الجمهورية اللبنانية
مكتب وزير الدولة لشؤون التنمية الإدارية
مركز مشاريع ودراسات القطاع العام

The Case of Lebanon RAB/96/002 5A

PROPOSAL FOR REVIEW

PROJECT TITLE: SUSTAINABLE USE OF DRYLAND	REGIONAL: CONSERVATION AND AGRO-BIODIVERSITY OF THE FERTILE CRESCENT
GEF FOCAL AREA:	Biodiversity (cross-cutting with Land Degradation)
COUNTRY ELIGIBILITY:	Under financial mechanism of Convention (ratification): Lebanon - 15 December 1994; Jordan - 12 November 1993; Syria - 4 January 1996; Under paragraph 9 (b) of the Instrument (See also CEO's note 2 August 996 to Council Members): Palestinian Authority
TOTAL PROJECT COSTS:	US$ $37,722,000
GEF FINANCING:	US $8,124,000
GOVERNMENT CONTRIBUTION:	In-kind: $US 2,068,000
COFINANCING:	• The International Centre for Agricultural Research in the Dry Areas (ICARDA): $5,300,000 • International Plant Genetic Resources Institute (IPGRI): $855,000 • Arab Centre for the Study of Arid Zones and Dry Lands (ACSAD): $495,000
ASSOCIATED PROJECTS:	US$ 1,575,000 (UNDP) US$19,305,000 (Others - Annex 7)
GEF OPERATIONAL FOCAL POINT:	Lebanon: Ministry of Environment Jordan: Ministry of Planning Syria: Ministry of Planning and Development Palestinian Authority: Ministry of Planning
GEF IMPLEMENTING AGENCY:	UNDP
EXECUTING AGENCY:	The International Centre for Agricultural Research in the Dry Areas (ICARDA), Aleppo, Syria

LEAD LOCAL COUNTERPART AGENCIES:	Lebanon: Agricultural Research Institute, Ministry of Agriculture Jordan: Ministry of Planning Syria: Scientific Agricultural Research Directorate, Ministry of Agriculture and Agrarian Reform Palestinian Authority: Ministry of Agriculture Agriculture Research Institute of Jerusalem
OTHER PARTICIPATING AGENCIES:	International Plant Genetic Resources Institute (IPGRI) Arab Centre for the Study of Arid Zones and Dry Lands (ACSAD)
ESTIMATED APPROVAL DATE:	December 1996
ESTIMATED STARTING DATE:	January 1997
PROJECT DURATION:	5 years
GEF PREPARATION COSTS:	PDF B: US$ 52,000 Co-funding: US$ 307,400 (UNEP, ICARDA, IPGRI, ACSAD)

COUNTRY AND SECTOR BACKGROUND

Global Significance of the Agro-biodiversity of the Fertile Crescent

1. The modern territories of the Near East (including Jordan, Lebanon, the Palestinian Authority, Syria, southeast Turkey and southern Iran) encompass the region of the "Fertile Crescent". The Fertile Crescent is an area of megadiversity of important food crop and pasture species. It is one of the few nuclear centres where numerous species (notably wheat, barley, lentil, pea and vetch) of temperate-zone agriculture originated 10,000 years ago, and where their wild relatives and landraces of enormous genetic diversity are still found (Annex 4; Figures 1 and 2). Many fruit trees such as almond (Figure 3), olive and pistachio are also originated from this region and have dominated its traditional agricultural systems (Harlan, 1975)[1]. They are present as a diverse range of wild relatives and local varieties. Cultivated olive, for example, exists as fifty different clones in the region; while almond, one of the most widely cultivated fruit trees in the Mediterranean, exist as more than fifteen local clones with distinct variations in fruit size, inflorescence, hairiness and flower colour.

2. The Levantine Uplands which comprise Lebanon, western Syria, small parts of Jordan and the northern Palestinian Authority, and the associated Mediterranean coasts and valleys, are considered one of the major centre of plant diversity and endemism in the world, and especially in southwest Asia and the Middle East (WWF and IUCN, 1994[2]; Figure 4). Seven genera of vascular plants are endemic to this region. Moreover, drylands are most outstanding for their within-species genetic diversity. Indigenous crops and food plants of the Fertile Crescent region are known for their resistance to disease and abiotic stresses, making them a valuable source of genetic material for germplasm enhancement upon which global food security depends. **The present project is concerned with agricultural biodiversity, referring to biological resources of actual or potential agricultural value, and the diversity of these species within agroecosystems. Given that dry lands of the Fertile Crescent represent the resource base for productive agriculture and given developing countries' food security priorities, the project is concerned with the conservation of biodiversity <u>within</u> agricultural systems.**

3. Wheat and barley, originated from the Fertile Crescent, have become two major staple crops upon which a large proportion, about one third, of the world's population depends. Wheat currently occupies 16% of the world's arable land. World production of wheat averaged 550 million MT between 1992-1994, approximately 30% of the global production of all cereals, exceeding that of both rice and maize. The production of Barley, averaged at 165 million metric tons from over 70 million hectares of land, contributes to

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[1] Harlan (1975). Crops and Man. Second edition.

[2] WWF and IUCN (1994). Centers of Plant Diversity. A guide and strategy for their conservation. Volume One - Europe, Africa, South West Asia and the Middle East. IUCN Publications Unit, Cambridge, UK.

20% of the global production of coarse grains. In many of the least developed countries, barley is the primary human staple although in developed countries, it is used mainly as animal feed and for brewing

4. The best example of economic value derived from genetic pasture species, whose source includes the countries/authority in and around the Fertile Crescent, is the Australian ley farming system, developed since the 1930s, using medics and clovers introduced into rotation with cereals (Puckridge and French 1983)[3]. This agro-biodiversity brought to Australia is worth hundreds of millions of dollars, in terms of meat, milk, wool, added nitrogen fertility and cereal yield sustainability. Similar annual legume exploitation has contributed or could contribute to successful pastures in Argentina, California, Oregon, Chile, North Africa, the Near East, Portugal, South Africa, Turkey, Uruguay and the European countries/authority on the northern rim of the Mediterranean Basin.

Threats to Global Agro-biodiversity

5. The major causes of plant genetic erosion or loss of agro-biodiversity have been summarized in the Report on the State of the World's Plant Genetic Resources (1996)[4]. as follows:

a. Replacement of local varieties
b. Land clearing
c. Over-exploitation of species
d. Population pressure
e. Environmental degradation
f. Overgrazing
h. Legislation/Policy
i. Changing agricultural systems
j. Pests/weeds/diseases
k. Civil strife
l. Reduced fallow

6. The Near East region supports a population of some 48 million. With an average growth rate of over 3% (3.61 % for Syria), the population is expected to more than double by 2025, reaching over 100 million. For a majority of the population in this region, agricultural production is the principal economic activity. In an effort to achieve national food self-security, agricultural land use has been intensified and expanded, leading to

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[3] FAO, 1996. Report on the State of the World's Plant Genetic Resources (ITCPGR/96/3). International Technical Conference on Plant Genetic Resources, Leipzig, Germany, 17-23 June 1996.

