, study tours, technical assistance and training courses, in topics such as conservation biology, bio-systematics, survey and inventory techniques and GIS. The project would also finance an international scientific advisory committee comprised of Turkish and international scientists and officials, to provide scientific support to the project.

Overview of Institutional Arrangements

4.06 The project would use the complementary strengths of the Ministries of Forestry (MOF), which has experience in local management, Agriculture and Rural Affairs (MARA), with experience in ex-situ conservation, and the Ministry of the Environment (MOE) which has a strategic outlook on resource management. MOE would have responsibility for extension and publicity for gene conservation in Turkey, and for preparation of the National Plan for In-situ Conservation through the establishment of 30 new regional offices which will have scientists available for the project.

4.07 The lead institutes under MARA for herbaceous species would be the NPGRI near Izmir for the work in Kazdagi, with the collaboration of the Ankara Field Crops Central Research Institute for the work in Central Southern Anatolia, and the Southeast Anatolia Regional Research Institute at Diyarbakir for the work in Southeast Anatolia. Allocation of support to and staff from these institutions has been determined, and all institutes report to the General Directorate for Agricultural Research in Ankara. The Research and Environment Department would be the lead institute for the Ministry of Forestry in Ankara, supported by the relevant regional research institutes at

Ankara and Izmir. The lead institutes for MOF would be: Directorate of National Parks, Wildlife and Hunting, Department of Research and Environment, Forestry Research Institute; Forest Tree and Seed Improvement Research Institute, General Directorate of Reforestation and Erosion Control; and Department of Foreign Affairs. The Department of Protection of Nature, Directorate of Protection of the Environment would be the lead institute for the MOE.

4.08 Representatives from all these agencies would form a Project Implementation Committee for coordination of activities at central level, and staff would work together at the relevant regional sites. Project staff would report to an inter-ministerial steering committee with representatives from the three Ministries, and a Scientific Advisory Committee would provide overall technical guidance. Additional details on these committees and the lead institutes are described in Chapter V.

B. Project Component Details

COMPONENT 1: SURVEYS AND INVENTORIES (US$2.4 million)

Component 1.A.(a): Regional Surveys for Significant Wild Crop Relatives

4.09 The GEF project, as a pilot program, can not cover all of Turkey or even all of those areas with wild crop relatives. Therefore, the GEF project will be limited to the following broad regions. The rationale for the selection of these areas is described in Attachment 4.

(i) The Kazdağı area of Aegean Northwestern Turkey (Balikeshir);

(ii) Ceylanpinar State Farm (Southeastern Turkey);

(iii) Karacadag Plateau (Southeast Anatolia);

(iv) Southern Anatolia (along the diagonal from the Amanos Mts. to Sivas; sites yet to be identified).

4.10 Surveys are broad in scope and not as detailed as an inventory. A survey will consist of a field assessment of selected sites (they are not collection oriented) to determine suitable habitats where wild crop relatives are likely to occur, notes on the presence or absence of priority target species, i.e. wild progenitors of wheat or chickpea and notes on suitability of the site(s) for potential designation as a GMZ. These sites afford the opportunity to develop strategies to designate GMZs on land under differing types of land ownership and varying degrees of management. The surveys will assess the extent to which wild crop relatives are already preserved in existing protected areas, including state farms. These will be rapid surveys designed to produce a preliminary report of the current state of conservation and assess potential designation as GMZ which would be developed in Component 2.

4.11 Survey teams will be small and highly mobile, consisting of 2-3 people with general expertise in identifying cereals, legumes and fruit or nut

species. Seasonal labor, such as college students can be helpful. A survey will likely require only two or three short visits (approx. one week duration) during the flowering and fruiting season of the target species. Surveys, and follow-up inventories, will require equipment such as 4-wheel drive vehicles, notebook computers, altimeters, global positioning devices, etc. (Details on equipment are provided at the end of this component description, as well as in the computerized cost tables in Attachment 9.)

(i) Survey of Kazdagi Area in Aegean Northwestern Turkey (MARA, MOF):

The PGRRI and the Izmir Forestry Research Institute will conduct a survey and inventory to identify potential GMZ sites. These sites are likely to be rich in wild fruit progenitor species, nut species and wild ornamental species (bulbs, carnations, etc.). Attachment 6 describes detailed information on the genetic resources to be inventoried at Kazdagi and a species list.

(ii) Survey of Ceylanpinar State Farm (MARA):

The PGRRI will have by this time developed considerable expertise in survey methods but will require the knowledge of regional agricultural scientists. They will be incorporated at this phase to expand the survey activities. The Southeast Anatolian Agricultural Research Institute (SEARARI) is the logical institution to lead survey activities in this region. They will be funded for this portion of the project and receive a vehicle to support field work as well as be represented on oversight or advisory committees. MOF manages important oak-pistachio park forests in this area, but other flora need identification. The open structure park forests are important vegetation types for progenitors and relatives of numerous cereals and legumes. A high priority site(s) would need to be inventoried in this area, should Ceylanpinar State Farm ultimately be found unsuitable for in-situ conservation of wild wheat, chickpea, lentil and barley genetic resources.

(iii) Karacadag Plateau area in Southeastern Turkey/Southeast Anatolia (MARA):

One site for survey and potential inventory will be Karacadag Plateau area. This site was mutually identified by MOF and MARA as being an area which may be rich with wild crop progenitors. Based on the findings of the survey, detailed inventories will be developed as warranted. If there is no site in this area that is owned by MOF or MARA, the resulting GMZ for this region can be managed by MOE as a Special Protected Area (SPA).

(iv) Survey of Sites in Southern Anatolia along the Anatolian Diagonal from the Amanos Mountains to Sivas (MARA, MOF):

South Central Anatolia is at the northern end of the "fertile crescent" and contains sites at the extreme limit of distribution for several significant wild crop relatives, including wheat, chickpea, barley and lentil. The adjacent transitional areas

contain several sites managed by MOF. The forest resources of this area, especially the Lake District are rich and include the northernmost extent of Cedar of Lebanon.

Component 1.A.(b): Detailed Inventories of Surveyed Areas

4.12 Once the surveys are completed for the selected sites, inventories will be conducted. These will consist of detailed descriptions of which plant species occur a site, their abundance, distribution and suggested management needs. A thorough inventory of wild crop relatives at each of the sites is essential to assess the value of the sites as an in-situ gene repository for establishment of GMZs. In addition to herbaceous and woody wild crop genetic resources, other useful or potentially useful species will be inventoried. This will include aromatic, medicinal and ornamental species.

4.13 The inventories will require repeated visits throughout at least one complete growing cycle by specialists on the targeted field botanists, natural resource management, forestry and germplasm preservation. Measurement of the genetic diversity found in select wild populations of crop relatives will provide crucial information to answer questions of how many individuals, populations and areas are needed to adequately preserve particular species. Intra-specific diversity will be measured by use of iso-enzyme scanning and separation apparatus.

4.14 The total number of sites selected for inventory (where GMZs will be established) will not exceed 5-6. These will include Kazdağı, Ceylanpinar, Karacadag and 2 or more sites in southern Anatolia. The following section describes the inventory process for Kazdagi as the "pilot site", from which lessons learned will be applied to the inventories of other sites. Attachment 4 describes the selection process and criteria for these sites.

Kazdağı Pilot Site

4.15 Kazdağı, has been selected to be an initial site for development of a pilot program of integrated in-situ conservation of wild crop relatives. The Kazdağı MOF site will be inventoried for wild crop relatives so that an integrated in-situ management plan can be developed. An in-depth inventory is necessary, but should not consume the entire resources of the in-situ conservation project during its first phase. It is essential to develop a detailed inventory of the basic forest types present at Kazdağı and to delineate those plant communities where crop relatives occur.

4.16 The Kazdağı region is ecologically and floristically diverse, containing a number of interesting and rare tree species. Some Kazdağı forest sites contain wild relatives of apple, plum, pistachio (Pistacia spp.), chestnut, hazelnut (Corylus spp.), forage legumes, chickpea and other crops. (A detailed list of species is provided in Attachment 6.) For the most part the species present are relatives of and not direct progenitors of cultivated crops. Other sites to be surveyed in later stages of the project are likely to contain more important crop progenitors. Habitats in active agricultural sites at the margin of forested areas contain a greater diversity of crop relatives than densely forested sites at Kazdağı. Wild relatives of peas,

faba bean, forages, ornamentals and medicinal plants are to be found in the agricultural zones.

4.17 Current management includes protection of rare tree species, reforestation, forest regeneration, select harvesting techniques and watershed management. From a pure forestry perspective of biodiversity conservation, Kazdağı is a site with many opportunities. It includes nearly all the components for an integrated strategy. The Kazdağı area is managed by MOF as a forest reserve and is proposed as a National Park.

4.18 The entire Kazdağı region, not just the currently protected area, will be surveyed and selected portions inventoried. With regard to importance for conserving wild crop relatives of major crops, the Kazdağı site is of regional rather than global significance. However, its value is that as a pilot site it meets all of the criteria and can serve as a focal point to develop skills and expertise which can be applied to other sites and regions of Turkey. It will also serve to demonstrate the value of existing protected lands as potential sites for designated gene management zones to promote in-situ conservation of wild crop relatives.

Survey Outputs

4.19 1) Physical Description of Area Surveyed: Physical description including size, topography (elevation ranges), access, land ownership, designation (Forest Protected Area, Special Protected Area, National Park, National Forest, etc.) and ownership of adjacent land. Maps should show the access roads and trails.

4.20 2) Ecological Description of Area Surveyed: Detailed description of plant community types currently present at the site. A standardized ecological classification system would be used if available, which includes hectare sizes of each ecological type.

(a) For each plant community type where wild crop relatives occur, a quantitative description of species composition and a plant species list based on field sampling would be provided. Scientific names of all species would be used. Sampling would include preparation of duplicate herbarium specimens for MARA, MOF and a major internationally recognized university herbarium in Turkey (i.e., Ege University, Istanbul University, or Ankara Univ). These quantitative descriptions will serve to provide information needed for selection of sites for more intensive inventory activities. Estimates of plant densities and population characteristics for wild crop relatives would be provided.

(b) Detailed black and white maps of plant community types present at the site surveyed with a topographical background map would be prepared. The scale would be large enough that community type boundaries and codes are clearly discernable.

(c) Occurrence according to the Red Data Book of rare and endangered plants would be listed and any locations within or adjacent to the GMZ where these species might be expected to occur based on existing biological information and previously recorded occurrences would be

identified. These species would be sought in the course of field work, and indicate locations of observed individuals or populations on a separate map.

3) Sampling: The objective of the sampling effort is to provide a quantitative description of general plant species associated with the inventoried areas. The data would be needed to provide a baseline for monitoring vegetation changes which might affect the population of wild crop relatives.

4.21 Sampling methods would be appropriate to the number, size and distribution of wild crop relatives on the site as well as the life history of the species in question. A method is needed that would provide a good baseline for monitoring changes in abundance and distribution of the species within a potential GMZ. Methods and locations would be described in sufficient detail so that sampling can be repeated in the future and observations would be documented with voucher specimens. For any forest sites containing wild crop relatives MOF would produce quantitative descriptions of tree stand characteristics to supplement herbaceous species composition data. If age data is essential to evaluation of the site as representative of a particular community type or condition, it should be obtained using appropriate non-destructive techniques.

4.22 4) Additional Descriptions: This may be obtained from literature or actual field sampling and includes geology; soils (maps if available; erosion hazards); climate information (including distance, direction and elevation of nearest weather station and length of data record available); fire history; logging, grazing, or other human impacts or uses; and cultural (historical) values.

Implementation Arrangements for Survey and Inventory Sub-components

4.23 PGRRI has experience in ecogeographic surveys to collect germplasm for ex-situ storage. This experience will be valuable in developing survey techniques to conserve globally significant crop progenitors in-situ. PGRRI will lead and coordinate survey activities but will require the assistance of agri-culture specialists in the various regions to be surveyed, particularly that of SEARARI at Diyarbakir. Southeastern Turkey is rich in the progenitor species of cereals and major food legumes and some GMZs will likely be identified at Ceylanpinar State Farm in that part of Turkey. The FCRI in Ankara will be a cooperating participant. Regional MARA institutes must have an active role in identification and management of in-situ conservation sites, thus their participation at the survey and inventory stage is essential. Other MARA expertise, such as wheat specialists at Eskisehir, will likely be needed to complement expertise found at Menemen.

4.24 MOF will lead the large scale inventory of ecosystems with assistance from MARA. These sites are difficult to manage in a traditional sense and would require involvement of the local community for long-term management stability. At the Kazdağı area, the appropriate Division Director of Forest Regional Conservancy Directorate will be responsible for carrying out and monitoring project activities.

4.25 The subsequent Data Management Component (3) will handle integrating the range of information to be generated from each component of the project. For example computer software, such as ALICE, can be used to manage species lists accumulated during surveys. During the surveys, a standardized data format will be used to assess sites for easy comparison between sites.

Equipment for the Survey and Inventory Sub-components

4.26 The project will fund the following equipment and recurrent costs for MARA and MOF in order to implement the survey and inventory sub-components. Detailed costs are provided in Attachment 11.

MARA:

(a) field equipment - 4 GPS receivers; 3 Ph meters, 6 altimeters, 3 soil and sieve sets, 3 clinometers, 10 compasses;
(b) laboratory equipment - electrophoresis supplies, 4 growth chambers, 1 drying oven, 5 thermometers, 1 incubator, 1 centrifuge, 6 microscopes and 1 camera, 3 balances;
(c) vehicles - 4 four-wheel drive jeeps, 2 Land Cruisers and 1 pickup truck, 1 minibus, 1 mobil lab and 4 motor bikes; and
(d) recurrent costs including laboratory supplies and vehicle maintenance.

MOF:

(a) field equipment - 3 GPS receivers, altimeters and Ph meters;
(b) laboratory equipment - 2 electrophoresis supplies, 3 Ph meters and balances, 1 gel reader and 1 microscope, 3 incubators;
(c) vehicles - 3 four-wheel drive jeeps, 4 Land Cruisers and 3 pickup trucks, 2 minibuses, 1 mobil lab;
(d) transport, housing and fuel;
(e) field labor; and
(f) recurrent costs including laboratory supplies and vehicle maintenance.

Component 1.B. Germplasm Management in Ex-situ Gene Banks

4.27 A complementary approach requires that a few select representative germplasm samples, but not all populations, of some species will be collected for ex-situ preservation at PGRRI. Plant species will be documented by herbarium specimens and a limited number of germplasm collections will be selected to be conserved ex-situ as well as in-situ. These collections will be preserved in duplicate for MOF and MARA and are to be shared with expert botanists. This will require some additional financial support for the existing herbarium at PGRRI and the central MOF herbarium in Ankara. Regeneration of these collections will not be necessary, except for research purposes, as it will likely be less costly in the long term to recollect from known sites.

Equipment for the Germplasm Management Sub-component

4.28 The project will fund the following equipment and recurrent costs for MARA and MOF in order to implement the germplasm sub-component. Detailed costs are provided in Attachment 9.

MARA:
2 seed blowers, 2 moisture meters, 1 multispec grain analyzer, 3 storage rack systems and supplies, 2 compressors, 1 refrigerator, 10 herbarium cabinets, propagation supplies and greenhouse expansion.

MOF:
1 seed blower, 1 moisture meter, 1 multispec grain analyzer, 1 storage rack system and supplies, 1 compressor, 2 refrigerators, 4 herbarium cabinets, propagation supplies, greenhouse expansion and fencing.

COMPONENT 2: GENE MANAGEMENT ZONES (GMZs) (US$172,000)

(a) Habitat Protection of Wild Crop Relatives

4.29 The in-situ conservation of wild crop relatives will be accomplished through establishing biological reserves, called GENE MANAGEMENT ZONES, where natural conditions of wild crop relatives are maintained. Such preserves should include sufficient environmental heterogeneity to provide the major ecological niches that influence wild crop population distribution. A single preserve is likely to be insufficient for this as wild species are genetically diverse and no one preserve can be said to encompass the range of genetic variability. Ideally, a series of preserves (GMZ's) representing the ecogeographic range of a species is needed. To date, there has been no direct protection of wild crop relatives in Turkey. Some protection has occurred where species occur on protected lands but these have been unintentional and existing management plans for those sites do not include wild crop relatives.

4.30 These sites will likely be from 20-70 ha in size and will require specific management, such as fencing and/or limited managed grazing to maintain the genetic diversity of the plant populations conserved. It is best to think of a GMZ as a protected island in a much larger area where the conserved genes also occur, but the surrounding area is not given specific management as is the resource within a GMZ. As described in component 1, these sites will be integrated into the existing state-owned land system of MOF and/or MOE. If any site that warrants protection lies outside the management areas of MOF or MARA, it can be managed by MOE as a SPA.

(b) Habitat Protection of Trees and Woody Wild Crop Species

4.31 In-situ conservation of tree species is often accomplished through the creation of national forests and nature preserves. These preserves are, however, rarely managed with the idea of maintaining biological diversity. The planning of forest use for biological conservation might include such steps as determining minimal critical size to preserve a large portion of variability or the limiting of such practices as forest livestock grazing that

changes the composition of the forest plant community. Currently a series of potential strategies are available such as, expanding national parks, traditional protection areas, and research natural areas (areas for protection and research) and use of a newer concept of the application of forest gene resource management areas. In this last method it is still possible to manage a forest genetic resource while at the same time meeting needs and services from the area protected.

(c) Management of GMZs

4.32 Management strategies will vary depending on target species conserved in a gene management zone. The appropriate number and size of sites will be determined based on the genetic diversity analysis during Component 1. Based on current knowledge of the genetic diversity and population biology of wild wheat, it is expected that there will be a network of small GMZs at each site within the regions of southeast and south central Turkey.

4.33 In some cases, depending on the site selected, immediate management will be required. This could include fencing as well as construction of public facilities for extension or interpretive purposes. Fencing, especially in heavily grazed areas is essential to control, but not necessarily eliminate grazing. Grazing control is essential in forested areas where it is desirable to allow natural regeneration of forest understory vegetation.

4.34 In any GMZ, permanent areas should be selected as control sites where no management will take place so as to have a measure of the effects of particular management practices. This is important also for long term ecological monitoring.

(i) Non-woody strategies

4.35 In selecting GMZs to conserve genetic resources of the target species, such as wild wheat, priority will be given to identifying areas with a diversity of factors affecting genetic diversity in that species; rainfall, rockiness and grazing. These factors have been identified as primary predictors of genetic diversity in wild wheat in Israel. Therefore, selection of a site in the largest and central portion of wheat's ecogeographic distribution, that being Turkey, will build upon this knowledge base and designate GMZs that have variation in rockiness, grazing history and be spread across a rainfall gradient in southern and southeastern Turkey.

4.36 The management objective for wild wheat will be to maintain and or increase the abundance and perhaps the genetic diversity of wild wheat in each GMZ and to prevent perennial grasses or forbs from overtaking wild wheat habitats. These objectives can be accomplished through controlled grazing, mowing or fire management to discourage perennial grasses from displacing the annual wild wheat. Grazing, if allowed, should not be continuous, rather it may be best to restrict limited grazing to the spring cool season when wild wheat is tillering and late in the growing season after mature spikelets have been shed. Grazing should not be allowed on a yearly basis but only as necessary to control dominance of perennial species. Some grazing may act as a stimulus to wild wheat populations as can fire.

4.37 Controlled fire management might be used if vegetation litter becomes abundant in the GMZ. Heat from fires can scarify seeds and release much needed nutrients back into the soil. However, any use of controlled fire must be closely supervised so as not to endanger surrounding lands and or adversely effect the resources of local people.

4.38 Invasive weed populations should be kept under control in the GMZ. Mowing, either by machine or hand, can be an appropriate means to control such invasions where fire and grazing are not suitable. Mowing will not be possible on steep slopes or rocky areas.

4.39 Management objectives and methods for wild barley (Hordeum spontaneum) present together with wild wheat at GMZs will be the same as those for wild wheat since they have similar life histories.

4.40 The wild relatives of food legumes (Lens orientalis and Cicer spp. but especially annual Cicer species and particularly C. reticulatum) present in GMZs for wild wheat are likely to require the elimination of grazing during critical life history phases such as flowering and fruiting periods. Grazing might be permitted after the seeds have naturally dispersed or early in the season before flowering and when grazing is permitted for wild wheat.

(ii) Woody management strategies

4.41 The management of woody crop genetic resources will have the same objectives as for herbaceous species, that is to maintain and or increase the abundance and perhaps the genetic diversity of species being conserved. A GMZ for wild apple, walnut or chestnut would likely require larger sites than required for annual grasses and legumes.