[4] FAO, 1996. Report on the State of the World's Plant Genetic Resources (ITCPGR/96/3). International Technical Conference on Plant Genetic Resources, Leipzig, Germany, 17-23 June 1996.

degradation of vegetation, soils and water. **Genetic diversity is seriously eroding through the degradation of their natural habitats, intensification and expansion of cultivation and overgrazing in natural rangelands.** Overgrazing is especially threatening to herbaceous crops such as wheat, barley and lentils, and their wild relatives, as it can wipe out entire populations. For tree crops and their wild relatives, regeneration can be seriously impaired as a result of overgrazing. Many of the major crops important in this region (e.g. wheat, barley, medics, almond) are threatened by overgrazing, habitat fragmentation and settlement expansion (Table 1).

7. The result is that now, wild relatives of crop species grow only in marginal land areas such as field borders, shallow soil and remnants of natural vegetation. The type of habitat supporting these precious resources is either patchy or degraded. During the last four decades, forest cover has continued to decrease in Syria despite substantial afforestation effort (5-25 million trees per year). Furthermore, afforestation programmes often fail to re-create the lost natural habitats of many wild relatives. Intensive agricultural practices, such as "de-stoning" fields using heavy machinery prior to planting to facilitate subsequent mechanized harvest and increase production, also lead to serious habitat destruction and fragmentation which are seriously threatening the populations of wild wheat, barley and lentils in the region. Furthermore, wild lands are often ploughed or disturbed as a means of securing property right by use, a tradition supported by law in many countries/authority with the Ottoman tradition. Over 30% of the steppe (or *badiya*) in Syria have been ploughed for this reason which has led to widespread habitat destruction and degradation.

8. Traditionally, farming systems have maintained diversity in order to preserve stability of production under climatic, disease and pest risks. Wild relatives of fruit trees used to be left growing on field borders to supply seeds or root stocks for planting. **The replacement of the traditional farming system by modern agricultural practices are endangering these wild relatives. Food demands and market forces have encouraged the replacement of the locally adapted varieties (landraces and local varieties) of both fruit trees and field crops with higher-yielding cultivars, hence hamperir[illegible] gene pools of these crops** (Table 1). For example, the improved cultivar of bread wheat is now occupying 70-80% of the global wheat areas. Over time, genetic diversity has erode. Agricultural production is now based on fewer and fewer crops and, within crops, on fewer and fewer genotypes. The genetic uniformity of modern cultivars and a tendency towards monoculture make them vulnerable to disease and pest epidemics and weather extremes.

9. Demands for higher-yielding food crops which must also be adapted to the ever changing weather and biotic stresses, and are disease- and pest-resistant, requires continuous and reliable access to genetic resources that can be used to impart such superior qualities. The loss of traditional agriculture to modern monoculture takes away with it the associated and potentially beneficial insects (pests and predators) and micro-organisms, as well as the invaluable traditional knowledge on the distinct qualities, uses and growth requirements of wild relatives and landraces. Addressing the current loss of agro-biodiversity in developing countries of the Near East is of global importance.

Urgent Need for *In-situ* and On-farm Conservation

10. Genetic materials of several agriculturally important species of the Fertile Crescent, such as wheat, barley, and lentil, have been collected and characterized in terms of the diversity of their responses to environmental factors such as cold, heat and drought stresses, resistances to disease pathogens, insect pests, as well as potential to increasing yield. Though still far from completion, substantial germplasm banks have been created as a means of *ex-situ* conservation. This is especially important for a number of species with only scattered and small wild populations which are unlikely to be viable, and which can be more effectively conserved through *ex-situ* conservation. ICARDA holds approximately 6500 *Medicago*, 3500 *Trifolium*, 1500 *Lathyrus*, 3000 *Vicia* and 5000 accessions from other annual legume genera, second only to the Australian holdings. However, the richness of many pasture and forage legume species in the Fertile Crescent are now under threat due to unmanaged overgrazing, especially those species with larger seeds.

11. Moreover, germplasm banks are only part of the process of maintaining agro-biodiversity. For large and highly varied populations, it is impossible to obtain a representative sample. For example, in 1992, fifty plants of *Triticum dicoccoides* were sampled on a transect of 500 m from one of the wild populations in southern Syria. Gliadin fingerprinting revealed that none of the plants was identical; instead, 50 distinct banding patterns were distinguished. It is increasingly recognized that *ex-situ* conservation has the limitations that only a small proportion of existing genetic resources may be sampled, and, as genetic make-up is not static but evolves in response to environmental changes, collections may represent only the variation present at one point in time. Naturally occurring and evolving populations must be maintained *in-situ* within their environments; this aspect of conservation has received much less attention than collection and *ex-situ* storage.

12. Degradation of biodiversity is attributed to the destruction of natural habitats, largely through human activity. However, in developing countries/authority of the Fertile Crescent, these are habitats represent the resource base for productive agriculture the livelihood of farmers and pastoralists. Large exclusionary "reserves" to preserve biodiversity, which remove land from productive use and do not take account of local needs, will not be acceptable. In addition, indigenous knowledge about cultivated species and their wild relatives, and traditional agricultural practices and systems of land and water management, is an invaluable resource in the search for new and appropriate ways of conserving and using genetic resources. Landraces which have been developed over the centuries by farmers' selection for desirable traits, are usually genetically more heterogenous and highly adapted to their specific agro-ecological environment. The conservation of the valuable and highly diverse genetic resources carried by these landraces can only be achieved through on-farm conservation and continuous use of these landraces in traditional farming systems. Conservation of the genetic diversity of many crops such as wheat, barley and lentil, as well as a number of forage and fruit species, therefore requires both *in-situ* and on-farm strategies, the success of which depends a great deal on community-based management.

13. Furthermore, exclusion by means of protected areas is not necessarily the best means of species or genetic resource conservation. For many species and environments, active management (often involving restoration or creation of niches and habitats within agricultural systems, promotion of traditional land management practices, or reform of social and economic policies) is required to conserve their population and the genetic diversity.

Country Background

14. The proposed regional project encompasses Jordan, Lebanon, the Palestinian Authority and Syria. Jordan, Lebanon and Syria have all ratified the Convention on Biodiversity (CBD).

15. Jordan, Lebanon, the Palestinian Authority and Syria have each established a National Biodiversity Committee under their respective institutions. Jordan, Lebanon and Syria are currently conducting Biodiversity Country Studies, supported by GEF/UNEP, which will document the status of flora and fauna in each country, identify endangered species and priorities for conservation or conservation, propose measures for the conservation and sustainable use of biodiversity, and assess the benefits of conservation of biodiversity and the cost of intervention. The reports from these studies will provide significant guidance to official policies as well as the planning and implementation of subsequent projects dealing with biodiversity and environment. Further details of official strategies and institutional framework of each of the four countries/authority, as well as the relevant NGOs, are given in Annex 5.

16. Jordan has completed a National Environment Strategy (1991)[5], and the Lebanese Environment Strategy is awaiting final Government endorsement. However, all countries/authority have prepared a National Report on Plant Genetic Resources as bases for the Global Plan of Action for the Conservation and Sustainable Utilisation of Plant Genetic Resources for Food and Agriculture (1996)[6]. For the Palestinian Authority, Environmental Profiles have been prepared for the West Bank[7] and Gaza[8] respectively.

17. GEF assistance for biodiversity conservation has been provided to Jordan and Lebanon through two protected areas projects. However, these two projects do not address the issue of agro-biodiversity. The conservation and sustainable use of agro-biodiversity

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5 National Environment Strategy for Jordan - A Resource Book of Information and Guidelines for Action. The Hashemite Kingdom of Jordan, Ministry of Municipal and Rural Affairs and the Environment, Department of Environment, and IUCN.

6 FAO, *in prep.* The Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture. International Technical Conference on Plant Genetic Resources, Leipzig, Germany, 17-23 June 1996.

7 Environmental Profile for the West Bank. Applied Research institute - Jerusalem (ARIJ), 1995.

8 Environmental Profile of Gaza., 1995.

and plant genetic resources require a totally different approach from protected areas for biodiversity at species level. The present project focuses on conserving the genetic diversity of ten target crops of global significance within eight target areas in four countries/authority of the Fertile Crescent. (For selected species, please see Annex 4, [species addressed by the project marked in bold]).

PROJECT OBJECTIVES

18. The overall, long-term, global objective of the project is to ensure the continuous availability of agro-biodiversity in the Fertile Crescent that is essential, not only to the sustainable development of agriculture in that region, but also for global food security and production.

19. The specific project objectives include the development of:

(a) An information base on the genetic diversity of ten target crops in the Fertile Crescent, and the social, economic, landuse and agricultural policies and practices which affect them.

(b) A replicable, transferable, integrated approach for the conservation and sustainable use of agro-biodiversity within agriculturally productive ecosystems, adopted by participating countries/authority and driven by local communities, in selected target areas of representative agro-ecosystems.

(c) National environmental, landuse, social and economic policy measures (involving incentives, compensation, and alternative income) to support and ensure the sustainability of the agro-biodiversity conservation activities.

(d) Strengthened national capacity for the conservation and sustainable use of agro-biodiversity (including technical, research and management capability), through training, regional collaboration, networking and exchange in experience.

PROJECT DESCRIPTION

20. The project strategy is to develop community driven *in-situ* and on-farm agro-biodiversity conservation initiatives in representative, targeted areas of global agro-biodiversity significance. These community driven initiatives will be supported by national, legislative, social and economic policies adapted to agro-biodiversity conservation during the project process, and benefit from the institutional capacity strengthened through personnel training, and regional networking and support. Awareness promotion is a priority at all levels of the project.

21. The involvement of land users as primary participants is fundamental to agro-biodiversity management. Innovative approaches to *in-situ* and on-farm conservation will be developed alongside appropriate resource management, which will at the same time, maintain the productive capacity of the resources and secure the economic viability of the community. Focus will be given to ten target crops (or crop groups) of global significance, all of which are originated from the Fertile Crescent or Central Asian region (Table 1). Both wild relatives and landraces of the selected crops will be studied and managed, incorporating indigenous knowledge and traditional practices, such as farmers' selection for desirable traits, which have over the years, generated genetically heterogenous crops and landraces which are highly adaptive to their specific agro-ecological environments.

22. The project activities will complement existing agricultural development and resource management projects, as well as *ex-situ* conservation activities (Annex 7), to enhance the process of conservation and sustainable use of agro-biodiversity. The co-financing leveraged through this project will also support training of researchers and extension services for farmers, institutional strengthening through the provision of equipment and facilities, and networking with institutions in the region and elsewhere, all of which will contribute to future sustainability.

23. A step-wise, long-term approach is needed to build the national capacity needed for the development and sustainability of the project. The project will strengthen institutional and community capacity, in order to phase in a progressively greater national contribution to agro-biodiversity conservation and management. The project implementation will focus on indigenous technical knowledge in communities concerning the target crops and their uses, build trust and bring people and government institutions into a collaborative mode of work.

24. Eight target areas where *in-situ* and on-farm conservation activities will be carried out through this project have been selected in the four countries/authority, based on the following criteria:

a. Wild "progenitors" of globally important crops
b. Wild relatives of globally important crops
c. Populations of high genetic diversity
d. Presence of more target species
e. Endangered populations
f. Species which are difficult to conserve *ex-situ*
g. Traditional agricultural systems
h. Traditional germplasm (landraces, breeds)
i. Linkage with agricultural development projects

25. The selection of the target areas was undertaken with the aim to capture the maximum genetic diversity of the target crops in the minimal number of areas possible. The target areas were therefore selected to cover the widest possible range of topography, climate and species concerned. For example, Ajlun is a mountainous area 500-1250 m with steep slopes and valleys and is rich in both field and fruit crops diversity; Baalbek is

characterized by a semi-arid Mediterranean climate and is very important in field crops including forage legumes; Hebron Area which has a sub-humid Mediterranean climate and is especially diverse in fruit crops (e.g. olive, plum and almond); and Sweida which is largely devoted to dryland farming and grazing, and is extremely important as 34 *Trifolium* spp., 6 *Aegilops* spp., 10 *Allium* spp. and 10 *Medicago* spp., as well as the close relative of almond and rootstocks species for cultivated pistachio and pear are found (Table 2, Annex 6).

26. The presence of wild relatives and landraces or local varieties of the target crops in each target area is listed in Table 3. Together, the target areas are able to capture significant fractions of the genetic diversity within the globally important target crops. Existing data indicate that 30-40% of the world's wild "progenitors" and wild relatives of wheat (*Triticum spp.)* and barley (*Hordeum spp.)* can be protected through this system of target areas (Table 3). Amount of genetic diversity of wild pear and wild pistachio that can be protected is estimated at 30 % and that for wild medics is 25 %. Collaborative efforts through this network of representative target areas in four countries/authority of the Fertile Crescent greatly increases the cost-effectiveness of this regional project.

27. Furthermore, the selection of the target areas has been a truly participatory process, through discussions in three workshops[9] participated by all the concerned countries/authority. The National Plant Genetic Resources Programmes were actively involved in site proposals and final selection, based on the above listed criteria, and in consultation with ICARDA, IPGRI, ACSAD, UNEP and UNDP. All the sites were visited by at least one person from each of the other countries/authority to encourage exchange. Due to the presence of different target crops, differing range and intensity of threats, and varying socio-economic conditions at the different target areas, the activities require for each area are also different (Table 4).

Project Component 1: Agro-biodiversity and Socio-economic Inventory and Monitoring

28. The information concerning wild relatives and landraces of field crops, fruit trees and forage plants is limited and scattered. This project component will be aimed at documentation and characterization of agro-biodiversity in the selected target areas, as well as land use practices which are contributing to the maintenance or loss of agro-biodiversity, during the course of agricultural development. Assessment will be made on the threats to agro-biodiversity hidden in wild relatives and "progenitors" of the target crops in their original habitat and farmers' landraces of the target crops. Local land users and community representatives will participate actively in these surveys carried out by local scientists.

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9 ICARDA, 1995. Dryland Biodiversity Conservation through Natural Resource Management - Summary Proceedings of a Workshop 5-9 February 1995, Amman, Jordan. Sponsored by UNEP, ICARDA, IPGRI and ACSAD.