4.42 For woody species, planting of trees from seed sources outside of the GMZs would not be permitted so as to prevent pollution of the genepool from exotic sources. Grazing would not be permitted in forest areas to encourage development of seedlings, associated species and a forest understory. There should not be grafting or other forms of propagation. If restoration (rebuilding populations) is necessary, then only "local" natural seeds should be used (local means within in "sight" of the GMZ, having similar aspect slope, water regimes, edaphic conditions, ecotypes...).

4.43 For wild apple, the removal of mature overstory trees may be necessary to allow development of young apple trees which are characteristically found at forest margins or as understory components where light intensity is greater. Depending on location of a GMZ, restoring the natural water relations in drained wet meadows where apples can occur may also be required. If fruit set is observed to be low in wild populations, introduction of managed apiaries may be attempted.

4.44 For walnuts, which often occur along streams, protection of riparian habitats may require management of streamside erosion or flood control. Should harvesting of wild walnuts occur, proper management will require leaving sufficient seed stock for natural regeneration of wild populations. Improved fruit or nut species must not be introduced or grafted in situ onto rootstocks of wild plants. For wind pollinated species such as walnut and

chestnut, orchards of cultivated improved varieties should be located considerable distance from the GMZ to reduce the influx of foreign pollen.

Implementation Arrangements

4.45 It is essential that the Government of Turkey will identify and support an agency (possibly MOF, MARA or MOE) to oversee the long-term preservation and necessary management of the designated sites. Designated sites should serve as natural laboratories where scientists can conduct research on the ecology of crop relatives in their native habitats. Since the designated GMZ will have national and global significance they should be available to the international research community. With respect to Turkey's sovereign control over its land and resources, the sites and the national in-situ conservation program will both benefit by serving the global research community as permanent natural laboratories. Additional implementation arrangements are provided in Chapter V.

Equipment for Implementation of GMZs

4.46 The project will fund the following activities and equipment for MARA and MOE in order to implement the GMZ component. Detailed costs are provided in Attachment 9.

MARA: survey and boundaries of GMZs and fencing.
MOF: survey and boundaries of GMZs and fencing.

COMPONENT 3: DATA MANAGEMENT (US$768,200)

4.47 An in-situ conservation project will depend upon the acquisition of existing data and result in generation of substantial quantities of new data. These data must be efficiently managed for success of the project. New techniques of data management will be required as there are no models to follow for incorporating an in-situ gene conservation scheme into existing ex-situ gene bank data management.

4.48 Much information concerning the distribution of crop relatives exists in diverse sources such as published floras, herbaria and gene banks in many countries. Rather than duplicate existing information these existing data will be assembled at a common site and incorporated into a central data management plan. The need to share data among scientists at the different institutes involved will require the use of a standardized protocol and perhaps a central data network.

4.49 The first year survey and later inventory activities will generate considerable data. The best management of this type of quantitative and spatial data will be through use of a Geographic Information System (GIS) (see terms of reference for GIS training in Attachment 3). Three systems are required as the three agencies involved have different but overlapping needs for use of the data in developing management plans. Management of species data will require the use of special computer software such as ALICE. ALICE or other comparable software packages can interface with a GIS which will be helpful in managing spatial data.

4.50 Remote Sensing for the Ecosystem and Plant Community Inventory (Component 1) will require the use of large scale land information. Remote satellite images will form the basis for guiding the later, in depth, inventories of plant species present. Current land use management identified by remote imagery will be ground verified.

Equipment for Data Management Component

4.51 A broad range of data will be generated by the project which must be coordinated within and between MOF, MARA and MOE, as well as the sharing of information on wild crop relative with universities and the international community. Therefore, the project will fund the following activities, equipment and recurrent costs for MARA, MOF and MOE in order to implement this component. Detailed costs are provided in Attachment 9.

MARA: data acquisition and management training, literature, books, Geographic Information System and software, 2 computer printers, software, 1 pen plotter, 1 mini computer, 4 desktop and 4 notebook computers, 1 laser printer, 3 photocopiers and 3 fax machines.

MOF: Same as above, except 4 printers and 5 desktop computers.

MOE: Same as above, except 6 desktop and 2 notebook computers, 1 photocopier and 1 fax machine.

All: recurrent costs of supplies, materials and report expenses.

COMPONENT 4: NATIONAL PLAN FOR IN-SITU CONSERVATION (US$488,000)

4.52 A strategic plan is needed to provide a mechanism for the GOT to set priorities and present a plan of actions that will ensure the protection of wild crop relatives and forest genetic resources in their native habitat beyond the three year GEF pilot program. This plan should help the GOT expand in-situ conservation activities into a network of GMZs which include other areas of the country and incorporate additional important wild crop, forest species and endangered species found in GMZs beyond those targeted in the GEF pilot project. The plan will also address the needs and opportunities for landraces as part of the in-situ genetic resources spectrum.

4.53 The expansion of GMZ's through the plan should be integrated with existing protected area strategies and relevant Turkish legislation. It should be consistent and complementary with other national, regional or global efforts to conserve wild plant genetic resources. For example, the plan should be compatible with and support MARA's National Plant Genetic Resources Research Project. The plan would contribute to but not replace the more comprehensive "National Conservation Plan" which is in preparation by the GOT, in that it will only address the primary elements of in-situ crop (woody and non-woody) resources. It is understood that the focus of the GEF project is on in-situ gene conservation and that a national plan for all biodiversity of Turkey is beyond the scope of this project.

4.54 The plan should lead the way for continuation and replication of the GEF pilot project which can provide a supportive platform for continued assistance from the international donor community.

4.55 The total preparation time of the Plan would be 20 months, beginning with month 17 of the project and ending in month 36, the last month of the 3 year GEF project. The plan will be developed in four distinct "phases" resulting in four reports. The timing, purpose and detailed description of activities for each phase as well as the functions, time frames and costs of local and international technical assistance is outlined in Attachment 4 and detailed costs are identified in Attachment 9. The phases are summarized below:

i) INCEPTION: To design the foundation of the plan through the development of an overall strategy and work plan for plan. The preparation will be done in coordination and cooperation between MOE, MOF and MARA, the international advisors and the local experts.

ii) CORE DEVELOPMENT: This is the core time in which background information for the plan will be gathered and then written into a proactive, long-term conservation strategy to meet the objectives outlined in this TOR. A draft final plan will be developed during the second half of this phase and presented at the international symposium scheduled for the beginning of year 3 of the project.

iii) FINAL PLAN: Revision of the draft plan based on information gathered at the International Symposium and from the SAC.

iv) PLAN APPROVAL: This phase will focus on coordination with other concerned agencies and communities involved for acceptance of the plan and incorporation with the broader GOT National Conservation plan.

Implementation:

4.56 MOE will be the lead agency for developing the plan with support from MARA, MOF through local and foreign technical assistance. MOE will oversee all contractual arrangements with the contractor for the technical assistance. MOE will also coordinate additional support form relevant international agencies such as IUCN, WWF, IBPOR, and FAO as needed. The GEF grant will cover the technical assistance costs as well as report production costs including translation. The contractor(s) will be responsible for overhead responsible for overhead responsibilities such as secretarial assistance. Technical assistance will be required at different times throughout this development of the plan and will be approximately 25% foreign and 75% local experts in the following disciplines:

International Advisors: Conservation Biologist, Conservation Management Expert, and Landrace expert;

Local Experts: Botanist, Agriculturalist, Forester and Anthropologist-Sociologist, Protected Area Specialist, Resource

Economist, Socio-economist, Legal and Institutions Expert, and an Extension/Education Expert.

4.57 Detailed information on the timing, duration, costs and qualifications for the technical assistance is provided in Attachment 4 and Table 405 of Attachment 9.

COMPONENT 5: INSTITUTIONAL STRENGTHENING (US$1,032, 800)

4.58 This component is designed to strengthen both the individual agencies of MOF, MARA and MOE as well as support their complementary strengths and capabilities through four types of input including: a) collaboration through the Project Implementation and the Scientific Advisory Committees, b) extension and public awareness, c) a broad range of in-country and international training activities, and d) sponsoring of an international symposium on in-situ conservation of genetic resources.

4.59 The need for coordination between the agencies cannot be overstated. For example, MARA will be implementing conservation activities on land that is in some cases controlled by MOF, and MARAs primary interest in wild crop resources may in some cases require MOF to modify its management scope and scale for selected national parks and forests (such as expanding the boundaries of a national park to accommodate crop genetic resources through the establishment of a GMZ). MOE will need to be involved and develop a level of scientific expertise appropriate to support the long-term goals of steering this pilot GEF project into an ongoing effort as described in the previous component on the National Plan.

a) Committee Coordination:

4.60 This is a complex and innovative project with requires considerable coordination and communication between different governmental levels and scientific disciplines as part of the institutional strengthening process. Therefore, three types of committees have been designed for project implementation including: the Inter-Ministerial Steering Committee to initiate support at the highest ministerial levels; the Project Implementation Committee which will provide overall project coordination and implementation through designated institutes, and a Scientific Advisory Committee for broad technical guidance and exchange between government, university and international organizations. These committees are described fully in Chapter 5 in the section on Coordination and Advisory Committees and detailed costs are provided in Attachment 9. The project will provide the following funds in mandays (md) for participation by local staff and foreign and local advisors at the following committee meetings. These times are also outlined in the workplan in Attachment 1.

4.61 MARA: Scientific Advisory Committee - local staff (20 md in year 1, 20 md in year 2 and 30 md in year 3); foreign advisors (24 md in year 1, 24 md in year 2, and 24 md in year 3); and local advisors (24 md in year 1, 24 md in year 2 and 24 md in year 3); Project Implementation Committee (30 md in year 1, 50 md in year 2 and 50 md in year 3).

MOF: Project Implementation Committee (30 md in year 1, 50 md in year 2 and 50 md in year 3).

MOE: Coordination of committee meetings (20 md in year 1, 30 md in year 2 and 30 md in year 3).

b) Extension and Public Awareness:

4.62 This project has tremendous potential to capture the support of the general public as a valuable example of how conservation of biodiversity can benefit human life. The project, being the first of its kind in the world, can serve as a pilot in Turkey and as a model for other countries rich in wild crop genetic resources. It is important that the success of this project be documented through informational brochures and visual means.

Turkish nationals living near the GMZs need to understand and be supportive of the project. This requires public education and awareness building also through the use of a wide range of published material and media including television documentaries, videos, books and brochures. For example, the project would benefit from production of a short video based on the well received booklet "Conserving the Wild Relatives of Crops". To further strengthen support in Turkey the same booklet can be translated into Turkish for wide dissemination. (See Attachment 8 for bibliography.)

4.63 MOE has extensive experience in the production of such materials and will take the lead role in developing these materials for the National Plan as well as ongoing public education activities of the project. MOF and MARA would also develop materials reflecting their active involvement in the project.

4.64 The project will fund the following equipment to support extension and public awareness activities (detailed costs are provided in Attachment 9).

MARA, MOF and MOE: 2 cameras, 2 video sets and 3 slide projectors (per agency). MOE will receive additional funds for overall publication costs about the report and the National Plan (see Component 4).

c) Training:

4.65 To effectively implement this project a broad spectrum of training opportunities are needed for MARA, MOF and MOE and are outlined below. A full description of training needs is described in Attachment 2, with TOR's provided in Attachment 3. Detailed costs for the following activities are described in Attachment 9.

4.66 Short-Overseas Courses: MOF has virtually no experience in in-situ conservation of important species and will send selected representatives for short-term courses abroad to universities such as University of California/Davis or The University of Birmingham. All of these will take place at the beginning of the project to lay the groundwork for successful starting of the project. The following describes the courses and man-months (mm) per course targeted to scientists from MOF: GIS/GPS (4mm), Population

Genetics (3mm), Survey/Inventory Techniques (2mm), Conservation Biology (9mm) and Seed/Pollen Management (4mm).

4.67 In-country Training: Training of Turkish scientists has been identified as critical to the success of this project and necessary for the development of a long term program for in-situ conservation of wild crop genetic resources. Development of expertise and application of conservation biology theory will require that training workshops be jointly held with MARA, MOF and MOE. Specialized in-country training in conservation biology, biosystematics and electrophoretic techniques, survey and inventory techniques, and data management through the use of GIS will be funded during the first year of the project in order to develop a baseline level of knowledge and skills to be expanded upon throughout the project. The project will fund the following number of man-weeks (mw) for both participants from MARA, MOF and MOE as well as the foreign technical assistance required to prepare and conduct these courses:

Course	Students (mw)	Foreign Trainers (mw)
Iso-ensyme:	60	8
GIS:	80	10
Consv. Biol.	250	18
Survey/Inv.	150	16

4.68 Study Tours: To acquire additional expertise several learning tours will be required for MARA, MOF and MOE personnel involved with the project. Study tours will occur during year two. These will be learning tours which specifically relate to skill development for in-situ conservation of plant genetic resources and will build upon training given in Turkey during the year one (see previous two paragraphs) of the GEF project. These tours will focus on acquiring knowledge about population genetics, conservation biology and the integration of in-situ and ex-situ-techniques. Funds are provided for six study tours, each lasting approximately one month in foreign countries where desired expertise can be found. This will enable MOF, MARA and MOE each have two scientists participate in the study tours.

4.69 Long-term international degree training: For institutional strengthening it is necessary to provide advanced degree training in selected areas of plant genetic resource conservation. For the purposes of the project four Masters Degree candidates from MARA (2), MOE (1) and/or MOF (1) will be selected and funded for one year Masters programs. Suitable programs are offered in genetic resources at the University of Birmingham, England. Other suitable courses may exist elsewhere.

d) International Symposium:

4.70 The project's survey, inventory and management activities will generate a considerable amount of information on the abundance and current preservation status of Turkey's wild crop genetic diversity. A successful realization of all the goals will require the advice and input of acknowledged international specialists. An international seminar will allow for exchange

of ideas and current literature on integrating in-situ conservation into a comprehensive biodiversity strategy for Turkey. This seminar will be an opportunity to feature the work of MOF, MARA, MOE and other Turkish scientists working on biodiversity conservation with the broad international community. Therefore, international scientists will be invited to broaden the scope of presentations. The SAC will play a key useful role in identifying results and accomplishments of the GEF.

4.71 The project will benefit from a workshop style seminar which can allow for free exchange of ideas and provide further direction. This meeting is best held at midpoint in year three for a number of reasons: (a) The project needs to be well into the implementation of all components before there can adequate information to share; (b) this is the optimum time with regard to growing seasons and academic schedules and (c) so that the last year of the project may benefit from ideas generated during the meeting. Information on the project will be disseminated to national and international NGOs and governments, International Agricultural Research Centers (IBPGR, ICARDA etc.) and other conservation organizations such as IUCN and WWF through this seminar. This meeting will contribute to the development of an international network on genetic resources for Turkey.

4.72 The draft final version of the National Plan (see component 4 and Attachment 4) will be presented at this symposium which will present the summary of activities to date and an action plan for priorities of in-situ conservation beyond the GEF pilot.

4.73 Turkish scientists participating in the GEF project will be encouraged to prepare scientific papers for presentation at the international symposium. These will either be published as part of proceedings or submitted to peer reviewed journals. There will be many opportunities for long-term ecological research publications, graduate student research projects and collaborative research projects with international scientists. This interaction and involvement should be encouraged and fostered by the SAC.

4.74 The project will provide perdiems for seventy local participants from MARA, MOF and MOE as well as travel and perdiems for ten invited scientists and/or resource managers from other countries that are conducting parallel conservation activities. It is assumed that representatives from international agencies will provide their own costs to attend the symposium. Detailed information on the symposium costs are provided in Table 405 of Attachment 9.

C. Project Costs and Financing

4.75 Total project costs are indicated below in Table 4.1. They are estimated at US$4.9 million excluding physical and price contingencies and US$5.7 million with all contingencies. Foreign exchange comprises 67% and taxes 9% of total project costs.

Table 4.1: Project Cost Summary

	US$'000			% of Total	
	Local	Foreign	Total	Foreign Exchange	Base Costs
COMPONENTS:					
1. Inventory/Survey					
a. Inventory and Survey	447	1411	1857	76	38
b. Germplasm Management	264	238	548	52	11
Sub-Total	711	1694	2405	70	49
2. Designation of GMZ	172	0	172	0	4
3. National Plan	238	250	488	51	10
4. Institutional Strengthening	222	809	1032	78	21
5. Data Management	226	543	768	71	16
Total BASELINE COSTS	1569	3296	4865	68	100
Physical Contingencies	157	330	487	68	10
Price Contingencies	120	201	321	63	7
Total PROJECT COSTS	1846	3828	5673	68	117

4.76 The financing plan is indicated below in Table 4.2. The GEF would finance 100% of foreign exchange and 89% of total project costs. GOT would in addition provide local staff, use of existing research facilities and use of some existing vehicles and laboratory equipment. These items have not been costed, however, since they are not incremental to the project.

Table 4.2: Financing Plan (US$ Million)

	Local	Foreign	Total
GOT	0.6	0.0	0.6
GEF	1.3	3.8	5.1

D. Procurement

4.77 Procurement methods are indicated in Table 4.3. Procurement comprises US$0.9 million for vehicles, motorbikes and mobile laboratories, all to be procured through ICB. Equipment and materials total US$2 million, principally for various types of field and laboratory equipment, but also for office equipment and computers. At least US$0.9 million of these items would be grouped and procured for ICB as large packages. Contracts estimated to cost less than US$100,000, up to a total value of no more than US$1 million, would be awarded after local shopping on the basis of comparison of at least three quotations from eligible suppliers. Civil works (US$437,000) comprise

principally construction of fencing around gene management zones. GMZs would be widely scattered in different parts of Turkey, and the fencing would be constructed using force account by MOF, which has considerable experience in this field.

4.78 Training and technical assistance totals US$1.7 million, of which US$1.5 million is for training, principally in-country, and US$200,000 for foreign and local technical assistance to carry out the training. Consultants to provide this assistance would be recruited according to IBRD guidelines for use of consultants, and the contracts would be subject to prior review by the Bank. All arrangements for training would be subject to IBRD approval. All contracts for goods and equipment above US$100,000 would be subject to prior review by the Bank. The items cover about 80% of procurement outside force account and recurrent costs.

4.79 The final items, transport and accommodation for local staff to attend project related meetings, local labor for field activities, and operation and maintenance of vehicles and equipment purchased under the project totalling US$0.6 million would be purchased directly using GOT procedures. GOT agreed at negotiations to follow the procurement practices outlined above (para 7.01(d)).

Table 4.3: Procurement

	Procurement Methods (US$ millions)			
	ICB	LCB	Other	Total
Civil Works			0.4[1/]	0.4
			(0.35)	(0.35)
Goods	1.9		1.0[2/]	2.9
	(1.7)		(0.9)	(2.6)
Training & TA			1.7[3/]	1.7
			(1.7)	(1.7)
Transport & Accommodation			0.2[4/]	0.2
			(0.18)	(0.18)
Recurrent Costs & Labor			0.4[4/]	0.4
			(0.27)	(0.27)
Total	1.9		3.7	5.7
	(1.7)		(3.4)	(5.1)

(Figures in parentheses indicate amounts financed by GEF.)

1/ Force Account
2/ Local shopping
3/ IBRD guidelines for use of consultants
4/ GOT procedures

E. Disbursements

4.80 The project is expected to be completed in about three and a half years and the grant to be disbursed over four years. Project completion is expected by September 30, 1996 and grant closing by March 31, 1997. The estimated disbursement profile is indicated in Attachment 9.

4.81 The GEF grant would disburse funds at the following rates:

Table 4.4: Disbursements

Category	GET Grant Allocation	Amount (US$M equivalent)
Civil Works	88% of expenditures	0.35
Goods	100% of foreign expenditures 100% of local expenditures (ex-factory cost) and 90% expenditures for other items procured locally	2.6
Training & Tech. Assistance	100% of expenditures	1.7
Transport & Accommodation	88% of expenditures	0.18
Recurrent Costs & Labor	67% of expenditures	0.27
		5.1

Table 4.5 Estimated Disbursement Schedule (US$ million)

IBRD Fiscal Year	FY93	FY94	FY95	FY96	FY97
Annual	0.2	3.1	1.0	0.6	0.2
Cumulative	0.0	3.3	4.3	4.9	5.1

4.82 Disbursements would be made against statements of expenditure for incremental operating costs, civil works, goods procured through direct purchases or prudent shopping, and training and technical assistance locally and abroad. Implementing agencies would retain support documentation for these items for review by IBRD and external auditors.