29. Results from the inventory activities will contribute to the databases and baseline mapping of the target areas. These will be integrated into a GIS system, containing information obtained from the inventories carried out under this component, as well as existing data generated by other projects and institutions on the biological, soil and water resources, ecology, land tenure and land use practices etc. This integrated mapping and database will provide the baseline for monitoring and improving the effectiveness of agro-biodiversity management, as agricultural, landuse, social and economic patterns change in time.

Activities:

30. Activities of this project component will be carried out for all target areas (Table 4), but with different amounts of details according to the amount of existing information and complexity of the local issues.

a. Agro-biodiversity, Land Use and Socio-economic Inventory

i. Carry out detailed eco-geographic surveys and genetic diversity analyses on the wild relatives and landraces of the target crops. Legal advice will be sought concerning intellectual property and farmers' right.

ii. In partnership and consultation with land users, carry out detailed socio-economic, landownership and land use surveys in the target areas; especially document the extent of use of landraces and other traditional agricultural management practices, as well as land use practices contributing to habitat destruction and biodiversity degradation.

iii. Organize consultative workshops to present and discuss the results with all stakeholder in the project, including community representatives, participating government/territory agencies, NGOs, research institutions and regional organizations.

b. Establishment of Databases and GIS

i. Review the current availability and application of databases on relevant agro-biodiversity information in the four countries/authority.

ii. Based on the above review, establish new databases and GIS or upgrade and expand from existing systems, integrating the various information obtained from the above inventory, and existing data from established institutions such as IPGRI and other projects. Update regularly and make available the stored information to the general public, farmers, agricultural developers, scientists and other interested parties, in the appropriate format and interpretation.

iii. Provide GIS training to national scientists working in the project.

c. Development of Monitoring Programme

Develop a monitoring programme to detect changes in the distribution and abundance of wild relatives, the use of landraces, and their genetic diversity, in relation to land use changes and other human-induced threats, and to project impacts. A network of extension officers will carry out this activity, with inputs from local communities. Some more specific indicators used for monitoring are described in the habitat management section of component 2. Feed the results of the monitoring programme back in the GIS system for analyses.

Expected Outputs:

- The genetic diversity of the target crops, especially in terms of morphological and ecological attributes, will be identified and documented. Some of these wild relatives and landraces will be used in breeding programmes described under component 2.

- By recognizing the knowledge of land users and by involving them actively in the surveys, support and commitment for appropriate *in-situ* and on-farm conservation of genetically diverse populations of wild relatives and landraces of the target crop species, will be generated. In return, a more diverse spectrum of genotypes will be made available to farmers and pastoralists in the region, hence generating incentives for participation and enhance project sustainability.

- The databases and GIS established will provide genetic resource scientists, conservationists, and agricultural developers and managers, with up-to-date practical information on the genetic resources of target crops in the target areas. Practical information, such as the distribution and growth requirements of specific wild relatives and landraces, can also be extracted from the databases and interpreted for applications by local farmers. Intellectual property right and farmers' right will be protected during this process.

- The monitoring programme developed will allow objective assessment of the long-term benefits and impacts of the agricultural and land use modifications to be introduced at the target areas.

Project Component 2: Community-based Agro-biodiversity Management

31. Globally important agro-biodiversity has been evolving as a part of the Near East landscape over the centuries. The objective of this activity is to maintain sufficient heterogeneity in farming systems and provide the necessary habitats to sustain agro-biodiversity. Technology plays a role in improving sedentary farming and rangelands farming systems, but the role of management is also crucial. Top down approaches have proved to be ineffective in regulating land use and allowing sustainable agro-biodiversity management and conservation within agro-ecosystems. On the contrary, community-based management, will generate widespread efforts in sustainable management of agro-

biodiversity, given substantial efforts for public awareness, transfer of the needed know-how, and partnership building.

32. One main, overreaching issue related to genetic erosion is the breakdown of traditional agricultural systems. Mechanization, increased transportation means, land reclamation (stone removal) and irrigation have expanded agricultural production through area expansion and intensification. For example, the Government of Syria is committed to reclamation of degraded pasture lands through de-stoning and planting of fruit trees. While these activities can be used to the advantage for agro-biodiversity, the current management is working against it, as it removes all rocky field border habitats and maximizes repeated ploughing under orchards. In addition, as cultivation has generally expanded to its limit, grazing pressures from small ruminants are intensifying, seriously threatening pasture biodiversity as a whole.

33. The issue of balancing agricultural production with agro-biodiversity conservation is a challenge, when economic and sustainable production systems have to be maintained. In low rainfall areas, farmers are slow to adopt modern varieties (especially of barley), preferring to use better adapted local landraces, and hence contribute to agro-biodiversity. However, the relatively low production has also led to increasing habitat destruction for agricultural expansion. Creation of alternative livelihoods, incentives or compensations, are needed to reduce the pressure on the land by needy people and to promote the cultivation of the less productive wild relatives and landraces.

Activities:

a. Species management

i. Based on findings from the inventories and data analyses in Component 1, initiate *in situ* conservation to protect wild species of the crop genepool in their original habitats. These habitats may be modified when necessary to ensure sufficient population size and gene flow. Different target species will require different management. For example, populations of wheat, barley and lentil wild "progenitors", *Triticum dicoccoides, Hordeum spontaneum* and *Lens orientalis*, growing on field borders of the respective crops are a special case for *in situ* conservation. These three crops and their "progenitors" develop hybridizing complexes, allowing introgression in both directions. The hybridizing complexes may be enhanced by frequent planting of cultivated species in fields adjacent to wild "progenitor" populations. *In situ* conservation will take place where mutual agreement has been achieved in dialogue with elements of the community (individual land owners or villages).

ii. Based on findings from Component 1, initiate on-farm conservation on selected farms located in specific locations which harbour important target crop populations. The strategy is to encourage farmers to grow landraces and local varieties of the target crops in their fields, especially in buffer

areas, corridors or habitat strips, through awareness building and incentives in the form of alternative livelihood. The latter may include apiculture (Habitat management section b-v), supply of rootstocks (section b-ii) and seeds (v-iv), or technical assistance in soil management (b-vi), water harvest (b-ii) and livestock health care (b-vii). Some of these activities are supported by existing non-GEF projects (Annex 7).

iii. Field gene banks will be established to grow vulnerable crop species for replanting in field margins and improved habitats as native trees or as adapted rootstocks. These field gene banks will be open to farmers and other visitors to promote public awareness.

iv. The wild relatives and landraces, characterized in relation to particular biotic and abiotic stresses, will be utilized in breeding programmes to make use of specific adaptation and thereby maintain genetic diversity within a crop. Farmers will participate in the selection of lines in breeding programmes to ensure that new genotypes are specifically adapted, not only to the ecological conditions, but also to the intended end-use and farmers' preferences. Additional germplasm of the target species will be conserved in *ex-situ* collections in the participating countries/authority and in international gene banks. Such complementary breeding programmes will be funded by non-GEF sources.

b. Habitat management

i. Land use planning of the target areas will be developed to provide buffers, corridors or habitat strips for the target species. Cooperate with the ongoing IFAD (International Fund for Agricultural Development) project in Syria to make use of the stones removed from land reclamation for farming, to provide both water catchment and habitat for crop "progenitors" and wild relatives.

ii. Building of small but simple dams and terraces in agreement with villagers to provide niches for diversified plant production and alternative income generation. Develop community level water harvesting techniques where necessary. These will help protect target tree species as a genetic resource along with their use as rootstocks for grafting newer more productive cultivars, and also provide the necessary habitats for herbaceous species.

iii. Promotion of biodiversity-maintaining agronomic practices (sustainable intensification) such as sowing mixtures of cereal land races in rotation with forage legumes to maintain soil fertility and production in rainfed cropping areas to avoid poor management.

iv. Pasture seed nurseries using local species of pasture legumes will be established in villages to provide sources of locally adapted material for revegetation of degraded common lands.

v. In conjunction with pasture and forest rehabilitation efforts, promote apiculture where ecologically and economically viable. This has proved to be a very effective intervention in Turkish projects, and could become an important means of income diversification and incentive generation for conservation efforts.

vi. Advice and assistance on sustainable grazing management, pasture and range condition monitoring, and animal nutrition and health, will be provided to villagers through extension services and on-site training. The aim is to demonstrate compatible ways to preserve germplasm while maintaining animal production. Some of these activities will be undertaken with non-GEF funding from other ongoing projects (Annex 7).

vii. Training on soil and water resource management techniques and nursery management will be provided to villagers in target areas as tools for habitat and agro-biodiversity conservation. Organization will be focused at the local level, through farmer cooperatives, NGOs and community leader associations, depending on the target areas.

viii. Species and ecotype diversity in the sites subject to improved management will be monitored. Case studies will be made at several sites to measure progress in achieving agro-biodiversity conservation and socio-economic benefits. All costs and returns, and the effect on labour requirements of the improved management will be monitored, and the benefits of the interventions assessed.

Expected Outputs:

- Safeguarded populations of wild "progenitors" of wheat, barley, lentil, and wild relatives of these and other target crops, and some associated plant species within target areas, through *in situ* conservation and habitat management.

- Larger portions of genepools of the target crop landraces conserved on farm, through public awareness and incentives from alternative income and other assistance.

- Improved habitat management including sustainable grazing practices and revegetation of overgrazed and eroded land.

Project Component 3. Social Economic Policy and Property Rights

34. Promising technologies exist for better management of agro-biodiversity, water, soil, land and cropping systems but their adoption has been inhibited by disincentives to rational and sustainable use of these natural resources, both in the settled areas and in the rangelands. Uncertainties over property rights among users of the natural grazing and water catchments, as well as economic distortions, are often the main obstacles against proper land and resource management. Some tribal institutions which once regulated grazing or water rights have been broken down or undermined by government nationalization of land. Some rangelands are being privately appropriated through new settlement and conversion to cropping while many are open access areas where users have neither the incentive to improve productivity or conserve agro-biodiversity.

35. In all four countries/authority, the governments are preoccupied with supporting and improving agricultural production since this region has some of the highest population growth rates in the world and a widening trade gap in food and agricultural products. Of prime concern to the governments is agricultural production. Hence policies which negatively impact on agro-biodiversity conservation tend to be those directed primarily at enhancing agricultural productivity. Although there are limited policies in the four countries/authority targeted at agro-biodiversity conservation, there is no holistic plan (including landuse planning) for its implementation.

36. Most of the target areas are agro-biodiversity rich upland sites and a few are adjacent to rangelands. The rangelands users are increasingly dependent on the target areas for supplementary feed and forage supplies, or for dry-season grazing on crop residues. This is causing significant competition over resources, hence, any policy changes must take into account the spatial and temporal linkages among the production systems, both in and outside the target areas.

37. It is recognized by the Governments involved that changes are needed but they will take time to implement. The strategy is therefore to place a strong emphasis on the communities as land managers, and to modify current government incentives for the benefit of agro-biodiversity conservation. In Syria, for example, the Government buys strategic crops (wheat, barley, cotton, sugar beet) at attractive prices; taxes on agricultural vehicles are lower than for non-agricultural ones; feed concentrates are distributed at cost through farmers cooperatives; the Government controls the price of meat; and there is no tax on agricultural land. Some of these policies may be modified after the demonstration of feasible policy alternatives through the project.

***Activities*:**

a. <u>Agricultural and land use policies</u>

(i) Analyze existing agricultural and land use policies, and legislation related to agro-biodiversity and resource management. Identify ways to modify these policies to remove or reduce negative impacts and promote agro-

biodiversity conservation without jeopardizing agricultural production aims. This activity will be done in tandem with work currently being carried out under the IFAD/AFESD special project on policy and property rights (in Syria, Jordan and Lebanon) and the Dryland Resource Management Project (DRMP). Both of these initiatives also address macro-level agricultural policy analysis.

(ii) Within the target areas, assess grassroots responses to existing policy and legislation. Through participatory dialogues and the activities to be launched as component 2, zones of intervention will be defined for testing policy options which will conserve agro-biodiversity while maintaining economic benefits for the communities. These may include current incentive practices for land clearing, herbicides and pesticides, land ownership and agricultural expansion. This exercise will also identify the outside influences which affect management, social changes and policy implications in the target areas.

(iii) Based on the above assessment and landuse findings from component 1, and working with the Governments and communities, develop the necessary legislative measures and agreements needed for landuse and access to the target areas (or zones of intervention within them). Reform of tenure, usufruct and management systems in the target areas will depend also on incentive policies to be developed in the next section. Through the past two years of project preparation, the four countries/authority have all indicated their willingness to address these issues as an integral part of their involvement in this project.

b. Social and economic measures

(i) Work with the governments/authority to review agricultural economic policies which affect agro-biodiversity conservation directly or indirectly. Initiate policy changes which will provide incentives for agro-biodiversity conservation where necessary. These may relate to credits, interest rates, agricultural pricing, input subsidies for feed, fertilizers and fuel and quantitative restrictions on cropping patterns and inputs, depending on the target areas.

(ii) In tandem with current agricultural development projects which include provision for establishment of credit facilities, loans, development of alternative income earning opportunities, or added value to agricultural products, but may be causing environmental damage and agro-biodiversity loss, analyze their impacts. Work with these and other development projects, develop immediate and direct interventions and remedy against negative measures or disincentives to agro-biodiversity conservation. Develop mechanism to give access of micro-agricultural credit to agro-biodiversity enhancing activities (e.g. terracing, apiculture, nursery plantations) or

products (e.g. landraces, local fruit varieties, locally adapted pasture seeds, organic produce). The focus for many of these activities will initially be based on already on-going micro-credit schemes which are available within the UNDP (Lebanon) and IFAD (Syria, Jordan) programmes (Annex 7).

Expected Outputs:

- Formulation and adoption of national policies which stimulate agro-biodiversity conservation, through an assessment of the most positive interventions and their feasibility for broad-scale extension to other areas. This project component will enable difficult policy changes to take place, based on lessons learnt from the participatory and collaborative approaches tried in the target areas.

- Stakeholder commitment will be generated for the sustainability of the project through intensive public participation, and government incentives such as loans or pricing support for agro-biodiversity enhancing practices and products.