4.83 GOT would establish a special account at the Central Bank to facilitate implementation of the project into which it would deposit US$400,000 of GEF grant funds. This account would be opened in accordance with arrangements for existing Bank assisted projects, and would be used for most disbursements except those in excess of US$150,000 (see para 7.01(f)).

4.84 Each implementing agency (including the GDAR of MARA, the Research and Environment Department of MOF and the General Directorate for the Protection of Environment, Department of Protection of Nature for MOE) would prepare detailed reports on expenditures on a semiannual basis. A consolidated report would be prepared annually by GDAR, within 2 months of

each calendar year. In addition, an annual audit would be carried out by the Treasury inspectors, 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. It was agreed with GOT at negotiations that the implementing agencies would follow these accounting and auditing practices (para 4.82).

F. Supervision

4.85 It is estimated that the GEF subproject would require approximately 10 weeks of supervision per year. Special skills needed would include a herbaceous plant geneticist, a woody plant geneticist and a land management specialist (from year 2). The Eastern Anatolia Watershed Rehabilitation project, to which this subproject is attached, would provide administrative, MOE and community participation skills.

V. ORGANIZATION AND MANAGEMENT

A. Lead Agencies and Institutes

5.01 As stated in the beginning of the previous chapter in the Institutional Overview section, the project requires the complementary capabilities of MARA, MOF and MOE to be successfully implemented, yet each has clear roles and areas of responsibility. It is imperative that regional agricultural and forestry research centers in the vicinity of the designated in-situ conservation sites be also be given a major role in managing those sites. (Throughout the project component descriptions, institutional roles are also identified).

5.02 MARA is primarily responsible for the non-woody species and MOF for the trees and woody crop relatives. MARA has identified the Plant Breeding and Agronomy Department of GDAR to have overall responsibility for project coordination and procurement. They identified the Plant Genetic Resources Research Institute (PGRRI) at Menemen to be the lead institute for activities at Kazdağı. Collaborating institutes will be the Ankara Field Crops Research Institute (FCRI) and the Southeast Anatolian Regional Agriculture Research Institute at Diyarbakir (SEAARI).

5.03 The MOF has overall responsibility for the tree and woody crop species. They have identified the Research and Environment Department within the Research, Planning and Coordination Board (APKKB) to be the lead institute. The Forestry Institute at Izmir will be a regional institute to carry out collaborative projects, specifically activities at Kazdağı. Collaborative institutes of MOF will be those of the Department of National Parks, the Forestry Research Institute in Ankara, Forest Tree and Seed Improvement Research Institute, General Directorate of National Parks, Wildlife and Hunting, General Directorate of Forestry, General Directorate of Reforestation and Erosion Control, and other central and regional units of MOF.

5.04 MOE will not be a primary implementing agency, but their involvement will strengthen many elements of the GEF project. Specifically, they have expertise in public awareness and environmental conservation. MOE has identified the General Directorate of Protection of Environment, Department of Protection of Nature, to be the lead institute for this project. Since MOE is a coordinating organization, it can be also instrumental in the selection of Technical Advisory Committee and Project Implementation Committee.

5.05 At the above institutes both MOF, MARA and MOE have agreed to provide scientists who will be assigned to the GEF project. This is outlined below:

Table 5.1: Suggested Allocation of GOT Personnel (person/year)

Personnel	MARA Iz	MARA Ank	MARA Diybk	MOF Ank	MOF Iz	MOE Ank
Ph.D. Level Biologists/ agronomists/foresters	1	1				1
MS Biologists/forest engineer/agronomists	2	2	2	3	2	2
BS Agronomists/Biologists	8	4	3	4	4	2
Bio. Tech./data management	2	1	1	4	4	
Support Staff	4	2	1	2	2	

(Note: Not all personnel will be full-time through the project period.)

5.06 The GDAR has demonstrated efficiency at managing foreign financed projects. For ease of administration GDAR will be responsible for procurement of equipment and materials for the GEF project. MARA and MOF will have responsibility for preparing specifications of all equipment and materials necessary for their Institutes to implement the GEF. This will streamline procurement as in most cases needs of MARA and MOF will be identical.

5.07 Government agreed at negotiations to follow these organizational arrangements (para 7.01(c), to allocate the staff necessary to implement the project, and to allocate the staff to carry out the work at Kazdagi within 2 months of negotiations (para 7.01(b).

B. Coordination and Advisory Committees

Inter-Ministerial Steering Committee (IMSC)

5.08 Since this project will require close linkage of the two implementing ministries and a supporting ministry which historically have not had such linkages; therefor, there is a need for support from the highest ministerial levels. The IMSC would be composed of the Deputy

Undersecretaries, related General Directors and related Head of Departments from each Ministry (MARA, MOF, MOE) and would meet at the beginning of each year. This interaction would reinforce the importance of the GEF project to Turkey and assure that the required support is given to the two following committees.

Project Implementation Committee (PIC)

5.09 Since it is essential that this be a joint program between the agricultural and forestry sectors a Project Implementation Committee (PIC) would be established at the start of the project. It will coordinate the GEF project through a person(s) to serve specifically as the GEF project manager/advisor within each lead agency. The lead agencies (MOF and MARA) may also appoint expert ad hoc advisory committees to coordinate activities within each agency. The chair of the PIC will rotate between MOF, MARA and MOE. The eleven members of the PIC will be composed of responsible officials from the following Institutes:

MOF
Directorate of National Parks, Wildlife and Hunting
Department of Research and Environment
Forestry Research Institute
Forest Tree and Seed Improvement Research Institute
Department of Foreign Affairs

MARA
Department of Breeding and Agronomy Research
Plant Genetic Resources Research Institute/AARI, Izmir
Field Crop Central Research Center, Ankara
Southeastern Anatolia Agricu. Res. Inst. Diyarbakir
National Coordinator of PGRRI, Izmir

MOE
Department of Protection of Nature, Directorate of Protection of Environment

5.10 Not all members of the PIC would participate in all meetings. However, monthly meetings in Ankara between MOF (Department of Research and Environment and MARA (Breeding and Agronomy Research Department and the PGRRI/AARI) would be held at a minimum. MOE will not be actively involved in this committee, however, all reports will be shared with MOE.

5.11 Nominated staff members of each agency that are located in the different project areas throughout the life of the project, would be responsible for the day to day project coordination. The PIC will assist with this intergovernmental project coordination.

Scientific Advisory Committee (SAC)

5.12 In-situ conservation is so complex and novel as to require the support and guidance of a scientific technical advisory committee. This committee should be comprised of members from the primary governmental institutions involved and of Turkish scientists with expertise in conservation

biology. In order to establish links with related international institutions and facilitate the international cooperation and data exchange, the Government of Turkey (GOT) should select international scientists to be part of the SAC. Involvement of the international community is also important for data sharing and exchange of research results. The composition of a scientific based SAC to assist and support the initial development of the GEF project should be:

MOF	2
MARA	2
MOE	2
Universities	2 (representing botanical expertise in the area)
Turkish NGO	1
Foreign	3 (invited representatives of IBPGR, FAO and one 1 international non-governmental conservation organization)

5.13 The first meeting of the SAC will be crucial to development of the project. It will serve as a mini-work group to aid in guiding direction of later project stages, especially the preparation of the International Symposium in year 3 and the preparation of the National Plan as outlined in components 4 and 5. For these reasons additional foreign representatives will be invited to attend this working group.

5.14 The project would fund the travel and per diem costs of the international members of the SAC. Details of these costs are outlined in Attachment 9.

C. Affiliated Groups

Universities and NGOs

5.15 NGOs that specialize in environmental issues, such as The Turkish Society for the Protection of Nature (DHKD), may be important contributors to this project and should be included on SAC on an ad hoc basis. The GOT and the SAC have agreed to fund NGOs for small projects in support of the overall in-situ conservation effort. These projects should emphasize education of the general public on the importance of conserving Turkey's rich heritage of plant genetic resources, especially in-situ.

5.16 Universities have been identified as important partners with government ministries in the in-situ conservation program. There are university-based biological scientists with specific expertise in conservation biology and management and with extensive knowledge of the ecology of regions that are important to conserving genetic resources. It is highly recommended that these scientists be incorporated into the program. It is difficult to envision an active university role in the in-situ effort without some direct support from the project. While the scope of the project is insufficient to design and implement major university programs in conservation biology, a commitment of a portion of project funds for university-based research and training activities is recommended. This would also be accomplished through a small grants program administered by the Scientific Advisory Committee of the project. Small research grants for university-based research on selected sites where MOF and MARA staff are working or in direct support of site

selection and management may have a very large benefit for both the university and the ministries.

D. Reporting, Monitoring and Evaluation

5.17 In conjunction with MOF, MARA and MOE, a draft work plan has been prepared. This plan, together with reporting requirements, is described in Attachment 1. Scheduled reporting will document progress and assess project success. Reports will be produced every six months and will include progress on training, results of the inventory/survey work, including species list and distribution, and criteria for selection of potential sites for GMZ; progress on the public awareness/information campaigns; on the recommendation of the Steering committee; detailed management plan for GMZ; results of the National Plan and recommendations for continuation.

5.18 The final report, after 36 months, would include a summary of accomplishments, including survey and inventory data of all sites, distribution maps of wild crop relatives, and for designated GMZs, maps, locations, ecological descriptions and management plans; extension material produced and their distribution and of other GEF publications; results of the Nation In-Situ Management Plan, including recommendations for project continuation; an overall evaluation of project progress and lessons learnt, with consideration about how the Turkish GEF project could form the basis for a regional or global approach to in-situ conservation of wild crop relatives.

5.19 GOT agreed at negotiations to follow the reporting, monitoring and evaluation outline indicated in Attachment 1 and summarized in paragraph (para 7.01(a)).

VI. BENEFITS AND RISKS

A. Benefits

Global Benefits

6.01 The project would protect in-situ biodiversity of globally significant wild crop relatives of herbaceous and woody species, and could potentially play a major role in developing new, more productive strains of economically and ecologically important crops and trees. By complementing ongoing ex-situ activities it would develop the institutional and technical mechanisms for a comprehensive strategy for genetic resource conservation in Turkey. Success in these endeavors could provide a model applicable in other parts of the world.

Form of Innovation

6.02 This is the first attempt to integrate the various components of in-situ conservation project (target species identification, establishment and management of conservation areas, and monitoring of genetic diversity), in the world through protecting wild crop relatives in their natural habitat. There have been a few national programs in Mexico, Brazil and Israel but these have

only targeted single species and have not focused on ecosystem management. The integrated in-situ/ex-situ strategies for genetic resources conservation on this project will also be innovative through the use of participatory approaches between different ministries for the siting, design, and maintenance of in-situ conservation areas.

Demonstration Value and Replicability

6.03 This project aims at demonstrating the feasibility of a comprehensive approach to the conservation of genetic diversity by strengthening the capacity of government agencies in effective on-site conservation of plant genetic diversity where it is most threatened. All aspects of this project are of importance for the advancement of the concept of in-situ conservation globally. Lessons learned will be disseminated to other countries through existing international networks and NGOs (IUCN, WWF, etc.), and through the organization of international seminars.

Contribution to the GEF Portfolio

6.04 This project will target the conservation of wild relatives of crop species and other selected plants with significant genetic variability. This type of activity is not yet represented in the portfolio. In-situ conservation is different from the concept of "protected areas" that is supported by GEF in other projects. In this respect, the significance of in-situ conservation is that it targets the conservation of genetic variability in specific plants, and not necessarily the protection of entire ecosystems.

B. Risks

6.05 The principal risks are institutional. The Ministries of Forestry, and Agriculture and Rural Affairs have limited experience in working together, while the Ministry of the Environment has been only recently established. Mechanisms for cooperation have been set in place. To simplify the project and reduce administrative risks, only wild relatives are being included at this stage. Conservation of landraces, which involves more complex socioeconomic and community participation issues, would be addressed at a later date.

VII. AGREEMENTS REACHED

7.01 At negotiations, GOT agreed:

(a) to follow the work plan and reporting schedule for project implementation summarized in paras 5.17-5.18 indicated in the Chart at the end of Attachment 1;

(b) to allocate the staff indicated in Table 5.1 necessary to implement the project and, within 2 months of negotiations, to have nominated the staff necessary to carry out the survey, inventory and designation of Gene Management Zones at the Kazdagi site; (para 5.05)

(c) to follow the organizational arrangements for project implementation indicated in Chapter 5, paras 5.02-5.10, and in particular, to nominate the Project Implementation Committee and Steering Committee within two months of negotiations, and the Scientific Advisory Committee within six months of negotiations;

(d) to follow the procurement arrangements indicated in paras 4.75-4.79.

(e) to follow the accounting and auditing arrangements indicated in para 4.84; and

(f) to open a Special Account as indicated in para 4.83.

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DETAILED WORK PLAN

1. In conjunction with both MOF and MARA a draft work plan time schedule has been prepared (Table 1, Attachment 1). The number of personnel required to meet the goals of the project is presented in table 5.1 and has been agreed to by MOF, MARA and MOE. Together they agree to commit to the staffing levels required to implement the GEF project. These will be personnel dedicated to working on the GEF project, not personnel taken from existing projects. MOE will coordinate all reports.

Products, Reports and Conditions

2. Each activity outlined in the work plan requires that certain accomplishments are achieved before progressing to the next activity. Scheduled reporting will document progress and serve to evaluate and assess the success of the GEF project. These reports are required to inform the Scientific Advisory Committee, Project Implementation Committee and for the World Bank to assess progress of the GEF. Each report should include the accomplishments of both joint and individual activities of MOF and MARA. The individual selected as the lead coordinator for each Ministry will be responsible for coordinating the preparation and timely submission of reports. A proposed reporting schedule and expected report contents is outlined in the work plan and detailed below (actual dates will be established following World Bank funding).

6 Month Report

- A brief report documenting the results of the training courses to-date. It would be useful to include a summary course rating of the quality of the course and instructors.
- Proposed plans for learning tours to include; purpose, place, duration and number of individuals to participate.

12 Month Report

- A report detailing the final training courses as above.
- Progress made in the first eight months survey/inventory at Kazdağı. This should be a summary of the data collected and decisions made. As part of the summary there should be plant species lists, distribution maps of wild crop relatives, both herbaceous and woody.
- Results of the initial survey of Southern Anatolia. This should include a map of the areas surveyed, potential sites identified which are candidates for later inventory and decisions made.

- Species, quantities and locations of the limited number of samples placed in ex-situ storage by MOF and MARA.

- A brief summary of plans to-date for the international symposium. This might include dates, place, suggested topics and invited participants.

- An accounting of all expenditures by MOF, MARA and MOE during the year.

- Extension of project information to the public will begin at the beginning of the second year with contributions by MARA, MOF and MOE.

18 Month Report

- Trip reports of completed learning tours

- Progress report on survey/inventory of Ceylanpinar State Farm and Karacadag plateau to include the same scientific details as those reported for Kazdağı.

- A continuation report for the Kazdağı inventory.

- A continuation report for the survey/inventory of Southern Anatolia.

- Species, quantities and locations of the limited number of samples placed in ex-situ complementary storage by MOF and MARA. These collections should not be the primary focus as this is an in-situ conservation project.

- A plan for which species of wild crop relatives from what sites will be examined for their genetic diversity, and for what purpose.

- A contractor identified for implementation of the writing and video documentation.

- For an international symposium at least one year advance notice is required. For this reason the 18 month report should include; progress on preparation, the final announcement, selection of speakers, preparation of invitations, location for the symposium and logistics, any proposed field excursions to accompany the symposium, plan for production of symposium output i.e, proceedings and the number of invited speakers to be funded.

24 Month Report

- A final report of learning tours to include a complete summary of activities undertaken and accomplishments.

- A final report on all Kazdağı activities. This will include; specimens collected, species found, maps of distribution of all wild crop relatives, their distribution and abundance, identification of sites which will be reviewed to establish gene management zones for wild crop relatives, distribution of forest communities where wild crop relatives

are found. Results of genetic analysis of wild crop relatives, especially woody species i.e., wild apple, plum, walnut, chestnut and pistachio, with the goal of identifying diverse representative populations for designation as gene management zones.

- o A continuation report on inventory of Ceylanpinar State Farm and Karacadag to include scientific details of the distribution of wild wheat, chickpea, lentil and barley and other wild crop relatives as encountered. Also, an analysis of isozyme analysis of selected populations with the goal of identifying diverse representative populations for designation as gene management zones.

- o Site(s) selected in Southern Anatolia for inventory and preliminary findings of that inventory.

- o Species, quantities and locations of the limited number of samples placed in ex-situ complementary storage by MOF and MARA. These collections should not be the primary focus as this is an in-situ conservation project.

- o A preliminary plan following the criteria developed for designating gene management zones for inventoried sites (Kazdağı, Karacadag, Ceylanpinar State Farm and the Southern Anatolia site.

- o A preliminary report from MOE outlining considerations for a National Plan for in-situ Conservation of Wild Crop Relatives to carry on the this activity beyond life of the GEF.

- o A preliminary report form MOE and the contractor with progress on extension materials.

- o The final program, final announcement, all speakers identified and meeting logistics for the International Symposium.

- o An accounting of all expenditures by MOF, MARA and MOE during the year.

30 Month Report

- o A final report on inventory of Ceylanpinar State Farm and Karacadag National Park to include scientific details on the distribution of wild wheat, chickpea, lentil and barley and any other wild crop relatives as encountered. This will include; specimens collected, species found, maps of distribution of all wild crop relatives, their distribution and abundance, identification of sites which will be reviewed to establish gene management zones for wild crop relatives and distribution of forest communities at Karacadag where wild crop relatives are found. Results of genetic analysis of wild crop relative populations from the sites.

- o A list of designated GMZs at all of the inventoried sites. For each GMZ; their purpose, location on maps, floras of the GMZs, management requirements i.e., fencing, forest rehabilitation needs and a summary

report on the measure of genetic diversity of wild crop relative populations conserved in the GMZs. Also, a plan for incorporating the GMZs into a comprehensive complementary in-situ/ex-situ gene conservation program.

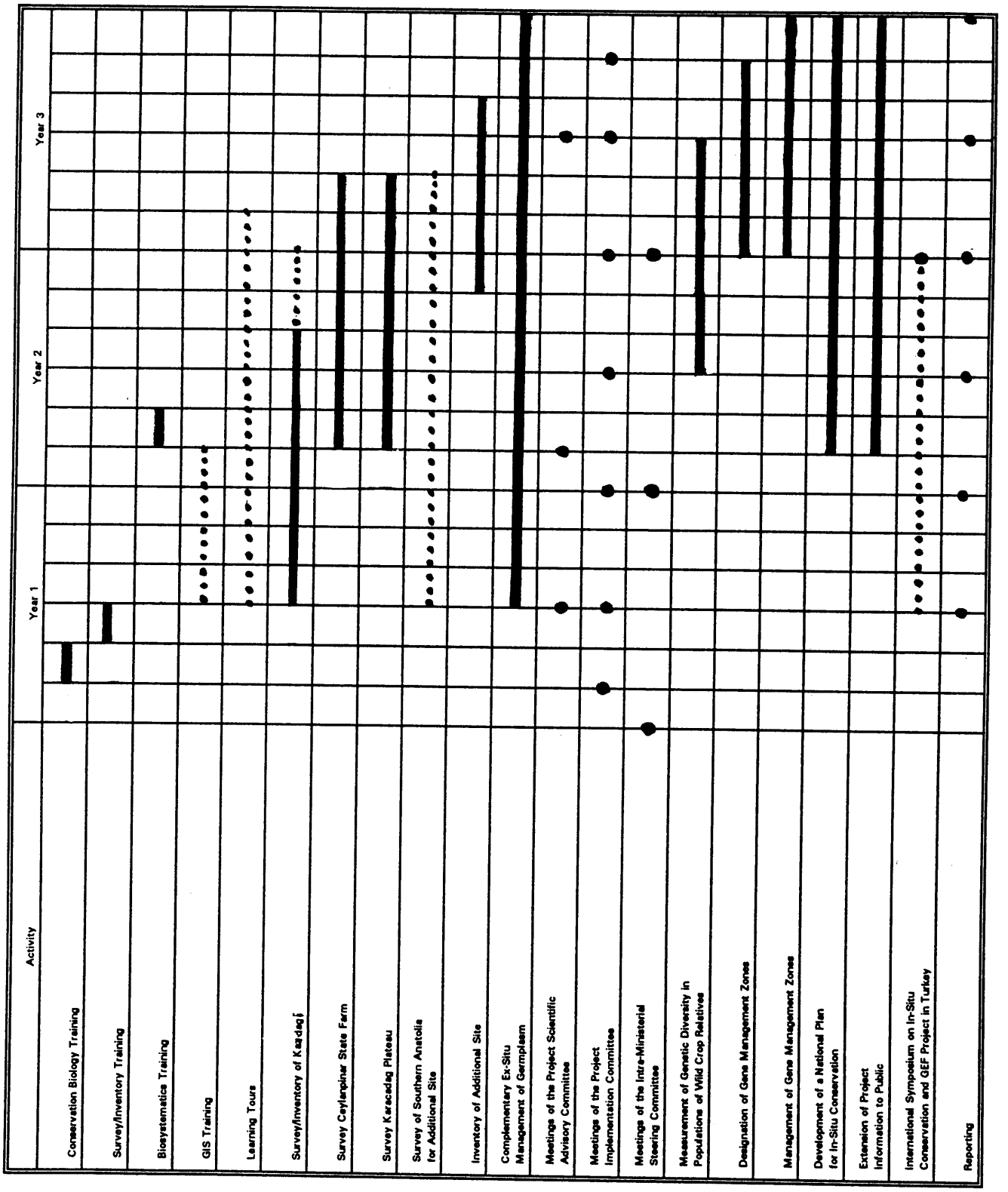
- o Progress on land acquisition for establishing GMZs.
- o A reviewed draft of the National In-situ Conservation Plan prepared by MOE in consultation with MOF and MARA.
- o Examples of all extension materials produced by MOE and the consultant(s).
- o Report of the International Symposium and plan for publication of the proceedings.