Project Component 4: Institutional and Human Resource Capacity Strengthening

38. Sustainability of the present project and its long-term objectives will rely on the institutional and human resource capacity concerned with agro-biodiversity at the national levels. Long-term national plant genetic resources programmes, complemented by coordinated regional activities, will provide the framework for sustainable agro-biodiversity conservation. However, skilled human resources are lacking in the region. Training needs of the countries/authority range over a number of disciplines and levels and involve both short and long term training. These include specialized training in plant identification of wild relatives and landraces, *in situ* and on-farm conservation, agro-ecosystem ecology, population genetics, and agricultural socio-economics. Administrators, technicians as well as managers in this field require specially adapted in-country training courses. Other related academic and research training will be provided by non-GEF resources (Annex 8). The participation of regional centres e.g ICARDA, IPGRI(WANA)[10], ACSAD and national universities will enhance the process of institutional and capacity building through networking, information dissemination and in-country training.

Activities:

a. Training

i. Organize training courses and research programs especially to train "trainers" in the specific areas related to agro-biodiversity, as requested by each country (Annex 3). These will be at the Ph.D. level, conducted at international centres of excellence e.g. in the Genetic Resources Conservation Program, University of California, USA, or School of

10 International Plant Genetic Resources Institute - West Asia North Africa Network.

Biological Sciences, The University of Birmingham, U.K. Ph.D. research projects will be based in-country and on the target areas wherever possible so that the findings generated can be applied in the target areas subsequently.

ii. Designate agro-biodiversity training centres in the countries/authority concerned, e.g. University of Jordan, American University of Beirut (AUB) in Lebanon and University of Damascus in Syria.

iii. The trainers, in consultation with mentors and administrators will develop agro-biodiversity curricular at non-degree, BSc. and MSc. levels in the designated training centres. On-the-job, in-country training will be provided, together with field training courses, in each of the target areas.

b. Networking

Strengthen the existing linkages among countries in the region, with regional and international institutions (ACSAD, IPGRI, ICARDA), the selected international centres of excellence, other centres, institutes and Universities in the region, and the designated training centres in each country. This can be enhanced by strengthening existing networks such as IPGRI/WANANET and participation in regional seminars, field courses and workshops on agro-biodiversity related issues.

c. Public Awareness

Develop public awareness programs on agro-biodiversity. This must operate at all levels, from ministers to farmers and the general public. Many of the training courses and the widespread extension services developed in the project will play a role in public awareness. Other important channels for public awareness will be through the mass media, publication of appropriate bulletins in Arabic for farmers and students.

Expected Outputs:

- The national institutional capacity of the countries/authority concerned will be strengthened, through the injection of a critical number of "trainers" and newly trained persons with agro-biodiversity conservation and management skills, and networking with established institutes and among themselves.

- Public awareness levels for agro-biodiversity will be raised in the concerned countries/authority and their partners.

RATIONALE FOR GEF FINANCING

39. Lebanon, Jordan and Syria have all ratified the Convention on Biological Diversity.

40. The project is developed closely in line with the GEF Operational Programme for Arid and Semi-Arid Ecosystems[11] of the Biodiversity focal area which emphasizes the "prevention and control of land degradation through development of sustainable use methods for biodiversity conservation..." The Operational Programme also calls for special attention for the "demonstration and application of techniques, tools, and methods to conserve traditional crops and animal species in their original habitats", and "Promotion of sustainable production and use of natural products, such as non-timber forest products, wild relatives of domesticated species, and agro-biodiversity-related products, including the development and implementation of sustainable harvesting and marketing regimes." The GEF Scope and Preliminary Operational Strategy for Land Degradation[11] highlights "*In-situ* conservation of genetic varieties of plants (grasses, shrubs and trees), insects, birds, worms, and micro-organisms (e.g. roo. bacteria like rhizobium, mycorzhia and other useful fungi) by improving management practices, institutional arrangements, policies and incentives, and community participation", as one of the GEF-funded activities in the interface between prevention and control of land degradation and biodiversity conservation and sustainable use. The present project targeting at the genetic diversity of ten major crops in the Fertile Crescent, with an integrated approach to grazing and farming management, falls well within this interface.

41. The project responds to the Convention on Biological Diversity and its concern that (i) biological diversity is being significantly reduced by certain human activities, (ii) the fundamental requirement for conservation of biological diversity is the *in-situ* conservation of ecosystems and natural habitats, and (iii) the traditional dependence of local communities on biological resources are recognized. The project also addresses the concern of Article 20.7 of the CBD providing for particular consideration of the countries/authority with arid and semi-arid areas and experiencing desertification and drought.

42. The project, in accordance with the policy and strategy regarding access to financial resources, will build cooperation at the sub-regional, regional and international levels and promote utilization of local and regional expertise, and addresses the following programme priorities as expressed by COP94:

(c) Strengthening conservation, management and sustainable use of ecosystems and habitats in accordance with Article 7 of the CBD, particularly with regard to species and communities of wild relatives of domesticated and cultivated species and species which are of agricultural value (Annex I of CBD);

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11 Operational Strategy of the Global Environment Facility, 1996. GEF, Washington, D.C. USA

11 Scope and Preliminary Operational Strategy for Land Degradation. GEF/C.3/8. Approved by the Executive Council, 22-24 February 1995.

(d) Identification and monitoring of wild and domestic biodiversity components and implementation of measures for their conservation and sustainable use;

(e) capacity building, including human resource development and institutional strengthening;

(j) strengthening the involvement of local people in the conservation of biological diversity and the sustainable use of its components; and

(k) promoting the conservation and sustainable use of biological diversity in environmentally vulnerable arid and semi-arid areas.

43. The proposed participatory research with local communities will contribute to the identification and development of economically and socially appropriate incentive or compensatory measures for local communities participating in biological conservation, according to Article 11 of the CBD.

SUSTAINABILITY AND PARTICIPATION

44. To achieve the overall goal of this project will require a long-term sustained programme of community participation, training and institutional development. This project is envisaged as a starting point that will provide the basis for a sustained programme of integrated measures for the conservation of agro-biodiversity within priority ecosystems. The project will contribute to this sustainability through its emphasis on regionality, institutional strengthening, capacity building, and community (land user) participation. A great deal of government and stakeholder commitment have already been shown during the development of the present proposal.

Government/Authority Commitment

45. All four countries/authority have shown strong willingness and priority for environment, agro-biodiversity conservation and community development during the development of the present proposal through the PDF process. Each country/authority's representative GEF operational focal point has confirmed their support to and participation in the present project.

Government/Authority Financial commitment:

46. For each selected target area in each country, the government/authority has agreed to identify staff with appropriate expertise to form the interdisciplinary units which would work at the target area. The specific disciplines needed to make up the units vary according to the nature of the problem and the prominent species in the target areas. The governments/authority have ranked their contributions to the project as a high priority.

Their contributions include costs in staff time, both administrative and scientific, agricultural equipment as well as office and laboratory equipment, telecommunications, utilities and premises.

47. Participation of a regional organization such as ACSAD will ensure that the links to other regional initiatives, already ongoing will be maintained. The National Plant Genetic Resources Programmes are already linked through regional projects/programmes, some coordinated by ICARDA. The Project will broaden these linkages, to link these national programmes with other national institutes/organizations involved in agro-biodiversity conservation, both within and among countries/authority. Participation of ICARDA and IPGRI (through IPGRI-WANA), will provide the means for institutional strengthening of national institutions by ensuring strong international linkages with other institutions and relevant technologies/research, and providing the forum on which exchange in national experience and technical advice will be promoted.