Final Report (36 Month)

The final report should be the summary of all that was accomplished during the term of the GEF project. It is important for several reasons; it will serve as an evaluation of the GEF project for the Ministries involved and the World Bank, it can serve as a model for similar activities in Turkey and other countries, and will serve, it will serve as a document describing how the Turkish GEF project can form the basis of a regional or global approach to in-situ conservation of wild crop relatives, it can be the basis for grant proposals to fund additional projects in Turkey. The final closure report will include;

- o A detailed description all the activities accomplished during the project, including; survey and inventory data of all sites, distribution maps of wild crop relatives. For the designated GMZs; maps, locations, ecological descriptions, floras, summary of genetic diversity of wild crop relatives present, and management plans.
- o The final extension materials produced and reports on their distribution to professional or popular audiences.
- o Copies of publications produced or in press based on the GEF project activities.
- o A final accounting of all expenditures by MOF, MARA and MOE during the three years.

D R A F T W O R K P L A N



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INSTITUTIONAL STRENGTHENING AND TRAINING

The following training needs are to support the activities identified in component 5 on Institutional strengthening. Terms of reference for instructors (technical assistance) for the course work described below is provided in Attachment 3.

1. Training Needs for Development of Expertise in Conservation Biology

The staff of PGRRI are familiar with ecogeographic and floristic survey techniques, but they are not familiar with conservation biology that will be necessary in designing and implementing in-situ management. The staff of the MOF is very similar to MARA in this regard. A period of research training and experience that will allow PGRRI and MOF staff to develop skills in conservation biology is essential to the success of this GEF project. The research methods that are now in place in both MOF and PGRRI can be improved with the addition of complementary conservation biology skills. Once these skills are established, it will be necessary to allow them to mature with practice on selecting and analyzing sites for in-situ management. The judgement of the mission, MOF and MARA was that the necessary training could be accomplished during the first year while inventory and survey activities were implemented on selected sites and species. The second year would focus on expanding survey and inventory activities to sites in other regions of turkey. Surveys will continue in the final year but more activity should be devoted to continued survey and to long-term planning efforts including designation of additional conservation sites as well as the development of a national strategy to conserve wild crop genetic resources in-situ. Training needs were identified and four specific training workshops are proposed (see contractor's Terms of Reference for subjects to be covered).

2. Conservation Biology and Its Application to In-Situ Conservation

Conservation biology is an emerging discipline which applies current scientific knowledge to the global need of conserving genetic diversity. Conservation biology employs the use of diverse sources of information which must be assimilated into a management plan. Acquisition of data, especially that about vegetation, ecology and current land use, is essential. Rapid Ecological Assessment (REA) is a technique which has recently been applied in tropical regions to quickly identify priority sites for protection. The technique involves use of remote images and limited ground verification to expand upon existing knowledge about an ecosystem. Several methods developed by an American NGO, The Nature Conservancy (TNC), and are available to the World Bank and GEF. The World Bank will provide details to MOF and MARA for testing and modifying to meet the needs of in-situ genetic conservation in Turkey.

Conservation management requires scientists to assess the future status of plant populations under different conditions. One difficult task is to estimate critical population sizes and densities for sustaining a plant population. Another task is to model the impact of such changes as physical changes (e.g. erosion) predation (e.g. insects) and disease on the plant population. Another task is to understand the ecological community of plants and other organisms that interact in a single location. The initial step is the development of an understanding for the principles of conservation biology as they apply to agriculture and forestry. The basic goal is to identify, establish, protect and manage a series of areas that will provide for natural evolution of complex plant and animal systems. It is the intent, in fact, the purpose of such areas to serve the needs of the nation and the world. The goal is to provide on an on-going basis for now and into the future the broad genetic base needed for sustainable agriculture and forestry.

3. Survey and Inventory Training in Gene Resource Conservation

In-situ conservation requires that sites be chosen and inventoried in a thorough manner. Inventories for biodiversity conservation are required and differ from traditional inventories of forest resources. Surveys of a species throughout its range, both ecological and geographical, within Turkey will be required for globally significant species. Training in the latest techniques and technology are required for both MARA and MOF. The use of rapid ecological assessment (REA) can greatly speed the survey process. While MARA has conducted ecogeographic surveys before they have not been with the goal of identifying in-situ conservation sites or used REA techniques. designed.

4. Isoenzyme Training and Application to Biosystematic Problems

Biosystematics is a rapidly changing field especially as new biochemical techniques are developed to identify genetic composition of different organisms. Isozyme analysis is a widely used tool that has been available for many years in developed nations but they are not widely used in either agriculture or forestry in Turkey. Biochemical techniques for measuring and analyzing genetic diversity require start-up cost, but they can provide valuable data to supplement less expensive conventional methods that depend on plant morphology. Adding more advanced biosystematic laboratory capacity and data management skills will complement existing strengths in conventional botany at both MOF and MARA.

5. Data Management with a Geographic Information System (GIS)

In any conservation system, considerable data will be gathered and such data to be useful must be organized and evaluated. Since the biological systems with a Geographic Information System selected to be managed are extremely complex biologically, since they will cover a wide geographic area and since many different factors are influencing them, a map modeling system through the application of a Geographic Information System (GIS) would be most appropriate. A properly designed GIS can handle the basic data management in addition to the necessary modelling activity. In its basic mode the GIS system uses spatial data which can then display a range of themes, i.e. ecosystem distributions, species locations, array of habitats, forest cover damage, etc. Employed with remote

sensing, a powerful analytical tool is available to the managers. In addition to displaying current data information, the GIS can be used to predict changes associated with various activities on a given site. Thus, the GIS can assist in site evaluation and selection of management strategies for sustainable use with an area.

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TERMS OF REFERENCE FOR TECHNICAL ASSISTANCE and TRAINING

This attachment provides detailed terms of reference for the instructors of the courses which has were previously described in Attachment 2.

- Conservation Biology training;
- Survey and Inventory training;
- Isoenzyme training;
- Data Management / GIS.

The expert or contractor(s) for the technical assistance would be responsible for administrative costs including any necessary translations and production of materials for the courses. The courses will take place at the Menemen Research Institute.

1. Conservation Biology and its Application to In-Situ Conservation

Qualifications:

The local and foreign experts (contractors) should show scientific knowledge in current theory and application of conservation biology to plant genetic resources, including;

a. Scientific knowledge of appropriate methods of conservation. This will include in situ, ex situ, site selection techniques, preserve design (size, buffer zones etc.), monitoring, management and restoration biology.

b. Training experience, preferably in temperate ecosystems and in practical field experience.

c. Experience in application of conservation biology to conservation of plant genetic resources.

d. Knowledge of applications of in situ conservation techniques comparable to GEF activities in Turkey.

e. Ability to travel and conduct field courses.

Scope of Work:

a. Planning and Preparation Phase (10 days)
In Turkey the contractor will identify priority issues relating to in situ conservation of plant genetic diversity.

Prepare course materials, literature, lectures and supplies for next phase.

b. Training phase (5 weeks)
Contractor will be expected to prepare lectures and field exercises to illustrate current theory and practices in conservation biology. The level of knowledge gained should enable participants to understand theory and practice of conservation biology as it relates to populations, species, communities and ecosystems.

c. Application/interpretation phase (1-2 weeks)
Contractor will conduct field site visits to one or more of the selected sites to illustrate application of theory to this GEF project.

d. Reporting (3 days)
Contractor will prepare a detailed report of all above phases to include; areas of training which need to be strengthened, suggest further areas of investigation to meet management needs of the GEF project, identify problem areas where multipurpose uses may conflict with goals of the GEF.

2. Survey and Inventory Training in Gene Resource Conservation

Qualifications:

The local and foreign experts should show scientific knowledge in current theory and application of survey and inventory of plant genetic resources. Ideally this should involve three specialists from disciplines representing crop genetic resources, forestry and rapid ecological assessment. The three specialists should have experience with practical application in their disciplines.

a. Scientific knowledge of current methods for survey and inventory of plant genetic resources. This will include current use of remote sensing technology, rapid assessment/inventory techniques, site selection techniques, statistical analysis of data, mapping technology and use of GIS technology. The contractor must have the ability to discuss application of those methods at the level of ecosystem, plant community, species and population level and appropriate sampling strategies for each level.

b. Training experience, preferably in temperate ecosystems and in practical field application.

c. Experience in application of techniques to both woody and herbaceous species.

d. Knowledge of applications of sampling to conservation of crop genetic resources.

e. Ability to travel and conduct field courses.

Scope of Work:

a. Planning and Preparation Phase (2 weeks)
In Turkey the experts will identify priority issues relating to the survey and inventory of areas for the GEF project. This will include sampling/inventory issues at the ecosystem, community, species and population level.

Prepare course materials, literature, lectures and supplies for next phase.

b. Training/application phase (6 weeks)
Experts will be expected to prepare lectures and field exercises to illustrate current theory and practices in survey and inventory. The level of knowledge gained should enable participants to undertake surveys and inventory of areas and site identified as a priority for the GEF project in Turkey.

c. Reporting (3 days)
Experts will prepare a detailed report of all above phases to include; areas of training which need to be strengthened, suggest further areas of investigation to meet management needs of the GEF project, identify problem areas where multipurpose uses may conflict with goals of the GEF. Identify appropriate application of GIS technology to the survey/inventory of GEF project sites.

3. Isoenzyme Training and Application to Biosystematic Problems

Qualifications:

The local and foreign experts should show technical capacity and experience in five areas:

a. Scientific knowledge and experience with current techniques in isoenzyme analysis, interpretation and data management.

b. Training experience, preferably introduction to techniques.

c. Experience in broad application of current technology in analysis of plant genetic diversity.

d. Knowledge of equipment operation, setup, maintenance and preparation of plant materials for analysis.

e. Ability to travel.

Scope of Work:

a. Planning and Preparation Phase (2 weeks)
In Turkey the experts will identify priority issues relating to in situ conservation of plant genetic diversity.

Prepare course materials, literature, equipment and supplies for next phase.

b. Training phase (4 weeks)
Experts will be expected to prepare lecture and laboratory demonstrations to convey current techniques in isoenzyme analysis, interpretation and data management. The level of knowledge gained should enable participants to undertake independent investigations on management problems of plant populations for in situ conservation of genetic resources.

c. Application/interpretation phase (3 weeks)
Experts will assist participants in application of above training to individual projects using plant materials of interest to participants and directly related to goals of the GEF project. MOF participants will be expected to work on woody crop genetic resources. MARA participants will be expected to work on crop genetic resources of significance as identified in the GEF project.

d. Reporting (3 days)
Experts will prepare a detailed report of all above phases to include; areas of training which need to be strengthened, suggest further areas of investigation to meet management needs of the GEF project.

4. Data Management with a Geographical Information System

Qualifications

The experts should show technical knowledge in use and application of GIS to the survey and inventory of plant genetic resources. This must have experience and be familiar with plant ecology and conservation biology. Knowledge of software design and computer science would be beneficial.

a. Technical and operation knowledge of current GIS application. Familiarity with more than one GIS software package which can be used on a personal computer. The contractor must have the ability to discuss application of GIS at the level of ecosystem, plant community, species and populations.

b. Experience in application of GIS to plant biology and preferably in training others in its application.

c. Ability to travel and conduct field courses.

Scope of Work:

a. Planning and Preparation Phase (7 days)
In Turkey the experts will identify priority issues relating to the application of GIS to survey and inventory of areas for the GEF project.

Prepare course materials, literature, software and computers for teaching.

b. Training/application phase (4 weeks)
Expert will be expected to prepare lectures and computer exercises to demonstrate current application of GIS technology to data management. This must include mapping of survey/inventory data at the ecosystem, community, species and population level. The level of knowledge gained should enable participants to manage data generated by the GEF and future projects.

c. Demonstration (3 days)
The expert will be required to arrange for demonstration of several different GIS software packages. Vendors may be solicited for this purpose.

d. Reporting (3 days)
Experts will prepare a detailed report of all above phases to include; areas of training which need to be strengthened, suggest further areas of investigation to meet data management needs of the GEF project. Together with MOF and MARA participants identify the GIS software package which best meets the needs of the GEF project in Turkey.

TURKEY

GLOBAL ENVIRONMENTAL FACILITY
IN-SITU CONSERVATION OF GENETIC DIVERSITY

TERMS OF REFERENCE FOR NATIONAL PLAN IN-SITU CONSERVATION OF GENETIC RESOURCES

National Plan for In-Situ Conservation of Genetic Resources

MOE would be the the lead agency on this plan and coordinate the technical assistance needs with regard to discipline and timing (as described in the Scope of Work). MOE would work with MOF and MARA in the identification of which experts/disciplines are needed to assist which Ministry, in light of their respective strengths and weaknesses. They will start developing the Plan in the second half of the second year of the project with the support from MARA, MOF and through local and foreign technical assistance. MOE will oversee all contractual arrangements with the contractor for the technical asistance as well as coordinate additional support for relevant international agencies such as IUCN, WWF, IBPGR, and FAO as needed.

The GEF grant will cover the technical assistance costs as well as report production costs including translation. The contractor(s) will be responsible for overhead such as secretarial assistance. With regard to basic office support for MOE, MARA and MOF that may be required in the preparation of this plan, office equipment such as computers is being provided by the GEF project through Component 4: Institutional Strengthening. Details can be found in chapter III and Attachment 9.

Objectives of the Plan:

- The overall goal of this Plan is to provide a mechanism for the GOT (primarily through MOE, MARA and MOF) to set priorities and present a plan of actions that will ensure the protection of wild crop relatives and forest genetic resources in their native habitat beyond the three year GEF pilot program.

- Based on findings of the GEF pilot an array of successful strategies to address conservation needs for the targeted species of wild crop, forest genetic resources and landraces would be developed.

- This Plan should help the GOT expand in-situ conservation activities (specifically the establishment of a network of GMZs) to other areas of the country not developed through the GEF pilot project.

- This Plan should help the GOT expand in-situ conservation activities to other important wild crop and forest species beyond those targeted for protection in the GEF pilot project including endangered flora species found in GMZs.

- The expansion of GMZ's through the Plan should be integrated with existing protected area strategies and relevant Turkish legislation.

- The Plan should be consistent and complementary with other national, regional or global efforts to conserve wild plant genetic resources. For example, the plan should be compatible with and support MARA's National Plant Genetic Resources Research Project.

- The Plan should lead the way for continuation and replication of the GEF pilot project which can provide a supportive platform for continued assistance from the international donor community.

- The Plan would provide a contribution to, and not replace the more comprehensive "National Conservation Plan" to be prepared by the GOT, in that it will only address the primary elements of in-situ crop (woody and non-woody) resources. It is understood that the focus of the GEF project is on in-situ gene conservation and that a national plan for all biodiversity of Turkey is beyond the scope of this project.

Scope of Work:

The total preparation time of the Plan would be 20 months, beginning with month 17 of the project and ending in month 36, the last month of the 3rd year GEF project. During this time there will be four distinct "phases" (INCEPTION, CORE DEVELOPMENT, FINAL PLAN, PLAN APPROVAL) resulting in 4 reports. The timing and purpose of each phase are outlined below. Table A-3: National Plan Technical Assistance Summary provides a summary of the schedule of the technical assistance discipline and time. Additional instruction and costs are presented in the subsequent section on "Qualifications".

I. INCEPTION (3 months, mo. 17-19):

1. Purpose: To design the foundation of the plan through the development of an overall strategy and work plan for Plan. The preparation will be done in coordination and cooperation between MOE, MOF and MARA, the international advisors and the experts as identified below.

2. Activities:
- Each ministry to prepare summaries of the status of GEF project to date;
- Have a series of workshops to develop the inception report:
    a) presentation of GEF project status, successes and problems;
    b) Ministries and experts to exchange ideas on what would be feasible and desired for sustaining in-situ genetic resource conservation beyond the GEF project time frame;

c) based on a) and b) outline plan of action for 9 month "Core Development Phase" identifying questions, roles between ministries, assessment needs, etc.

3. Reporting: An inception report will be due at the end of month 19.

4. Technical Assistance:

International Advisors: Conservation Biologist (1 month), Conservation Management Expert (1 month), Landrace expert (1 month);

Local Experts: Botanist, Agriculturalist, Forester and Anthropologist (each for 1 month).

II. CORE PLAN DEVELOPMENT (9 months, mo. 20-29):

1. Purpose: This is the core time in which background information for the Plan will be gathered and then written into a proactive, long-term conservation strategy to meet the objectives outlined in this TOR.

2. Activities:

- assess the inventory and survey components for information on species, area, in-situ and ex-situ compatibility, benefits and results of training, and institutional coordination and cooperation;

- assess the GMZ component in terms of success of management strategies, biodiversity conservation, impacts on adjacent areas and communities, institutional cooperation and coordination, and compatibility with other protected area strategies;

- identify conservation regions and strategies;

- outline means for extension and public awareness activities;

- develop new policies and regulations for wild crop relatives and forest resources;

- compile assessment information into form that can be presented as an interim report to the World Bank and the SAC;

- identify recurrent funding mechanisms and potential donor activities;

- identify ways to work with different institutional sectors to implement an ongoing in-situ conservation program which utilize existing governmental and community authority arrangements, and does not create new Governmental entities;

- based on information from assessments, prepare strategic outline for the Plan to ensure Plan objectives; and

- develop Plan in full written form that can be presented at the International Symposium.

3. Reporting: An interim report will be due at month 25 along with presentation to SAC as reviewers; a draft final will be due in month 30.

4. Technical Assistance:
   International Advisors: Conservation Biologist (3 months), Conservation Management Expert (2 months), Landrace expert (2 month);
   Local Experts: Botanist, Agriculturalist, Forester and Anthropologist and Protected Area Specialist Resource Economist (each for 3 months); Socio-economist, Legal and Institutions Expert, and Extension/Public Awareness Expert, Protected Area Management Expert (each for 2 months).

III. FINAL PLAN PRODUCTION: (5 months, mo. 30-34)

1. Purpose: Revision of the draft Plan based on information gathered at the International Symposium and from the SAC.

2. Activities:
   - Attend and present draft Plan at the International Symposium;
   - Have follow-up workshop with MOF, MARA, MOE and experts to identify new ideas learned from workshop, applications from other parts of the world and discuss, evaluate changes in Plan accordingly;
   - Revise Plan as necessary; and
   - Prepare Plan in its final form both in terms of content and presentation style.

3. Reporting: Final Plan due month 34.

4. Technical Assistance:
   International Advisors: Conservation Biologist (1 month), Conservation Management Expert (1 month), Landrace expert (1 month);
   Local Experts: Botanist, Agriculturalist, Forester and Anthropologist, Resource economist, Socio-economist, Legal and Institution Specialist, Extention/Public Awareness Expert and Protected Area management Expert, (each for 1 month).

IV. PLAN APPROVAL (2 months, mo 35-36)

1. Purpose: coordination with other concerned agencies and communities involved for acceptance of the plan and incorporation with larger plan.

2. Activities:
   Meet with other agencies and communities who would be involved in implementing and/or possibly funding the Plan to get their support.

3. Technical Assistance:
   Local Experts: Protected Area Specialist, Legal and Institutions Expert, and Extension/Public Awareness Expert (each for 1 month).

Table A-4: National Plan Technical Assistance Summary (manmonths)

Project Phases	Pase I Inception (mo.17-19)	Phase II Core Dev. (mo.20-28)	Phase III Final Draft (mo. 29-34)	Phase IV Plan Approval (mo.35-36)	Subtotal
Foreign Technical Assistance					
Conservation Biologist	1	3	2	0	6
Conservation Mgmt. Spec.	1	2	2	0	5
Landraces Specialist	1	2	2	0	5
Subtotal	3	7	6	0	16
Local Technical Assistance					
Botanist	1	3	1	0	5
Forester	1	3	1	0	5
Agriculturalist	1	3	1	0	5
Antropologist/Sociologist	1	3	1	0	5
Resource Economist	1	3	1	1	5
Socio-Economist	1	2	1	1	5
Legal and Instit. Spec.	1	2	1	1	5
Extension/Public Awareness	1	2	1	1	5
Protected Area/Mgmt. Expert	1	2	1	1	5
Subtotal	9	23	9	4	45

Technical Assistance Qualifications:

To meet the above objectives and scope of work, the contractors would be a multi-disciplinary team of experts comprised of both international advisors and local consultants who would assist MOE, MARA and MOF with preparation of the Plan. The contractors would also work with the SAC, experts from Turkish and other universities, and local and international NGOs. For each expert, the total expected man-months is provided in parenthesis. Also see the above "Scope of Work section and table A-3 for the breakdown of Plan Phase/discipline/mm.

International Advisors:

The following three advisors are to be extremely experienced in their respective fields throughout the world and also familiar with Turkey. Together they will be provide the core guidance and coordination from an international perspective. They will provide guidance to MOE on the overall design, preparation and implementation of the Plan component. They will work closely with the local

experts in a guidance capacity, but all aspects of the Plan are done in a spirit of shared knowledge and recognition that local knowledge must be the foundation upon which the Plan is based.

1. Conservation Biologist: This person will have the lead "expert" role and should have the most comprehensive knowledge and worldwide experience in the global field of in-situ conservation for genetic resources. While they may themselves be an expert in one type of genetic resource, they should have a familiarity with woody and non-woody species, relationships between in-situ and ex-situ, landraces as well as "hands on" research and management experience in this field. They should have a familiarity with Turkey and other in-situ projects. They will also serve as the primary technical assistant to MOE in the overall development of the Plan including design and coordination. Time Summary: Phase I: INCEPTION - 1 mo.; Phase II: CORE DEVELOPMENT - 3 mo.; Phase III: FINAL PLAN - 2 mo.

2. Conservation Management Specialist: This person would have experience primarily in the practical, implementation aspects of establishing and managing protected areas for in-situ conservation, but should have an ecological training in plant resources that would make them familiar with the overall research aspects of conservation biology and landraces. They will work with MOE primarily in developing the Plan to be compatible with other conservation plans and strategies ongoing in Turkey and in particular ensure that the Plan is compatible with and support MOE's Special Protected Areas Program, MOF's National Park Program, MOF's Natural Areas Program and MARA's National Plant genetic Resources Research Project. Time Summary: Phase I: INCEPTION - 1 mo.; Phase II: CORE DEVELOPMENT - 2 mo.; Phase III: FINAL PLAN - 2 mo.

3. Landraces Specialist: This person would understand the current theory and application of in-situ conservation technologies for cultivated landraces both in Turkey as well as other parts of the world. They would be able to develop and integrate the ecological, cultural and socio-economic aspects of landraces. They would have practical experience in working with local communities about landraces. Time Summary: Phase I: INCEPTION - 1 mo.; Phase II: CORE DEVELOPMENT - 2 mo.; Phase III: FINAL PLAN - 2 mo.

Local Consultants:

1. Botanist: Should have an excellent knowledge of Turkish plants, in particular non-woody crops including wheat, chickpeas, lentils, etc., with a clear understanding of their role in and need for in-situ conservation.
Time Summary: Phase I: INCEPTION - 1 mo.; Phase II: CORE DEVELOPMENT - 3 mo.; Phase III: FINAL PLAN - 1 mo.

2. Forester: Should have an excellent knowledge of Turkish trees, in particular woody crops including apple, pear, chestnut, pistachio, etc., with a clear understanding of their role in and need for in-situ conservation, as well as the role these trees play in the overall forest ecosystem and the resource management considerations of "traditional, production" forestry.

Time Summary: Phase I: INCEPTION - 1 mo.; Phase II: CORE DEVELOPMENT - 3 mo.; Phase III: FINAL PLAN - 1 mo.

3. Agriculturalist: This person would have an excellent understanding of both in-situ and ex-situ conservation techniques and related agricultural practices in Turkey, including research and management of areas for particular purposes.
Time Summary: Phase I: INCEPTION - 1 mo.; Phase II: CORE DEVELOPMENT - 3 mo.; Phase III: FINAL PLAN - 1 mo.

4. Anthropologist/Sociologist: This person should have a clear understanding of the social and economic issues that impact on the GOT's ability to implement the conservation and management of wild crop relatives and landraces, with a strong emphasis on landraces and community involvement.
Time Summary: Phase I: INCEPTION - 1 mo.; Phase II: CORE DEVELOPMENT - 3 mo.; Phase III: FINAL PLAN - 1 mo.

5. Resource Economist: This person would have demonstrated knowledge of the economic and ecological aspects of forestry and agriculture as they would be applied to wild crop relatives and landraces.
Time Summary: Phase I: INCEPTION - 1 mo.; Phase II: CORE DEVELOPMENT - 3 mo.; Phase III: FINAL PLAN - 1 mo; Phase IV: APPROVAL - 7 mo.

6. Socio-Economist: This person would have demonstrated knowledge of the economic and social conditions of Turkey as they relate to agriculture, and forestry land-use in light of practical applications for genetic resources and protected area management. Time Summary: Phase I: INCEPTION - 1 mo.; Phase II: CORE DEVELOPMENT - 2 mo.; Phase III: FINAL PLAN - 1 mo.; Phase IV: APPROVAL - 1 mo.

7. Legal and Institution Specialist: This person would have extensive knowledge of the institutional and legal considerations of Turkey as they would relate to land management, institutional roles and project management, establishment of protected areas, legislation for protected areas and species, and international treaties relevant to in-situ conservation.
Time Summary: Phase I: INCEPTION - 1 mo.; Phase II: CORE DEVELOPMENT - 2 mo.; Phase III: FINAL PLAN - 1 mo.; Phase IV: APPROVAL - 1 mo.

8. Extension/Public Awareness Expert: This person would have the ability to communicate scientific information into general terms, concepts and recommendations for a broader audience; familiarity with on-site training programs and activities related to agriculture, forestry and nature conservation; ability to develop public awareness activities for governmental agencies and local communities. Time Summary: Phase I: INCEPTION - 1 mo.; Phase II: CORE DEVELOPMENT - 2 mo.; Phase III: FINAL PLAN - 1 mo.; Phase IV: APPROVAL - 1 mo.

9. Protected Area Management Expert: They would have extensive experience in the planning and management of protected areas from both a policy level and actual management of protected areas for nature conservation. They would have a clear understanding of in-situ conservation goals for genetic resources. This person

would be able to assess other planning initiatives in Turkey and assist in the preparation of this plan in a way that is both contributing and complementary with these initiatives. Time Summary: Phase I: INCEPTION - 1 mo.; Phase II: CORE DEVELOPMENT - 2 mo.; Phase III: FINAL PLAN - 1 mo.; Phase IV: APPROVAL - 1 mo.

TURKEY

GLOBAL ENVIRONMENTAL FACILITY

IN-SITU CONSERVATION OF GENETIC DIVERSITY

SITE SELECTION CRITERIA

1. Species vs. Area Approach

In-situ conservation of plant genetic diversity can be approached from two perspectives, each with different methods and goals. A species approach, identifying globally significant species (e.g. wheat, chickpea, barley and lentil relatives), will be used in conjunction with area approach for this project.

The species approach selects priority species and seeks to preserve representative examples of their wild relatives wherever they may naturally grow. This approach requires broad ecological surveys to identify the geographical and ecological range of habitats where the selected species occur. Genetic diversity within the target species must be considered in identifying suitable sites for conservation (isozyme data can be helpful). A single site for each species is unlikely to contain the range of genetic variability which should ideally be conserved.

Sites designated using a species approach do not necessarily need to be of a pristine nature. Suitable sites representing an abundance and/or great genetic diversity of the target species can be partially degraded from over-grazing or other activities. Some management activities, such as limited grazing or timber harvesting may be necessary to maintain the habitat for a selected species to be managed in-situ.

In addition to the conservation benefits, the species approach has the advantage in that selecting a globally important species is likely to result in much interest from other nations seeking to replicate the Turkish project.

The area approach to in-situ conservation identifies an area that is rich in the important wild relatives of several agricultural or forestry species. This approach gives additional significance to areas which are already protected, such as MOF or MOE managed areas. The concept that currently protected areas can also serve to preserve wild crop relatives of importance to agriculture will serve to expand the role and importance of existing areas. Such an approach will require some changes in current management plans of MOF areas so that an integrated in- situ management plan includes sites with wild crop relatives and priority species.

2. Background: Site Selection Criteria

Site selection for a demonstration in-situ conservation project can be done at the level of ecosystems, communities or species. Each level reflects the desired goals and number of species to be preserved. Selection at the ecosystem level will involve larger areas and include a range of habitats where priority species may occur. An ecosystem level of conservation will likely include several levels of habitat disturbance from pristine to degraded or cultivated environments. An example of an ecosystem approach would be the selection of Aegean forests as a priority for conservation. A plant community approach will involve identifying a particular community, such as the oak-pistachio forests which are rich in wild crop progenitors. A species approach would involve establishment of several preserves to protect sites representative of the eco-geographic range of one species. The latter include habitats which require continual disturbance such as weedy environments associated with agricultural practices.

The criteria to be employed in the selection of the appropriate sites can be summarized in the following general terms:

(a) Representativeness. Does the area, large or small, truly represent the populations to be protected and maintained? It is essential that the genetic mix of an area be known to a reasonable degree to ensure that the investment will in fact ensure adequate protection of the priority resource.

(b) Diversity. It is both feasible and desirable in selecting a given site that ecosystem, species and population diversity is included. Forests are dynamic, living systems, and as such communities contribute to the evolution of species development. Whenever possible rich species diversity as well as community diversity should be considered.

(c) Naturalness. Since natural processes are to be maintained it is essential that the protected system be as natural as possible. However, pure natural forest systems are rarely found. This being the case, a degree of compromise is called for. It is possible under some conditions to actually restore a degree of naturalness and this may well be part of the management strategy.

(d) The Likelihood of Success. Before selecting a strategy and approximate area what will be the degree of success? With limited funding only priority areas should be selected that have a high degree of success in achieving the conservation goals.

3. Rationale for Site Selection

One benefit of initially using an area approach is to strengthen the capacity of MOF and MARA in jointly designing a comprehensive in-situ conservation project. Surveying an existing MOF managed area will provide useful data

on the utility of designating gene management zones on existing state owned lands. It is important that the project begin with an initial in-depth survey of a MOF managed area.

The MOF and MARA have agreed that for establishment of in-situ gene management zones, wheat, chickpea, barley and lentil will be the highest priority. A site to preserve and study the genetic diversity of wild wheat has been established at the southern extreme of its range in Israel. As Turkey is the center of distribution of the species a comparative site with parallel research projects is of global significance and will complement any future activities to conserve wild wheat in Syria and Jordan.

As described in Component 1., MOF and MARA independently identified Kazdağı in northwestern Turkey as the initial site to begin the project since both of the lead institutes of MOF and MARA are located near Kazdağı in Izmir. Wheat and its close relatives are not abundant at Kazdağı, yet this site affords excellent opportunities for protection of major fruit, nut and timber crop relatives of global significance. In addition, the richness of species, communities and ecosystems affords excellent opportunities for institutional strengthening and application of a multi-disciplinary approach to in-situ gene resource management.

During the preparation mission, an initial assessment of the sites in Turkey which contain wild progenitors of several important crops such as wheat, barley, oats, rye, lentil, chickpea and pea was conducted. Ceylanpinar State Farm and Karacadag were proposed as suitable sites to meet both area and species approach considerations. Surveys and inventories of these sites for wild crop relatives will be conducted during Component 1.

The Karaca Dag plateau near Diyarbakir and a site in Southern Anatolia will be investigated for sites which can be adequately protected for management purposes. Land would need to be purchased and allocations made of current land usage of sites designated as gene management zones.

Additional sites for inventory and creation of GMZs for wild wheat, chickpea, lentil and barley will be sought through surveys in Southern Anatolia. At the sites chosen and inventoried selected areas will be designated as gene management zones.

Based on the criteria outlined previously, the following guidelines will be used in selecting the additional sites during Components 1 and 2:

- Selection of sites with plant species of global significance, especially the close wild relatives of wheat, chickpea, lentil and barley.

- Designation of a site which contributes new or significant genetic diversity to the gene pool of the priority species.

- A site which can be managed and protected, with priority given to MOF and MARA lands, but not ignoring the potential to acquire and manage new lands.

- **Sites which are of interest to nearby research scientists of MOF and/or MARA so that they may oversee and manage the site following designation of an in-situ gene management zone.**

- **Sites which will not adversely impact local people or require substantial land use compensation cost. Lands which are likely to have suitable wild wheat, chickpea, lentil or barley populations are marginal rocky lands used only for grazing during part of the growing season.**

TURKEY

GLOBAL ENVIRONMENTAL FACILITY
IN-SITU CONSERVATION OF GENETIC DIVERSITY

TYPES OF GENETIC RESOURCES TO BE INVENTORIED AT KAZDAĞI

1. Inventory activities at Kazdağı will focus primarily on wild crop relatives, both herbaceous and woody. In addition, other plant genetic resources to be part of the survey will include; forest trees, medicinal resources, aromatic, spice, industrial, ornamental and bulbous species.

Forest Trees

2. MOF manages over 90% of the forest resources of Turkey. However the current emphasis of such management is mainly focused on the traditional woody plants. Although there is an interest in broader conservation issues, there is little to no consideration given to non-woody plants and their management. Still, there is a direct link between forestry and agriculture that has received modest consideration in that there is some modest conservation management provided to such food crops as walnut, chestnut, apple and cherry. Such conservation management has for the most part been passive rather than active.

3. A reasonable starting point would be joint consideration by MOF and MARA to develop a common conservation plan for valuable woody food crops. Such a plan would consist of the following elements:

(a) The strict protection of native woody food crops.

(b) The removal of improved crops from the selected areas.

(c) Using modern genetic techniques of selection, mitigate a forest restoration project for several selected areas of mutual interest to agricultural and forestry concerns.

4. A more serious concern is the mutual protection, management and restoration of non-woody crops found in the forests. These crops have essentially received little or no attention and are rapidly disappearing. Thus a mutually agreed upon plan is essential if these invaluable crop resources are to be maintained. With direct cooperation of the MOF and MARA a series of Gene Resource Conservation Areas need to be established. Such areas require protection, management and often a degree of restoration.

Wild Relatives of Aromatic, Spice and Industrial Crops

5. The flora of Turkey contains wild relatives or progenitor species of a number of spice and aromatic, spice and industrial crops. These include anise, black cumin, coriander, basis, parsley, hop fennel, oregano, marjoram, mint, sage, thyme, fenugreek, poppy, digitalis and many other. A number of

these crops are significant sources of export income for Turkey and their wild relatives will be included in the inventory.

6. Wild orchids (*Orchis* spp.) are another group of plants which are harvested from the wild for ornamental use or for production products used in flavoring industries i.e, beverages such as salep or in ice cream. Like the bulbous ornamentals, these are not always harvested in a sustainable manner, especially due to their slow reproductive rate. At PGRRI there is a program to propagate *Orchis* spp. which can form the basis for future efforts at complementary ex-situ - in-situ preservation.

7. Used locally by forest dwellers are an array of forest plants with considerable value for plant dyes used in the paint, carpet making and related industries of Turkey. Such plants as indigo (*Isatis* sp.), madder (*Rubia tinctoria*), alkanet (*Alkanna tinctoria*) and walnut (*Juglans regia*) are commonly harvested. Since many of these can not be adequately cultivated and since little is known as to their genetic structure it is essential and necessary to maintain them in their natural conditions. Under proper management such plants can be developed as a source of a modest but productive forest industry.

Herbaceous Ornamentals Originating in Turkey

8. Turkey is the origin of numerous herbaceous ornamentals, especially bulbs. Tulips (*Tulipa* spp.), Daffodils (*Narcissus* spp.), Snow Drops (*Galanthus* spp.) Cyclamen (*Cyclamen* spp.) *Eranthus* spp., *Anemone* spp., *Gladiolus* spp., *Fritillaria* spp., *Sternbergia*, Lily (*Lilium* spp.), Grape Hyacinth (*Muscaria* spp.), Carnation (*Dianthus* spp.) and others. Many of these bulbous species are harvested from wild populations and shipped to foreign countries for resale. Some 60,000,000 bulbs are exported annually and form a source of income for local villagers. Over harvesting and nonsustainable production methods are a problem in many ares of the country. The Turkish Society for the Protection of Nature (DHKD) is investigating methods to sustainably propagate and/or harvest these important ornamental resources. It is important that these species be included in the inventory of potentially useful plants of Kazdağı.

Ornamental Woody Species Originating in Turkey

9. The Cedar of Lebanon (*Cedrus libani*) is widely planted around the world as an attractive ornamental. Most of the various ornamental forms have come from selections from the forests of Turkey. This species is also of considerable value as a timber species. However over the last centuries this species has been over harvested and destroyed over much of its natural range. Today sparse damaged forests are still to be found at altitudes of 1400-1700m between Maras and Antalya. However, remnants of the once great cedar forests can also be found in the Ciglikara District of Antalya-Elmali, as well as on the northern slopes between Afyon and Sultandag and Isparta Barla Mountain. It should be noted that Turkey represents the most northern extension of this species and as such its genetic composition represents a valuable and unique resource. Because of its potential direct value to the forest ecosystems of Turkey as well as its value to other nations it is essential that the

remaining populations be protected and restored. In order to accomplish this task an ecosystem approach must be instituted since other valuable woody and non-woody species are associated with this species. Both an ex-situ and in-situ program should be developed.

Medicinal Resources

A valuable source of secondary income for rural families are selected plants of medicinal usage. Although most such plants are non-woody, it is important that woody plants not be overlooked. The recent discovery of the cancer cure by taxol, a chemical product found in the needles, bark and wood of the yew strongly suggests that such trees as the European yew (*Taxus baccata*) be protected. In Turkey, this species does not appear in pure forests but scattered among other species. In Turkey this species essentially reaches its most southern part of its natural range and as such represents a unique genetic base. Somewhat less dramatic are 3 species of joint fir (*Ephedra*) which are small woody bushes found in stony and rocky places in the steppe regions and have been utilized for many years because of their unique medicinal value as a vasopressor.

Existing Inventory Data for the Kazdağı Nature Reserve Area

Location = Aegean Region, West Turkey
Elevation = 1375 m. 1424 m
Province = Balikesir
Area (ha) = 240 - Nature Reserve
Land Owner = State

Main Characteristics = A unique ecosystem that possesses a fir species which is endemic and whose race is exposed to danger. Rich plant species and rich wildlife.

Main Tree Species =

Fir (Abies equi-trojani)
Pine (Pinus nigra)
Beech (Fagus orientalis
Oak (Quercus Sp.)

Main fauna =

Roe Deer (Capreoius Capreolus)
Wolf (Canis Lupus)
Jackal (Canis Bureas)
Wild Boar (Sus Sorafa)
Deer (Cervus Elaphus)

Main Flora =

Medical Plants

Lobaria pulmonaria (L) Hoffm.
Cladonia pyxidata (L) Fr.