48. The present project is designed to be implemented in parallel with a large number of related ongoing, national and regional projects, many of which are development oriented and supported by foreign agencies (Annex 7). The institutional capacity built and strengthened by the present project and these other ongoing activities, as well as the social economic measures initiated by this project, will enable the concerned governments and institutions to pick up the recurrent costs, after the GEF project is concluded.

Stakeholder Commitment:

49. Sustainability is directly linked with the development of effective mechanisms for local participation, and the explicit consideration of the local communities' livelihoods, within the project. The project's concepts, objectives and activities stress the importance of the involvement of local communities as fundamental to integrated biodiversity conservation in agriculturally used areas. By including land users as managers responsible for biodiversity conservation, in a manner compatible with the agricultural production that is their livelihoods, sustainability is ensured. Furthermore, returning the results from the use of that biodiversity to farmers, by involving them in germplasm enhancement and breeding programmes utilizing their local biological resources, will ensure a long-term interest by farmers in conserving the sources of genetic diversity.

50. This project proposal has resulted from extensive consultations and workshops at the national and regional levels involving government/authority organizations, NGOs and regional and international organizations and experts, and has been officially endorsed by the representative Ministry of each country. The initial project concept paper was circulated widely to national programmes run by national scientists and managers, regional institutions in the Near East, IPGRI, ACSAD and research institutions/universities in donor countries/authority. A consultation and project planning meeting was held in Amman in June 1994. Following discussions with UNDP (Damascus) a full UNDP project document was developed which provided the basis for a follow-up workshop in Amman in February 1995, with presentations and detailed discussion on specific components/topics of the project which have contributed to the development of the current Project Brief. The

proceedings of this workshop are in considerable demand and have just been reprinted. PDF funds provided for collection of supporting information and further consultations necessary for preparation of this Project Brief.

51. Jordan, Lebanon and the Palestinian Authority now have several NGO's participating in solving various environment problems. These NGOs will be actively involved in the implementation of this project.

LESSONS LEARNED AND TECHNICAL REVIEW

52. The external reviewer rated the project "high priority and with great relevance to the countries involved and even more so to the rest of the world". Covering ten target crops and eight target areas, the project promises to yield much important information and operational experience and serve as a "**prototype for other projects in the centres of origin of crops, or in places of great biodiversity, and where significant changes in rural life and agricultural production are taking place.**" The reviewer has great confidence in the executing and other participating agencies (ICARDA, IPGRI, ACSAD) with specialized expertise in plant genetic resources research and management. The ongoing partnerships among these agencies and their substantial experience in the region are described crucial to the success of such a complex project involving many actions by many actors. The reviewer emphasized repeatedly the weak scientific knowledge base for *in situ* conservation which must be overcome, and that the present project will help greatly in improving this knowledge base and provide experience in both *in situ* and on farm conservation in non-reserve settings, alongside agricultural lands. Furthermore, by involving land users as primary participants, the project will become a prototype for participatory management of genetic resources.

PROJECT FINANCING AND BUDGET

53. The costs of the existing complementary activities, together with the incremental costs of US$ 18,417,000 from GEF and non-GEF sources, amount to US$ 37,722,000. Details of the incremental costs involved in each project component are listed in the indicative budget. Of the incremental component, US$ 8,124,000 is being requested from the GEF to achieve global biodiversity benefits. The amount requested from GEF will support activities in Lebanon, Jordan, the Palestinian Authority and Syria, as well as regional technical coordination. Government contributions to the project amount to US$ 2,068,000 as in-kind contributions of national programme personnel and supporting facilities including premises, agricultural, laboratory and office equipment. Contributions of ICARDA and other participating agencies represent the dollar values of contributions of personnel, facilities and actual project funding.

54. The project will be supported by ICARDA's core research programme and the complementary activities in other regional projects implemented by ICARDA, IPGRI and ACSAD, as well as other research and development projects/programs undertaken in the participating countries/authority with support from the governments/authority and/or foreign

funds (see Annex 7). In addition, co-financing is also being sought, in collaboration with advanced research institutions, for specific complementary research activities related to the project, such as the documentation, characterization and evaluation of genetic diversity and *ex-situ* collections (including the application of biotechnology techniques), and the utilization of genetic diversity in germplasm enhancement.

INDICATIVE BUDGET

Component	Staff Cost	Subcontract	Equipment	Training	Misc	Total
1 Agro-biodiversity & Social Economic Inventory & Monitoring						
1.1 Surveys	0	80	10	60	60	210
1.2 GIS	225	80	160	160	100	725
1.3 Monitoring	225	60	10	80	60	435
GEF Contribution	**450**	**220**	**180**	**300**	**220**	**1,370**
Non-GEF						540
Sum						1,910
2. Community based Agro-biodiversity Management						
2.1 Species						
2.1.1 *In-situ*	425	60	100	125	60	770
2.1.2 On-Farm	225	120	60	120	160	685
2.2 Habitat	425	60	90	125	60	760
GEF Contribution	**1,075**	**240**	**250**	**370**	**280**	**2,215**
Non-GEF						6,985
Sum						9,200
3 Social Economic Policy & Property						
3.1 Agricultural & Landuse	425	40	20	125	80	690
3.2 Social & Economic	425	40	85	90	80	720
GEF Contribution	**850**	**80**	**105**	**215**	**160**	**1,410**
Non-GEF						1,335
Sum						2,625
4. Institutional Strengthening						
4.1 Training	0	120	40	950	50	1,160
4.2 Public Awareness	0	50	20	100	30	200
4.3 Networking	0	40	65	80	50	235
GEF Contribution	**0**	**210**	**125**	**1,130**	**130**	**1,595**
Non-GEF						1,150
Sum						2,745
Project Coordination						
Regional Coordinator	425	0	10	0	0	435
Four National Coordinators	360	0	0	0	0	360
GEF Contribution	**785**	**0**	**10**	**0**	**0**	**795**
Non-GEF						283
Sum						1,078
Project Support Services	**316**	**75**	**67**	**201**	**79**	**739**
Total GEF Contribution	**3,476**	**825**	**737**	**2,216**	**869**	**8,124**
Total Non-GEF:						
Governments						2,068
ICARDA, IPGRI, ACSAD						6,650
UNDP						1,575
Total non-GEF contribution						10,293
GRAND TOTAL						18,417

INCREMENTAL COSTS

55. Please see Annex 1 for full Incremental Cost analysis in accordance with GEF formats.

ISSUES, ACTIONS AND RISKS

56. The success of the project depends on the full participation of local communities of land users, which is very different to the traditional approach to agricultural development in the participating countries/authority. The development of appropriate procedures and methodologies for achieving this is likely to be a learning experience for all concerned. Elucidation of land users' production objectives, the factors influencing and constraining production and farm resource management decisions, and the rules or patterns in social behaviour governing the utilization of common resources requires expertise particularly in the social sciences that are not usually strongly represented in national programmes. Giving priority to training nationals in these areas will enhance public participation throughout the project period and beyond. In addition, Lebanon, in particular, has initiated a number of projects that involve local participation (see Annexes 5 and 7) and the project will benefit from their experiences.