Other Plant Species

Achillea millefolium L.
Agrostemma githago L.
Alnus sp.
Alyssum campestre L.
Alyssum erosulum Gennar et. Pestal
Alyssum smyraheum Meyer.
Alyssum unibellatum Desu.
Alyssum venustum Nyar
Amaranthus Sp.
Ammi visnaga (L.) Lam.
Anemone sp.
Aristolochia clematitis L.
Arthemisia sp.
Arum italicum Mill. et Gard.
Asphodelus microcarpus salzm.
Asplenium nigrum L.
Asplenium trichomanes (L)
Astragalns sp.
Athyrium filix-femina (L.) Roth.
Brassia nigra (L) Koch.
Calendula aruensis L.
Cannabis sativa L.
Capparis sicula Duh.
Capsella bursa-pastoris (L.) Mch.
Cephalanthera sp.
Cercis siliquastrum L.
Cicer montbretii Saub. et Spach.
Cichorium intybus L.
Cistus sp.
Colchicum autumnale L.
Conium maculatum L.
Centaurea depressa M.B.
Crataegus orientalis Poll.
Crocus sp.
Delphinium staphisagria L.
Dianthus erinaceus Boiss.
Digitalis ferruginea L.
Digitalis trojani
Dryopteris filix-mas (L.) Schoff
Ecbalium elaterium (L.) Rich.
Crocus gargoricus Herbert (Endemic)
Epipactis sp.
Erica arborea L.
Euphorbia sp.
Fagus sp.
Fragaria vesca
Galium sp.
Gentiana ascelepiadea L.
Geranium asphodeloides Burm
Hedera helix L.

Humulus lupulus L.
Hypericum olympicum (L.)
Hypericum perfoliatum L.
Iris kernerinana Anchers et sint.
Jasminum fruticans L.
Lamium sp.
Lathyrus sp.
Laurus nobilis L.
Linum sp.
Lonicera etrusca santi
Malus orientalis
Matricaria chamomilla L.
Medicago sp.
Mentha sp.
Muscaria sp.
Nigella arvensis L.
Orchis anatolica
Orchis sp.
Paeonia sp.
Peganum harmala L.
Pistachio lentiscus L.
Pistachio terebinthus L.
Polypodium vulgare (L)
Prunus spinosa L.
Pteridium aquilinum (L) Kohn
Ranunculus orientalis L.
Ranunculus sp.
Reseda lutea L.
Rhus coriaria L.
Rosa sicula Tratt
Rubus sp.
Rumex acetossella L.
Ruscus aculeatus L.
Salvia sp.
Saponaria officianalis L.
Scilla sp.
Sedum album L.
Silene compacta Fisch.
Silene inflata L.
Silene vulgaris (Moench) Garcke
Sorbus torminalis L.
Styrax officinale L.
Tamarix pallesir Desu.
Tamus communis L.
Taraxacum sp.
Teucrium Sp.
Thymus sp.
Tilia officinarum Cr. ssp. rubra
Tilia sp.
Trifolium sp.
Tulipa sp.
Urtica dioica L.

Urtica pilulifera L.
Vaccinium myrtillus L.
Valeriana alliariaefolia Vahl.
Verbascum sp.
Vicia cracca
Vicia narbonensis
Vicia sp.
Viscum album L.
Vitex agnus castus L.

Kazdağı Forest Main Products

Juniperus oxycedrus (L.)
Cupressus sempervirens L.
Endemic — Abies equi-trojani (Asch. et Sint.) Mattf
Pinus pallasiana lamb
P. pinea L.
Alnus glutinosa (L.) Gartn.
Corylus avellana L.
C. colurna L.
(Natural Monuments) — Fagus orientalis Lipsky
Castanea satiua Mill.
Quercus pedunculiflora K. Koch.
Q. frainettoe Ten. ve Quercus Sp.
Juglans regia L.
Populus alba L.
P. tremula L.
Salix alba L.
Morus alba L.
Ulmus sp.
Arbutus unedo L.
Fraxinus oxycarpa Willd.
Phillyrea media L.
Olea europaea L.
Atropa belladona L.
Muscari sp.
Viburnum sp.

Main Problems = Overgrazing, clearing the forest land for agriculture, collecting the plants for marketing.

Other Information = The ecological system contains a very rich flora, mixed forests, rich wildlife, stable rivers. Mediterranean climate, summers are dry and hot, winters are rainy and moderate. It snows high elevations, especially in Winter. It has some historical places like Thebe, Lyrnessos, Khrysa, Killa, anderia, Antandros, Adremittion, Astrya, Gorgora, etc.

TURKEY

GLOBAL ENVIRONMENTAL FACILITY

IN-SITU CONSERVATION OF GENETIC DIVERSITY

GLOSSARY

Biodiversity	(Biological diversity) means the variability among living organisms from all sources including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part. This includes diversity within species, between species and of ecosystems.
Clone (Clonal)	Group of genetically identical plants produced by vegetatively propagating a single plant over one or more vegetative generations. Clones may become widely dispersed through human dispersal and propagation.
Coppiced forest	A forest of trees grown from re-sprouts of the stumps following harvesting or excessive grazing.
Ecogeographic	Involving both the entire ecological range and geographic range of a species.
Ex-situ	The off-site management of plants outside their natural range; the conservation of plant seeds or propagating parts in genetic resource collections.
Gene bank	A center or institution that manages genetic resources, in particular, maintaining ex-situ or in-situ collections.
Gene Management Zone	An area selected for the natural occurrence of genetic resources found at the site and which is managed specifically so as to maintain the natural diversity of the species at the site.
Genepool	The total of all species or populations, wild or cultivated, that can potentially exchange genes with a cultivated species.
Genetic Resources	Genetic resources of actual or potential value to humanity.
Germplasm	Living reproductive material including seeds, pollen and plants or their parts.

Germplasm collection	A collection of many different individuals, populations, varieties, subspecies or species representing a diverse collection of genetic material.
In-situ	The management of organisms in their natural state or within their natural range. For domesticated or cultivated species, in the surroundings where they have developed their distinctive properties.
Inventory	An inventory is a detailed assessment of what plant species occur at the site, their abundance, distribution and suggested management needs.
Landraces	A cultivated (domesticated) population that is genetically heterogenous and over generations has become adapted to the local environment and cultural conditions under which it is grown.
Seed Orchard	A collection of selected trees planted or natural which are managed for the purpose of producing seeds.
Survey	Surveys are broader in scope and not as detailed as an inventory. A survey consists of a field inventory of the site (not collection oriented) to determine suitable habitats where wild crop relatives are likely to occur, notes on the presence or absence of priority target species and notes on suitability of the site for designation of a gene management zone.

TURKEY

GLOBAL ENVIRONMENTAL FACILITY

IN-SITU CONSERVATION OF GENETIC DIVERSITY

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Attachment 9

IN-SITU CONSERVATION OF GENETIC DIVERSITY

PROJECT COST ESTIMATES AND DISBURSEMENT PROFILE

A. Summary Cost Tables

Table

1. Project Cost Summary
2A/2B Project Components by Year
3. Summary Accounts Cost Summary
4A/4B Summary Accounts by Year
5. Summary Account by Project Component
6. Estimated Disbursement Schedule
7. Price Contingency Assumptions

B. Detailed Cost Tables

Table

101 Eco-System, Community and Species Inventory/Survey (MARA)
102 Eco-System, Community and Species Inventory/Survey (MOF)
103 Germplasm Management (MARA)
104 Germplasm Management (MOF)
201 Designation of Gene Management Zones (MARA)
202 Designation of Gene Management Zones (MOF)
301 National Plan for In-Situ Conservation of Wild Crop Relatives (MOE)
401 Institutional Strengthening (MARA)
402 Institutional Strengthening (MOF)
403 Institutional Strengthening (MOE)
404 Institutional Strengthening Training (MARA, MOF, MOE)
405 International Symposium (MARA)
501 Data Management (MARA)
502 Data Management (MOF)
503 Data Management (MOE)

Turkey
In Situ Conservation of Genetic Diversity
Project Cost Summary

	TL000			US$000			% Total	
	Local	Foreign	Total	Local	Foreign	Total	% Foreign Exchange	Base Costs
A . Inventory/Survey								
1. Inventory and Survey	3927954.1	12411952.9	16339907.0	446.8	1410.6	1857.4	76.0	38.2
2. Germplasm Management	2325383.8	2493207.9	4818591.7	264.5	283.3	547.7	51.7	11.3
Sub-Total	6253337.9	14905160.8	21158498.7	711.3	1693.8	2405.1	70.4	49.4
B . Designation of Gmz	1512822.1	0.0	1512822.1	172.0	0.0	172.0	0.0	3.5
C . Nat. Plan for in Situ Con	2085988.6	2207779.0	4293767.6	237.6	250.5	488.1	51.4	10.0
D . Institutional Strenghth.	1952360.3	7124277.3	9076637.7	222.3	809.4	1031.8	78.5	21.2
E . Data Management	1982377.0	4775598.0	6757974.9	225.6	542.6	768.2	70.7	15.8
Total BASELINE COSTS	13786885.9	29012815.1	42799701.0	1568.8	3296.3	4865.2	67.8	100.0
Physical Contingencies	1378688.6	2901281.5	4279970.1	156.7	329.8	486.5	67.8	10.0
Price Contingencies	20420368.6	30163560.7	50583929.3	120.2	200.7	320.8	62.5	6.6
Total PROJECTS COSTS	35585943.0	62077657.4	97663600.4	1845.7	3826.8	5672.5	67.5	116.6

Values Scaled by 1000.0 - 12/14/1992 14:57

Turkey
In Situ Conservation of Genetic Diversity
Projects Components by Year

	Totals Including Contingencies TL000				Totals Including Contingencies US$000			
	1993	1994	1995	Total	1993	1994	1995	Total
A. Inventory/Survey								
1. Inventory and Survey	24680077.5	4004427.7	5199357.7	33883862.9	1751.9	196.6	202.8	2151.4
2. Germplasm Management	6672949.8	1437466.5	2353857.9	10464274.3	473.7	70.6	91.8	636.1
Sub-Total	31353027.3	5441894.2	7553215.6	44348137.1	2225.6	267.2	294.6	2787.4
B. Designation of Gmz	0.0	0.0	5410867.4	5410867.4	0.0	0.0	211.1	211.1
C. Nat. Plan for in Situ Con	0.0	7716874.1	5226474.0	12943348.1	0.0	379.0	203.9	582.8
D. Institutional Strenghth.	8355008.5	10330186.5	2652594.1	21337789.1	593.1	507.3	103.5	1203.8
E. Data Management	10639461.3	1556232.7	1427764.6	13623458.7	755.2	76.4	55.7	887.4
Total PROJECTS COSTS	50347497.1	25045187.5	22270915.8	97663600.4	3573.9	1229.9	868.7	5672.5

Values Scaled by 1000.0 12/14/1992 14:57

Turkey
In Situ Conservation of Genetic Diversity
TL000

Project Components by Year

	Base Costs			Total	
	1993	1994	1995	TL000	US$000
A. Inventory/Survey					
1. Inventory and Survey	13412838.8	1463611.1	1463457.1	16339907.0	1857.4
2. Germplasm Management	3634340.7	525441.9	658809.1	4818591.7	547.7
Sub-total	17047179.5	1989053.0	2122266.2	21158498.7	2405.1
B. Designation of Gmz	0.0	0.0	1512822.1	1512822.1	172.0
C. Nat. Plan for in Situ Con	0.0	2820487.2	1473280.4	4293767.6	488.1
D. Institutional Strenghth.	4554106.8	3775137.1	747393.7	9076637.7	1031.8
E. Data Management	5787828.5	568806.1	401340.3	6757974.9	768.2
Total BASELINE COSTS	27389114.8	9153483.5	6257102.7	42799701.0	4865.2
Physical Contingencies	2738911.5	915348.4	625710.3	4279970.1	486.5
Price Contingencies	20219470.8	14976355.7	15388102.8	50583929.3	320.8
Total PROJECT COSTS	50347497.1	25045187.5	22270915.8	97663600.4	5672.5
Taxes	5331004.8	1015871.3	2058973.5	8405849.6	508.6
Foreign Exchange	38774102.0	16376088.3	6927467.1	62077657.4	3826.8

Values Scaled by 1000.0 12/14/1992 14:57

Turkey
In Situ Conservation of Genetic Diversity
Summary Accounts Cost Summary

	TL000			US$000			% Foreign Exchange	% Total Base Costs
	Local	Foreign	Total	Local	Foreign	Total		
I. INVESTMENT COSTS								
A. Civil Work	3043580.7	161151.8	3204732.4	346.1	18.2	364.3	5.0	7.5
B. Equipment & Materials	3151699.1	12343535.0	15495234.1	358.5	1402.9	1761.4	79.7	36.2
C. Vehicles	834754.9	5843284.3	6678039.2	94.9	664.2	759.1	87.5	15.6
D. Training & Tech. Assist.	3802344.8	8912408.3	12714753.0	433.1	1012.2	1445.3	70.1	29.7
E. Transport & Accommodation	813433.9	736284.5	1549718.4	92.6	83.5	176.2	47.5	3.6
F. Labor	800905.8	0.0	800905.8	91.0	0.0	91.0	0.0	1.9
Total INVESTMENT COSTS	12446719.1	27996663.8	40443382.9	1416.3	3181.0	4597.3	69.2	94.5
II. RECURRENT COSTS								
A. Vehicles Maintenance	867898.3	290968.4	1158866.7	98.8	32.9	131.7	25.1	2.7
B. Labratories Maintenance	223051.6	671465.6	894517.2	25.4	76.3	101.7	75.1	2.1
C. Supplies	53439.9	53717.3	107157.2	6.1	6.1	12.2	50.1	0.3
D. Report Expenses	195777.0	0.0	195777.0	22.3	0.0	22.3	0.0	0.5
Total RECURRENT COSTS	1340166.8	1016151.3	2356318.1	152.6	115.3	267.8	43.1	5.5
Total BASELINE COSTS	13786885.9	29012815.1	42799701.0	1568.8	3296.3	4865.2	67.8	100.0
Physical Contingencies	1378688.6	2901281.5	4279970.1	156.7	329.8	486.5	67.8	10.0
Price Contingencies	20420368.6	30163560.7	50583929.3	120.2	200.7	320.8	62.5	6.6
Total PROJECTS COSTS	35585943.0	62077657.4	97663600.4	1845.7	3826.8	5672.5	67.5	116.6

Values Scaled by 1000.0 - 12/14/1992 14:57

Turkey
In Situ Conservation of Genetic Diversity
Summary Accounts by Year

	Totals Including Contingencies TL000				Totals Including Contingencies US$000			
	1993	1994	1995	Total	1993	1994	1995	Total
I. INVESTMENT COSTS								
A. Civil Work	1464421.8	973770.6	7320585.3	9758777.6	104.0	47.8	285.5	437.3
B. Equipment & Materials	26212012.1	1874438.4	1995398.2	30081848.8	1860.7	92.0	77.8	2030.5
C. Vehicles	12293534.4	0.0	0.0	12293534.4	872.7	0.0	0.0	872.7
D. Training & Tech. Assist.	8288632.2	18052273.7	5667191.2	32008097.1	588.4	886.5	221.1	1695.9
E. Transport & Accommodation	621520.6	972103.9	3035741.8	4629366.2	44.1	47.7	118.4	210.3
F. Labor	486274.8	730327.9	954859.0	2171461.6	34.5	35.9	37.2	107.6
Total INVESTMENT COSTS	49366395.9	22602914.5	18973775.5	90943085.9	3504.3	1110.0	740.1	5354.3
II. RECURRENT COSTS								
A. Vehicles Maintenance	407172.5	1219417.3	1746255.1	3372845.0	28.9	59.9	68.1	156.9
B. Labratories Maintenance	411059.6	979060.5	1105755.5	2495875.6	29.2	48.1	43.1	120.4
C. Supplies	81823.2	97729.7	95014.7	274567.6	5.8	4.8	3.7	14.3
D. Report Expenses	81045.8	146065.6	350114.9	577226.3	5.8	7.2	13.7	26.6
Total RECURRENT COSTS	981101.2	2442273.1	3297140.3	6720514.5	69.6	119.9	128.6	318.2
Total PROJECT COSTS	50347497.1	25045187.5	22270915.8	97663600.4	3573.9	1229.9	868.7	5672.5

Values Scaled by 1000.0 12/14/1992 14:57

Turkey
In Situ Conservation of Genetic Diversity
TL000

Summary Accounts by Year

	Base Costs				Foreign Exchange	
	1993	1994	1995	Total	%	Amount
I. INVESTMENT COSTS						
A. Civil Work	802015.0	355958.1	2046759.3	3204732.4	5.0	161151.8
B. Equipment & Materials	14247579.3	685097.2	562557.5	15495234.1	79.7	12343535.0
C. Vehicles	6678039.2	0.0	0.0	6678039.2	87.5	5843284.3
D. Training & Tech. Assist.	4519616.2	6597524.5	1597612.3	12714753.0	70.1	8912408.3
E. Transport & Accommodation	339264.5	355297.5	855156.4	1549718.4	47.5	736284.5
F. Labor	266968.6	266968.6	266968.6	800905.8	0.0	0.0
Total INVESTMENT COSTS	26853482.9	8260845.9	5329054.1	40443382.9	69.2	27996663.8
II. RECURRENT COSTS						
G. Vehicles Maintenance	222859.0	445718.0	490289.8	1158866.7	25.1	290968.4
H. Labratories Maintenance	223629.3	357806.9	313081.0	894517.2	75.1	671465.6
I. Supplies	44648.8	35719.1	26789.3	107157.2	50.1	53717.3
J. Report Expenses	44494.8	53393.7	97888.5	195777.0	0.0	0.0
Total RECURRENT COSTS	535631.9	892637.6	928048.6	2356318.1	43.1	1016151.3
Total BASELINE COSTS	27389114.8	9153483.5	6257102.7	42799701.0	67.8	29012815.1
Physical Contingencies	2738911.5	915348.4	625710.3	4279970.1	67.8	2901281.5
Price Contingencies	20219470.8	14976355.7	15388102.8	50583929.3	59.6	30163560.7
Total PROJECT COSTS	50347497.1	25045187.5	22270915.8	97663600.4	63.6	62077657.4
Taxes	5331004.8	1015871.3	2058973.5	8405849.6	0.0	0.0
Foreign Exchange	38774102.0	16376088.3	6927467.1	62077657.4	100.0	62077657.4

Values Scaled by 1000.0 12/14/1992 14:57

Turkey
In Situ Conservation of Genetic Diversity
Summary Account by Project Component
TL000

	Inventory and Survey	Germplasm Management	Designation of Gmz	Nat. Plan for in Situ Con	Institutional Strenghth.	Data Management	Total	Physical Contingencies %	Physical Contingencies Amount	Price Contingencies %	Price Contingencies Amount
I. INVESTMENT COSTS											
A. Civil Work	0.0	1691910.4	1512822.1	0.0	0.0	0.0	3204732.4	10.0	320473.2	194.5	6233571.9
B. Equipment & Materials	5869952.7	3126681.3	0.0	142974.9	615089.0	5740536.3	15495234.1	10.0	1549523.4	84.1	13037091.3
C. Vehicles	6678039.2	0.0	0.0	0.0	0.0	0.0	6678039.2	10.0	667803.9	74.1	4947691.4
D. Training & Tech. Assist.	0.0	0.0	0.0	4150792.8	7849455.7	714504.5	12714753.0	10.0	1271475.3	141.7	18021868.8
E. Transport & Accommodation	937625.4	0.0	0.0	0.0	612092.9	0.0	1549718.4	10.0	154971.8	188.7	2924676.1
F. Labor	800905.8	0.0	0.0	0.0	0.0	0.0	800905.8	10.0	80090.6	161.1	1290465.3
Total INVESTMENT COSTS	14286523.0	4818591.7	1512822.1	4293767.6	9076637.7	6455040.8	40443382.9	10.0	4044338.3	114.9	46455364.7
II. RECURRENT COSTS											
A. Vehicles Maintenance	1158866.7	0.0	0.0	0.0	0.0	0.0	1158866.7	10.0	115886.7	181.0	2098091.5
B. Labratories Maintenance	894517.2	0.0	0.0	0.0	0.0	0.0	894517.2	10.0	89451.7	169.0	1511906.7
C. Supplies	0.0	0.0	0.0	0.0	0.0	107157.2	107157.2	10.0	10715.7	146.2	156694.7
D. Report Expenses	0.0	0.0	0.0	0.0	0.0	195777.0	195777.0	10.0	19577.7	184.8	361871.7
Total RECURRENT COSTS	2053384.0	0.0	0.0	0.0	0.0	302934.2	2356318.1	10.0	235631.8	175.2	4128564.6
Total BASELINE COSTS	16339907.0	4818591.7	1512822.1	4293767.6	9076637.7	6757974.9	42799701.0	10.0	4279970.1	118.2	50583929.3
Physical Contingencies	1633990.7	481859.2	151282.2	429376.8	907663.8	675797.5	4279970.1				
Price Contingencies	15909965.2	5163823.4	3746763.1	8220203.7	11353487.7	6189686.2	50583929.3	9.1	4598539.0		
Total PROJECT COSTS	33883862.9	10464274.3	5410867.4	12943348.1	21337789.1	13623458.7	97663600.4	9.1	8878509.1	51.8	50583929.3
Taxes	4702347.1	1308034.3	676358.4	57887.7	168725.3	1492496.8	8405849.6	9.1	764168.1		
Foreign Exchange	24378575.8	4712321.4	0.0	6683365.7	17072422.7	9230971.7	62077657.4	9.1	5643423.4		

Values Scaled by 1000.0 12/14/1992 14:57

ESTIMATED SCHEDULE OF DISBURSEMENTS (US$ MILLIONS)

IN-SITU GENE CONSERVATION PROJECT

IBRD FY &	Quarter	IBRD Disbursements	Cumulative Disbursements	% of Loan Disbursed
FY93	-4	0.2	0.2	4%
FY94	-1	0.8	1.0	19%
	-2	0.8	1.8	35%
	-3	0.8	2.5	50%
	-4	0.8	3.3	65%
FY95	-1	0.3	3.6	70%
	-2	0.3	3.8	75%
	-3	0.3	4.1	80%
	-4	0.3	4.3	85%
FY96	-1	0.2	4.5	88%
	-2	0.2	4.6	91%
	-3	0.2	4.8	94%
	-4	0.1	4.9	96%
FY97	-1	0.1	5.0	98%
	-2	0.1	5.1	100%

TURKEY

GLOBAL ENVIRONMENTAL FACILITY

IN-SITU CONSERVATION OF GENETIC DIVERSITY

Price Contingency Assumptions

	1993	1994	1995	1996
Local inflation	65%	41%	24%	18%
International inflation	3.8%	1.9%	2.7%	3.4%

Turkey
In Situ Conservation of Genetic Diversity
Table 101. Eco System, Community and Species Inventory/Survey
Ministry of Agriculture & Rural Affairs (MARA)
Detailed Cost Table
TL000

	Quantity				Unit Cost	Base Costs				Base Costs in US$000			
	1993	1994	1995	Total	1993-95	1993	1994	1995	Total	1993	1994	1995	Total
I. INVESTMENT COSTS													
A. Field Equipment													
GPS Receiver	4	0	0	4	30216	120863.8	0.0	0.0	120863.8	13.7	0.0	0.0	13.7
PH Meters	3	0	0	3	40288	120863.8	0.0	0.0	120863.8	13.7	0.0	0.0	13.7
Altimeters	6	0	0	6	40288	241727.6	0.0	0.0	241727.6	27.5	0.0	0.0	27.5
Soil & Sieve sets	3	0	0	3	10072	30216.0	0.0	0.0	30216.0	3.4	0.0	0.0	3.4
Clinometers	3	0	0	3	10072	30216.0	0.0	0.0	30216.0	3.4	0.0	0.0	3.4
Compass	10	0	0	10	1007	10072.0	0.0	0.0	10072.0	1.1	0.0	0.0	1.1
Altimeters/PH meters Misc	-	-	-	-	-	50404.7	10072.0	10072.0	70548.7	5.7	1.1	1.1	8.0
Sub-Total						604363.8	10072.0	10072.0	624507.8	68.7	1.1	1.1	71.0
B. Laboratory Equipment													
Electrophoresis	1	0	0	1	2042419	2042419.4	0.0	0.0	2042419.4	232.2	0.0	0.0	232.2
Thermmeters	5	0	0	5	2014	10072.0	0.0	0.0	10072.0	1.1	0.0	0.0	1.1
Supplies for Electrophor.	-	-	-	-	-	50404.7	20144.0	20144.0	90692.6	5.7	2.3	2.3	10.3
Growth Chamber	4	0	0	4	201440	805758.8	0.0	0.0	805758.8	91.6	0.0	0.0	91.6
Drying Oven	1	0	0	1	60432	60431.9	0.0	0.0	60431.9	6.9	0.0	0.0	6.9
Incubator	1	0	0	1	80576	80575.9	0.0	0.0	80575.9	9.2	0.0	0.0	9.2
Ultra Centrafuge	1	0	0	1	100720	100719.8	0.0	0.0	100719.8	11.4	0.0	0.0	11.4
Stereo Microscopes/Camera	6	0	0	6	80576	483455.3	0.0	0.0	483455.3	55.0	0.0	0.0	55.0
Compound Microscop/Camera	1	0	0	1	120864	120863.8	0.0	0.0	120863.8	13.7	0.0	0.0	13.7
Balances	3	0	0	3	10072	30216.0	0.0	0.0	30216.0	3.4	0.0	0.0	3.4
Miscellaneous	1	0	0	1	100720	100719.8	0.0	0.0	100719.8	11.4	0.0	0.0	11.4
Sub-Total						3885637.4	20144.0	20144.0	3925925.3	441.7	2.3	2.3	446.3
C. Vehicles													
4WD Jeeps	4	0	0	4	251844	1007377.5	0.0	0.0	1007377.5	114.5	0.0	0.0	114.5
Land Cruiser Pick-ups	2	0	0	2	302160	604319.1	0.0	0.0	604319.1	68.7	0.0	0.0	68.7
Pickup Trucks	1	0	0	1	201440	201439.7	0.0	0.0	201439.7	22.9	0.0	0.0	22.9
Minibus	1	0	0	1	402879	402879.4	0.0	0.0	402879.4	45.8	0.0	0.0	45.8
Mobil Lab	1	0	0	1	503599	503599.2	0.0	0.0	503599.2	57.2	0.0	0.0	57.2
Motorbikes	4	0	0	4	20144	80575.9	0.0	0.0	80575.9	9.2	0.0	0.0	9.2
Sub-Total						2800190.8	0.0	0.0	2800190.8	318.3	0.0	0.0	318.3
D. Transport. Housing, Fuel	-	-	-	-	-	178595.3	178595.3	178595.3	535786.0	20.3	20.3	20.3	60.9
E. Field Labor	-	-	-	-	-	177979.1	177979.1	177979.1	533937.2	20.2	20.2	20.2	60.7
Total INVESTMENT COSTS						7646766.4	386790.3	386790.3	8420347.1	869.2	44.0	44.0	957.2
II. RECURRENT COSTS													
A. Labratory Supplies	-	-	-	-	-	89451.7	134177.6	134177.6	357806.9	10.2	15.3	15.3	40.7
B. Vehicles & Maintenance	-	-	-	-	-	89143.6	222859.0	222859.0	534861.6	10.1	25.3	25.3	60.8
Total RECURRENT COSTS						178595.3	357036.6	357036.6	892668.5	20.3	40.6	40.6	101.5
Total						7825361.7	743826.9	743826.9	9313015.5	889.5	84.6	84.6	1058.6

Unit Costs Scaled by 1000.0 - Values scaled by 1000.0 12/14/1992 14:56

Turkey
In Situ Conservation of Genetic Diversity
Table 102. Eco System, Community and Species Inventory/Survey
Ministry of Forestry (MOF)
Detailed Cost Table
TL000

	Quantity				Unit Cost	Base Costs				Base Costs in US$000			
	1993	1994	1995	Total	1993-95	1993	1994	1995	Total	1993	1994	1995	Total
I. INVESTMENT COSTS													
A. Field Equipment													
GPS Receiver	3	0	0	3	30216	90647.9	0.0	0.0	90647.9	10.3	0.0	0.0	10.3
Altimeters/PH meters Misc	-	-	-	-	-	40287.9	10072.0	10072.0	60431.9	4.6	1.1	1.1	6.9
Sub-Total						130935.8	10072.0	10072.0	151079.8	14.9	1.1	1.1	17.2
B. Labratory Equipment													
Electrophoresis	2	0	0	2	251844	503688.8	0.0	0.0	503688.8	57.3	0.0	0.0	57.3
Supplies for Electrophor.	-	-	-	-	-	100719.8	40287.9	40287.9	181295.7	11.4	4.6	4.6	20.6
PH Meter & Balances	3	0	0	3	40288	120863.8	0.0	0.0	120863.8	13.7	0.0	0.0	13.7
Incubators	3	0	0	3	80576	241727.6	0.0	0.0	241727.6	27.5	0.0	0.0	27.5
Gel Reader	1	0	0	1	40288	40287.9	0.0	0.0	40287.9	4.6	0.0	0.0	4.6
Microscopes	1	0	0	1	80576	80575.9	0.0	0.0	80575.9	9.2	0.0	0.0	9.2
Sub-Total						1087863.9	40287.9	40287.9	1168439.7	123.7	4.6	4.6	132.8
C. Vehicles													
4WD Jeeps	3	0	0	3	251844	755533.1	0.0	0.0	755533.1	85.9	0.0	0.0	85.9
Land Cruiser Pick-ups	4	0	0	4	302160	1208638.2	0.0	0.0	1208638.2	137.4	0.0	0.0	137.4
Minibus	2	0	0	2	402879	805758.8	0.0	0.0	805758.8	91.6	0.0	0.0	91.6
Pickup Trucks	3	0	0	3	201440	604319.1	0.0	0.0	604319.1	68.7	0.0	0.0	68.7
Mobile Lab	1	0	0	1	503599	503599.2	0.0	0.0	503599.2	57.2	0.0	0.0	57.2
Sub-Total						3877848.4	0.0	0.0	3877848.4	440.8	0.0	0.0	440.8
D. Transport. Housing, Fuel	-	-	-	-	-	133946.5	133946.5	133946.5	401839.5	15.2	15.2	15.2	45.7
E. Field Labor	-	-	-	-	-	88989.5	88989.5	88989.5	266968.6	10.1	10.1	10.1	30.3
Total INVESTMENT COSTS						5319584.1	273295.9	273295.9	5866176.0	604.7	31.1	31.1	666.8
II. RECURRENT COSTS													
A. Labratory Supplies	-	-	-	-	-	134177.6	223629.3	178903.4	536710.3	15.3	25.4	20.3	61.0
B. Vehicles & Maintenance	-	-	-	-	-	133715.4	222859.0	267430.8	624005.2	15.2	25.3	30.4	70.9
Total RECURRENT COSTS						267893.0	446488.3	446334.2	1160715.5	30.5	50.8	50.7	131.9
Total						5587477.1	719784.2	719630.2	7026891.5	635.1	81.8	81.8	798.8

Unit Costs Scaled by 1000.0 - Values scaled by 1000.0 12/14/1992 14:56

Turkey
In Situ Conservation of Genetic Diversity
Table 103. Germplasm Management (MARA)
Detailed Cost Table
TL000

	Quantity				Unit Cost	Base Costs				Base Costs in US$000			
	1993	1994	1995	Total	1993-95	1993	1994	1995	Total	1993	1994	1995	Total
I. INVESTMENT COSTS													
A. Seed Blower	2	0	0	2	100720	201439.7	0.0	0.0	201439.7	22.9	0.0	0.0	22.9
B. Moisture Meter	2	0	0	2	50360	100719.8	0.0	0.0	100719.8	11.4	0.0	0.0	11.4
C. Multispec Grain Analyser	1	0	0	1	302160	302159.5	0.0	0.0	302159.5	34.3	0.0	0.0	34.3
D. Storage Rack System	3	0	0	3	100720	302159.5	0.0	0.0	302159.5	34.3	0.0	0.0	34.3
E. Storage Supplies	-	-	-	-	-	26789.3	35719.1	26789.3	89297.7	3.0	4.1	3.0	10.2
F. Compresor	2	0	0	2	53394	106787.4	0.0	0.0	106787.4	12.1	0.0	0.0	12.1
G. Refregerator	1	0	0	1	100720	100719.8	0.0	0.0	100719.8	11.4	0.0	0.0	11.4
H. Herbarium Cabinets	10	0	0	10	30261	302607.2	0.0	0.0	302607.2	34.4	0.0	0.0	34.4
I. Vegetative Pt. Propagat.	-	-	-	-	-	62400.5	62400.5	62400.5	187201.6	7.1	7.1	7.1	21.3
J. Greenhouse Expansion	1	0	0	1	267338	267338.3	0.0	0.0	267338.3	30.4	0.0	0.0	30.4
Total INVESTMENT COSTS						1773121.3	98119.6	89189.8	1960430.6	201.6	11.2	10.1	222.8
Total						1773121.3	98119.6	89189.8	1960430.6	201.6	11.2	10.1	222.8

Unit Costs Scaled by 1000.0 - Values scaled by 1000.0 12/14/1992 14:56

Turkey
In Situ Conservation of Genetic Diversity
Table 104. Germplasm Management (MOF)
Detailed Cost Table
TL000

	Quantity				Unit Cost	Base Costs				Base Costs in US$000			
	1993	1994	1995	Total	1993-95	1993	1994	1995	Total	1993	1994	1995	Total
I. INVESTMENT COSTS													
A. Fencing	-	-	-	-	-	0.0	355958.1	533937.2	889895.3	0.0	40.5	60.7	101.2
B. Greenhouse Expansion	2	0	0	2	267338	534676.7	0.0	0.0	534676.7	60.8	0.0	0.0	60.8
C. Low Temp. Refrigerator	2	0	0	2	100720	201439.7	0.0	0.0	201439.7	22.9	0.0	0.0	22.9
D. Storage Supplies	-	-	-	-	-	53578.6	35719.1	17859.5	107157.2	6.1	4.1	2.0	12.2
E. Material for Greenhouse	-	-	-	-	-	124757.9	35645.1	17822.6	178225.6	14.2	4.1	2.0	20.3
F. Seed Blower	1	0	0	1	100720	100719.8	0.0	0.0	100719.8	11.4	0.0	0.0	11.4
G. Moisture Meter	1	0	0	1	50360	50359.9	0.0	0.0	50359.9	5.7	0.0	0.0	5.7
H. Multispec Grain Analyser	1	0	0	1	302160	302159.5	0.0	0.0	302159.5	34.3	0.0	0.0	34.3
I. Compressor	1	0	0	1	60432	60431.9	0.0	0.0	60431.9	6.9	0.0	0.0	6.9
J. Storage Rack System	1	0	0	1	100720	100719.8	0.0	0.0	100719.8	11.4	0.0	0.0	11.4
K. Herbarium Cabinets	4	0	0	4	30216	120863.8	0.0	0.0	120863.8	13.7	0.0	0.0	13.7
L. Seed Propagat. Apparatus	1	0	0	1	211512	211511.7	0.0	0.0	211511.7	24.0	0.0	0.0	24.0
Total INVESTMENT COSTS						1861219.4	427322.3	569619.3	2858161.0	211.6	48.6	64.8	324.9
Total						1861219.4	427322.3	569619.3	2858161.0	211.6	48.6	64.8	324.9

Unit Costs Scaled by 1000.0 - Values scaled by 1000.0 12/14/1992 14:56

Turkey
In Situ Conservation of Genetic Diversity
Table 201. Designation of Gene Management Zones (MARA)
Detailed Cost Table
TL000

	Quantity	Unit Cost	Base Costs				Base Costs in US$000			
	93-95 Total	1993-95	1993	1994	1995	Total	1993	1994	1995	Total
I. INVESTMENT COSTS										
A. Survey & Bounderies	- -	-	0.0	0.0	311463.4	311463.4	0.0	0.0	35.4	35.4
B. Fencing	- -	-	0.0	0.0	444947.7	444947.7	0.0	0.0	50.6	50.6
Total INVESTMENT COSTS			0.0	0.0	756411.0	756411.0	0.0	0.0	86.0	86.0
Total			0.0	0.0	756411.0	756411.0	0.0	0.0	86.0	86.0

Unit Costs Scaled by 1000.0 - Values scaled by 1000.0 12/14/1992 14:56

Turkey
In Situ Conservation of Genetic Diversity
Table 202. Designation of Gene Management Zones (MOF)
Detailed Cost Table
TL000

	Quantity	Unit Cost	Base Costs				Base Costs in US$000			
	93-95 Total	1993-95	1993	1994	1995	Total	1993	1994	1995	Total
I. INVESTMENT COSTS										
A. Survey & Bounderies	- -	-	0.0	0.0	311463.4	311463.4	0.0	0.0	35.4	35.4
B. Fencing	- -	-	0.0	0.0	444947.7	444947.7	0.0	0.0	50.6	50.6
Total INVESTMENT COSTS			0.0	0.0	756411.0	756411.0	0.0	0.0	86.0	86.0
Total			0.0	0.0	756411.0	756411.0	0.0	0.0	86.0	86.0

Unit Costs Scaled by 1000.0 - Values scaled by 1000.0 12/14/1992 14:56

Turkey
In Situ Conservation of Genetic Diversity
Table 301. National Plan for In Situ Conservation of Wild Crop Relative
Ministry of Environment
Detailed Cost Table
TL000

	Unit	Quantity 1993	1994	1995	Total	Unit Cost 1993-94	1995	Base Costs 1993	1994	1995	Total	Base Costs in US$000 1993	1994	1995	Total
I. INVESTMENT COSTS															
A. Tech. Assistance Foreign															
Conservation Biologist	manmonth	0	4	2	6	134131	134131	0.0	536525.5	268262.7	804788.2	0.0	61.0	30.5	91.5
Cons. Management Special.	manmonth	0	3	2	5	134131	134131	0.0	402394.1	268262.7	670656.8	0.0	45.7	30.5	76.2
Landrace Specialist	manmonth	0	3	2	5	134131	134131	0.0	402394.1	268262.7	670656.8	0.0	45.7	30.5	76.2
Sub-Total								0.0	1341313.6	804788.2	2146101.8	0.0	152.5	91.5	244.0
B. Tech. Assistance (Local)															
Socio-economist	manmonth	0	3	2	5	44549	44549	0.0	133646.1	89097.4	222743.4	0.0	15.2	10.1	25.3
Botanist	manmonth	0	4	1	5	44549	44549	0.0	178194.8	44548.7	222743.4	0.0	20.3	5.1	25.3
Forester	manmonth	0	4	1	5	44549	44549	0.0	178194.8	44548.7	222743.4	0.0	20.3	5.1	25.3
Agriculturist	manmonth	0	4	1	5	44549	44549	0.0	178194.8	44548.7	222743.4	0.0	20.3	5.1	25.3
Anthropologist/Sociolog.	manmonth	0	4	1	5	44549	44549	0.0	178194.8	44548.7	222743.4	0.0	20.3	5.1	25.3
Resource Economist	manmonth	0	4	1	5	44549	44549	0.0	178194.8	44548.7	222743.4	0.0	20.3	5.1	25.3
Legal/Institution Spec.	manmonth	0	3	2	5	44549	44549	0.0	133646.1	89097.4	222743.4	0.0	15.2	10.1	25.3
Exten./Puplic Awarness Sp	manmonth	0	3	2	5	44549	44549	0.0	133646.1	89097.4	222743.4	0.0	15.2	10.1	25.3
Protected Area Mang. Exp.	manmonth	0	3	2	5	44549	44549	0.0	133646.1	89097.4	222743.4	0.0	15.2	10.1	25.3
Sub-Total								0.0	1425558.0	579132.9	2004691.0	0.0	162.0	65.8	227.9
C. Report Production Costs															
Production		-	-	-	-	-	-	0.0	17871.9	53615.6	71487.4	0.0	2.0	6.1	8.1
Translation		-	-	-	-	-	-	0.0	35743.7	35743.7	71487.4	0.0	4.1	4.1	8.1
Sub-Total								0.0	53615.6	89359.3	142974.9	0.0	6.1	10.2	16.3
Total INVESTMENT COSTS								0.0	2820487.2	1473280.4	4293767.6	0.0	320.6	167.5	488.1
Total								0.0	2820487.2	1473280.4	4293767.6	0.0	320.6	167.5	488.1

Unit Costs Scaled by 1000.0 - Values scaled by 1000.0 12/14/1992 14:57

Turkey
In Situ Conservation of Genetic Diversity
Table 401. Institutional Strenghtening (MARA)
Detailed Cost Table
TL000

	Unit	Quantity 1993	1994	1995	Total	Unit Cost 1993-95	Base Costs 1993	1994	1995	Total	Base Costs in US$000 1993	1994	1995	Total
I. INVESTMENT COSTS														
A. Scientif. Advisory Commit														
Local Staff	manday	20	30	30	80	267	5346.8	8020.2	8020.2	21387.1	0.6	0.9	0.9	2.4
Foreign Advisors	manday	24	24	24	72	2683	64383.1	64383.1	64383.1	193149.2	7.3	7.3	7.3	22.0
Local Advisors	manday	24	24	24	72	267	6407.2	6407.2	6407.2	19221.7	0.7	0.7	0.7	2.2
Sub-Total							76137.1	78810.5	78810.5	233758.0	8.7	9.0	9.0	26.6
B. Project Implem. Committee	manday	30	50	50	130	267	8020.2	13366.9	13366.9	34754.0	0.9	1.5	1.5	4.0
C. Extension														
Cameras		2	0	0	2	13429	26858.6	0.0	0.0	26858.6	3.1	0.0	0.0	3.1
Videos		3	0	0	3	26859	80575.9	0.0	0.0	80575.9	9.2	0.0	0.0	9.2
Slide Projector		3	0	0	3	8953	26858.6	0.0	0.0	26858.6	3.1	0.0	0.0	3.1
Sub-Total							134293.1	0.0	0.0	134293.1	15.3	0.0	0.0	15.3
Total INVESTMENT COSTS							218450.3	92177.4	92177.4	402805.1	24.8	10.5	10.5	45.8
Total							218450.3	92177.4	92177.4	402805.1	24.8	10.5	10.5	45.8

Unit Costs Scaled by 1000.0 - Values scaled by 1000.0 12/14/1992 14:57

Turkey
In Situ Conservation of Genetic Diversity
Table 402. Institutional Strenghtening (MOF)
Detailed Cost Table
TL000

	Unit	Quantity 1993	1994	1995	Total	Unit Cost 1993-95	Base Costs 1993	1994	1995	Total	Base Costs in US$000 1993	1994	1995	Total
I. INVESTMENT COSTS														
A. Coordination														
Project Implem. Committeemanday	30	50	50	130	267	8009.1	13348.4	13348.4	34705.9	0.9	1.5	1.5	3.9
B. Extension														
Camera	2	0	0	2	15112	30224.9	0.0	0.0	30224.9	3.4	0.0	0.0	3.4
Video Equipment	3	0	0	3	30216	90647.9	0.0	0.0	90647.9	10.3	0.0	0.0	10.3
Slide Projector/Screen	3	0	0	3	10072	30216.0	0.0	0.0	30216.0	3.4	0.0	0.0	3.4
Sub-Total						151088.7	0.0	0.0	151088.7	17.2	0.0	0.0	17.2
Total INVESTMENT COSTS						159097.8	13348.4	13348.4	185794.6	18.1	1.5	1.5	21.1
Total						159097.8	13348.4	13348.4	185794.6	18.1	1.5	1.5	21.1

Unit Costs Scaled by 1000.0 - Values scaled by 1000.0 12/14/1992 14:57

Turkey
In Situ Conservation of Genetic Diversity
Table 403. Institutional Strenghtening (MOE)
Detailed Cost Table
TL000

	Unit	Quantity 1993	1994	1995	Total	Unit Cost 1993-95	Base Costs 1993	1994	1995	Total	Base Costs in US$000 1993	1994	1995	Total
I. INVESTMENT COSTS														
A. Coordination														
Committee Meetings	manday	20	30	30	80	267	5346.8	8020.2	8020.2	21387.1	0.6	0.9	0.9	2.4
B. Extension Equipment														
Camera		2	0	0	2	15112	30224.9	0.0	0.0	30224.9	3.4	0.0	0.0	3.4
Videos		3	0	0	3	30216	90647.9	0.0	0.0	90647.9	10.3	0.0	0.0	10.3
Slide Projector		3	0	0	3	10072	30216.0	0.0	0.0	30216.0	3.4	0.0	0.0	3.4
Production of Brochures		0	1	1	1	89259	0.0	44629.6	44629.6	89259.1	0.0	5.1	5.1	10.1
Sub-Total							151088.7	44629.6	44629.6	240347.9	17.2	5.1	5.1	27.3
Total INVESTMENT COSTS							156435.5	52649.7	52649.7	261734.9	17.8	6.0	6.0	29.8
Total							156435.5	52649.7	52649.7	261734.9	17.8	6.0	6.0	29.8

Unit Costs Scaled by 1000.0 - Values scaled by 1000.0 12/14/1992 14:57

Turkey
In Situ Conservation of Genetic Diversity
Table 404. Institutioanl Strengthening
Training: MARA, MOF, MOE
Detailed Cost Table
TL000

	Unit	Quantity 1993	1994	1995	Total	Unit Cost 1993-95	Base Costs 1993	1994	1995	Total	Base Costs in US$000 1993	1994	1995	Total
I. INVESTMENT COSTS														
A. MOF Short/T Overseas Tr.														
GIS/GPS	manmonth	4	0	0	4	53717	214869.0	0.0	0.0	214869.0	24.4	0.0	0.0	24.4
Population Genetics	manmonth	3	0	0	3	53717	161151.8	0.0	0.0	161151.8	18.3	0.0	0.0	18.3
Inventory Techniques	manmonth	2	0	0	2	53717	107434.5	0.0	0.0	107434.5	12.2	0.0	0.0	12.2
Conservation Biology	manmonth	9	0	0	9	53717	483455.3	0.0	0.0	483455.3	55.0	0.0	0.0	55.0
Seed/Pollen Management	manmonth	4	0	0	4	53717	214869.0	0.0	0.0	214869.0	24.4	0.0	0.0	24.4
Sub-Total							1181779.5	0.0	0.0	1181779.5	134.3	0.0	0.0	134.3
B. In-Country Training														
Iso-Enzyme Training	manweek	60	0	0	60	2673	160375.3	0.0	0.0	160375.3	18.2	0.0	0.0	18.2
GIS	manweek	80	0	0	80	2673	213833.7	0.0	0.0	213833.7	24.3	0.0	0.0	24.3
Conservation Biology	manweek	250	0	0	250	2673	668230.3	0.0	0.0	668230.3	76.0	0.0	0.0	76.0
Survey/Inventory	manweek	150	0	0	150	2673	400938.2	0.0	0.0	400938.2	45.6	0.0	0.0	45.6
Sub-Total							1443377.5	0.0	0.0	1443377.5	164.1	0.0	0.0	164.1
C. Technical Trainers														
Iso-enzyme Expert	manweek	8	0	0	8	26826	214610.2	0.0	0.0	214610.2	24.4	0.0	0.0	24.4
GIS Expert	manweek	10	0	0	10	26826	268262.7	0.0	0.0	268262.7	30.5	0.0	0.0	30.5
Conservation Biologists	manweek	18	0	0	18	26826	482872.9	0.0	0.0	482872.9	54.9	0.0	0.0	54.9
Survey/Inventory Experts	manweek	16	0	0	16	26826	429220.4	0.0	0.0	429220.4	48.8	0.0	0.0	48.8
Sub-Total							1394966.2	0.0	0.0	1394966.2	158.6	0.0	0.0	158.6
D. Study Tours														
Population Genetics	manmonth	0	6	0	6	161152	0.0	966910.5	0.0	966910.5	0.0	109.9	0.0	109.9
Conservation Biology	manmonth	0	6	0	6	161152	0.0	966910.5	0.0	966910.5	0.0	109.9	0.0	109.9
Ex-Situ/In-Situ Compleme.	manmonth	0	6	0	6	161152	0.0	966910.5	0.0	966910.5	0.0	109.9	0.0	109.9
Sub-Total							0.0	2900731.6	0.0	2900731.6	0.0	329.7	0.0	329.7
E. Long-term Training														
MSc Conservation Biology	manyear	0	4	0	4	179058	0.0	716230.0	0.0	716230.0	0.0	81.4	0.0	81.4
Total INVESTMENT COSTS							4020123.2	3616961.6	0.0	7637084.8	457.0	411.1	0.0	868.1
Total							4020123.2	3616961.6	0.0	7637084.8	457.0	411.1	0.0	868.1

Unit Costs Scaled by 1000.0 - Values scaled by 1000.0 12/14/1992 14:57

Turkey
In Situ Conservation of Genetic Diversity
Table 405. International Symposium (MARA)
Detailed Cost Table
TL000

	Unit	Quantity 1993	1994	1995	Total	Unit Cost 1993-95	Base Costs 1993	1994	1995	Total	Base Costs in US$000 1993	1994	1995	Total
I. INVESTMENT COSTS														
A. Participants														
Local Paricipants	manweek	0	0	70	70	2670	0.0	0.0	186878.0	186878.0	0.0	0.0	21.2	21.2
Foreign Participants	manweek	0	0	10	10	26842	0.0	0.0	268424.5	268424.5	0.0	0.0	30.5	30.5
Sub-Total							0.0	0.0	455302.5	455302.5	0.0	0.0	51.8	51.8
B. Production Materials		-	-	-	-	-	0.0	0.0	89359.3	89359.3	0.0	0.0	10.2	10.2
C. Communication Costs		-	-	-	-	-	0.0	0.0	44556.4	44556.4	0.0	0.0	5.1	5.1
Total INVESTMENT COSTS							0.0	0.0	589218.2	589218.2	0.0	0.0	67.0	67.0
Total							0.0	0.0	589218.2	589218.2	0.0	0.0	67.0	67.0

Unit Costs Scaled by 1000.0 - Values scaled by 1000.0 12/14/1992 14:57

Turkey
In Situ Conservation of Genetic Diversity
Table 501. Data Management (MARA)
Detailed Cost Table
TL000

	Quantity				Unit Cost	Base Costs				Base Costs in US$000			
	1993	1994	1995	Total	1993-95	1993	1994	1995	Total	1993	1994	1995	Total
I. INVESTMENT COSTS													
A. Data Acquisation	-	-	-	-	-	534676.7	89112.8	89112.8	712902.3	60.8	10.1	10.1	81.0
B. Literature, Books	-	-	-	-	-	44648.8	17859.5	8929.8	71438.1	5.1	2.0	1.0	8.1
C. GIS	-	-	-	-	-	2014396.9	0.0	0.0	2014396.9	229.0	0.0	0.0	229.0
D. Printers	2	0	0	2	20144	40287.9	0.0	0.0	40287.9	4.6	0.0	0.0	4.6
E. Software	-	-	-	-	-	30216.0	0.0	0.0	30216.0	3.4	0.0	0.0	3.4
F. Pen Plotter	1	0	0	1	15130	15130.4	0.0	0.0	15130.4	1.7	0.0	0.0	1.7
G. Data Management Training	-	-	-	-	-	214351.4	71450.5	71450.5	357252.3	24.4	8.1	8.1	40.6
H. Desktop Computers	4	0	0	4	40288	161151.8	0.0	0.0	161151.8	18.3	0.0	0.0	18.3
I. Notebook Computers	2	2	0	4	30216	60431.9	60431.9	0.0	120863.8	6.9	6.9	0.0	13.7
J. Mini Computer	1	0	0	1	302160	302159.5	0.0	0.0	302159.5	34.3	0.0	0.0	34.3
K. Lazer Printer	1	0	0	1	20144	20144.0	0.0	0.0	20144.0	2.3	0.0	0.0	2.3
L. Photocopier	3	0	0	3	30216	90647.9	0.0	0.0	90647.9	10.3	0.0	0.0	10.3
M. Fax Machine	3	0	0	3	15112	45337.4	0.0	0.0	45337.4	5.2	0.0	0.0	5.2
Total INVESTMENT COSTS						3573580.5	238854.7	169493.0	3981928.1	406.2	27.2	19.3	452.6
II. RECURRENT COSTS													
A. Supplies, Materials	-	-	-	-	-	17859.5	17859.5	8929.8	44648.8	2.0	2.0	1.0	5.1
B. Report Expenses	-	-	-	-	-	17797.9	26696.9	53393.7	97888.5	2.0	3.0	6.1	11.1
Total RECURRENT COSTS						35657.4	44556.4	62323.5	142537.3	4.1	5.1	7.1	16.2
Total						3609237.9	283411.1	231816.5	4124465.5	410.3	32.2	26.4	468.8

Unit Costs Scaled by 1000.0 - Values scaled by 1000.0 12/14/1992 14:57

Turkey
In Situ Conservation of Genetic Diversity
Table 502. Data Management (MOF)
Detailed Cost Table
TL000

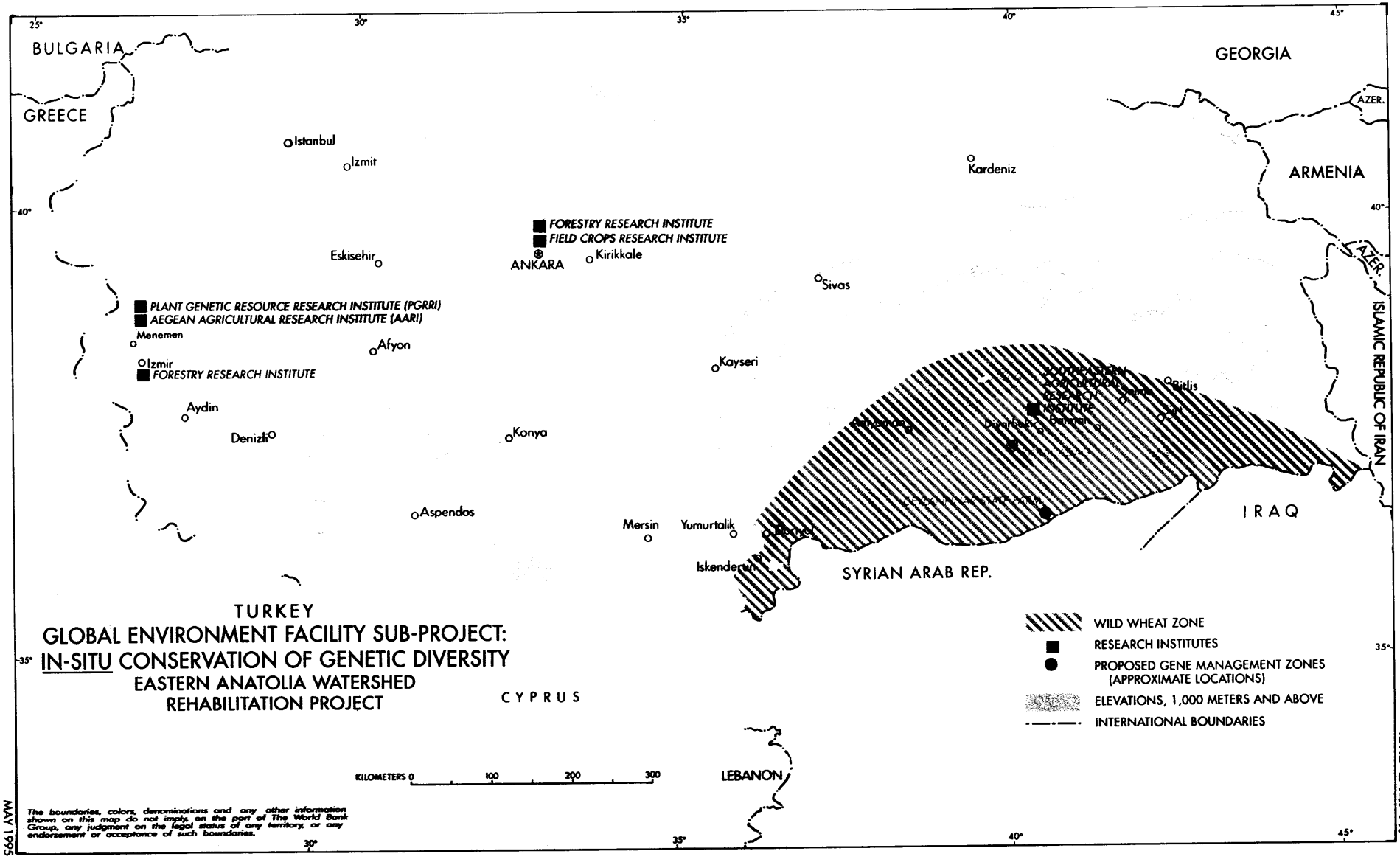
	Quantity				Unit Cost	Base Costs				Base Costs in US$000			
	1993	1994	1995	Total	1993-95	1993	1994	1995	Total	1993	1994	1995	Total
I. INVESTMENT COSTS													
A. Data Acquisation	-	-	-	-	-	133669.2	133669.2	0.0	267338.3	15.2	15.2	0.0	30.4
B. GIS	-	-	-	-	-	201439.7	0.0	0.0	201439.7	22.9	0.0	0.0	22.9
C. Literature, Books	-	-	-	-	-	35719.1	26789.3	26789.3	89297.7	4.1	3.0	3.0	10.2
D. Printers	4	0	0	4	20144	80575.9	0.0	0.0	80575.9	9.2	0.0	0.0	9.2
E. Software	-	-	-	-	-	35274.3	0.0	0.0	35274.3	4.0	0.0	0.0	4.0
F. Pen Plotter	1	0	0	1	15112	15112.5	0.0	0.0	15112.5	1.7	0.0	0.0	1.7
G. Data Management Training	-	-	-	-	-	107175.7	35725.2	35725.2	178626.1	12.2	4.1	4.1	20.3
H. Desktop Computers	5	0	0	5	40288	201439.7	0.0	0.0	201439.7	22.9	0.0	0.0	22.9
I. Notebook Computers	4	0	0	4	30216	120863.8	0.0	0.0	120863.8	13.7	0.0	0.0	13.7
J. Photocopier	3	0	0	3	30216	90647.9	0.0	0.0	90647.9	10.3	0.0	0.0	10.3
K. Fax Machine	3	0	0	3	15112	45337.4	0.0	0.0	45337.4	5.2	0.0	0.0	5.2
L. Minicomputer	1	0	0	1	302160	302159.5	0.0	0.0	302159.5	34.3	0.0	0.0	34.3
Total INVESTMENT COSTS						1369414.5	196183.7	62514.5	1628112.8	155.7	22.3	7.1	185.1
II. RECURRENT COSTS													
A. Supplies, Materials	-	-	-	-	-	26789.3	17859.5	17859.5	62508.4	3.0	2.0	2.0	7.1
B. Report Expenses	-	-	-	-	-	26696.9	26696.9	44494.8	97888.5	3.0	3.0	5.1	11.1
Total RECURRENT COSTS						53486.2	44556.4	62354.3	160396.8	6.1	5.1	7.1	18.2
Total						1422900.7	240740.1	124868.8	1788509.6	161.7	27.4	14.2	203.3

Unit Costs Scaled by 1000.0 - Values scaled by 1000.0 12/14/1992 14:57

Turkey
In Situ Conservation of Genetic Diversity
Table 503. Data Management (MOE)
Detailed Cost Table
TL000

	Quantity				Unit Cost	Base Costs				Base Costs in US$000			
	1993	1994	1995	Total	1993-95	1993	1994	1995	Total	1993	1994	1995	Total
I. INVESTMENT COSTS													
A. GIS	-	-	-	-	-	201439.7	0.0	0.0	201439.7	22.9	0.0	0.0	22.9
B. Literature, Books	-	-	-	-	-	8929.8	8929.8	8929.8	26789.3	1.0	1.0	1.0	3.0
C. Printers	2	0	0	2	20144	40287.9	0.0	0.0	40287.9	4.6	0.0	0.0	4.6
D. Software	-	-	-	-	-	15112.5	0.0	0.0	15112.5	1.7	0.0	0.0	1.7
E. Pen Plotter	1	0	0	1	15112	15112.5	0.0	0.0	15112.5	1.7	0.0	0.0	1.7
F. Data Management Training	-	-	-	-	-	107175.7	35725.2	35725.2	178626.1	12.2	4.1	4.1	20.3
G. Desktop Computers	6	0	0	6	40288	241727.6	0.0	0.0	241727.6	27.5	0.0	0.0	27.5
H. Notebook Computers	2	0	0	2	30216	60431.9	0.0	0.0	60431.9	6.9	0.0	0.0	6.9
I. Photocopier	1	0	0	1	30216	30216.0	0.0	0.0	30216.0	3.4	0.0	0.0	3.4
J. Fax Machine	1	0	0	1	15112	15112.5	0.0	0.0	15112.5	1.7	0.0	0.0	1.7
K. Lazer Printer	1	0	0	1	20144	20144.0	0.0	0.0	20144.0	2.3	0.0	0.0	2.3
Total INVESTMENT COSTS						755689.9	44655.0	44655.0	844999.9	85.9	5.1	5.1	96.1
Total						755689.9	44655.0	44655.0	844999.9	85.9	5.1	5.1	96.1

Unit Costs Scaled by 1000.0 - Values scaled by 1000.0 12/14/1992 14:57



TURKEY
GLOBAL ENVIRONMENT FACILITY SUB-PROJECT:
IN-SITU CONSERVATION OF GENETIC DIVERSITY
EASTERN ANATOLIA WATERSHED REHABILITATION PROJECT

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