57. A second issue with which the project will be dealing is to ensure to build the trust and maintain communication lists of the local farming communities. Amongst many of the world's farming communities there is often a lack of trust in central authorities and government policies. These prevailing attitudes are also likely to meet the present project in some of the farming communities. The project will therefore have to work directly with the participating stakeholder, with strong extension and outreach components, in order to ensure that these potential obstacles can be overcome so that on-going dialogue is maintained.

58. A third issue of relevance is the necessity that the project leverages government/authority reform with respect to securing in-situ agro-biodiversity conservation. Through the preparation of the present project, the authorities in question have already signified their willingness to institute reforms in this area, based on the lessons learnt in the selected target areas. However, as with any reform process, it is already clear that this will involve a number of competing interests, and the project will therefore have to ensure a transparent and participatory process as far as the various governmental authorities are concerned and further ensure an active dialogue on the lessons learnt from the activities of the target sites so that broader policy reform can be proposed, initially for the target areas, but eventually for wider adoption in the countries/authority.

INSTITUTIONAL FRAMEWORK AND PROJECT IMPLEMENTATION

59. The project will be implemented by a consortium of government/authority agencies and non-governmental organizations, regional organizations, and international agricultural research centres operating in the region (see Annex 5), working in close collaboration with

local representative groups and communities. The project will be implemented over five years.

60. As the Executing Agency, ICARDA, in addition to its mandate activities, will be responsible for coordination of the Project and administration of funds. In consultation with the participating countries/authority, ICARDA will recruit a Regional Project Coordinator who will be responsible for daily project coordination and administration, project monitoring, operational management and technical and financial reporting. The Project Coordinator will be located at ICARDA's Headquarters to take advantage of its regional and international linkages and facilities for administrative and logistical support

61. National authorities will designate one representative in each country as the National Coordinator of the institutions participating in the Project at the designated sites. These National Coordinators will coordinate on-site activities to be carried out by the various national institutions and NGOs as well as forming the linkages with the regional activities.

62. Coherence across activities and partners will be achieved through:

- A Steering Committee, comprised of the National Coordinators, the Regional Project Coordinator, representatives of other participating agencies (IPGRI, ACSAD), UNDP and donor representatives. The Steering Committee will meet at least once a year, at a time to be agreed by the members. The Committee will finalize and approve the detailed work and financial plans for the coming year presented at the annual regional coordination meeting (see below).

- Regional Technical Coordination and Planning Meetings, involving concerned scientists from all participating organisations, will be held prior to meetings of the Steering Committee. Results of the previous years work, and workplans and budgets for the next year's work, will be presented and discussed. To minimize coordination costs, and to ensure integration of the project with other complementary activities, where possible the technical and Steering Committee meetings would coincide with the regular annual regional coordination meetings of ICARDA.

List of Annexes, Tables and Figures

Annexes

Tables

Figures

* Materials available upon requests.

ANNEX 1

INCREMENTAL COST ANALYSIS

Broad Development Goals

1. All four countries/authority, Jordan, Lebanon, the Palestinian Authority and Syria, have demonstrated increasing commitment to biodiversity. Conservation of biodiversity through protected areas has begun in Jordan, Lebanon and Syria. In the case of Jordan, range reserves were first established as early as 1945. In the Palestinian Authority, military zones and other delimited areas have in effect been protected and active management is currently being sought. All countries/territory have each established a Biodiversity Committee under their respective ministries and institutions, and Jordan, Lebanon and Syria have all ratified the Biodiversity Convention. The Biodiversity Country Studies in the three countries are at their final stage of completion. The findings in these country studies will provide significant guidance to official policies as well as projects related to biodiversity and environment. In the Palestinian Authority, Environmental Profiles have been prepared for Gaza and different areas of the West Bank and a Biodiversity Committee has been established.

2. In terms of the conservation and management of agrobiodiversity and plant genetic resources, the four countries/authority are in different stages of development but the three countries all expressed keen interest and commitment in their respective National Reports on plant genetic resources submitted for the Global Plan of Action for the Conservation and Sustainable Utilisation of PGR for Food and Agriculture (1996)[1]. Syria may be regarded as the most advanced, partly due to the longterm presence of ICARDA and IPGRI. There is good progress from *ex-situ* conservation of a few major crops to increasing accessions and field gene banks of larger variety of species, and more and more trial activities for *in-situ* and on-farm conservation. There is not yet adequate facility for *ex-situ* conservation in Jordan, Lebanon nor the Palestinian Authority. Lebanon has some temporary collections only and the Palestinian Authority has none. However, Jordan has a seed centre for forest species and has recently established a genetic resource unit at its National Centre for Agricultural Research and Technology Transfer (NCARTT). It will soon build up its own national gene banks, with assistance from the IPGRI/WANA office. No *in-situ* conservation for plant genetic resources *per se* is in place yet.

3. In all four countries/authority, agriculture is an important sector of the economy, both in terms of national production and rural livelihoods. All four countries/authority are increasingly aware of the threat to long-term agricultural productivity, due to the

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[1]FAO, *in prep.* The Global Plan of Action for the Conservation and Sustainable Utilisation of Plant Genetic Resources for Food and Agriculture. International Technical Conference on Plant Genetic Resources, Leipzig, Germany, 17-23 June 1996.

mismanagement and resulting degradation of the natural resource base: land, water and natural vegetation. They are also aware of the fact that sustainable development through stable agriculture production will depend largely on the conservation of plant genetic resources.

4. To be effective, any strategy for the conservation of natural resources and biodiversity must be directed towards, and implemented within, national goals of sustainable agricultural production. Agrobiodiversity conservation and sustainable use in the Fertile Cresent does not merely satisfy national priority, but will also generate significant global benefits, for it is here that many of the world's major crops originated and are still present as wild relatives and landraces (local varieties), carrying some of the world's most diverse plant genetic resources.

Baseline

5. Agrobiodiversity and plant genetic resources of the world are eroding fast; the main causes being replacement by modern cultivars, land clearing and habitat destruction by expanding and heavily mechanized agriculture, overgrazing, deforestation, and loss of traditional knowledge and management. The authorities of the four participating countries/authority aim to curb natural resource degradation through sustainable management and conservation of natural resources within productive agricultural systems. They are aware that the key to food security and sustainable agricultural production are the biological resources of agriculturally important species, and their associated insects and micro-organisms, in providing valuable sources of resistance to biotic and abiotic stresses in producing higher yielding, disease-resistant and environmentally adapted plant varieties. This requires continuous and reliable access to genetic resources, especially landraces and wild relatives of plant species.

6. Under the baseline, action for agrobiodiversity would be limited to collection, characterization, evaluation and *ex-situ* conservation of genetic resources. Comprehensive information and understanding about the status and dynamic interactions of agrobiodiversity in the different ecosystems and agro-ecosystems of the Fertile Crescent is lacking. At ICARDA[2] and IPGRI-WANA[3], the genetic resources of some agriculturally important species have been characterized in some detail with the aim to assist developing countries/authority in the region to improve their agricultural practices and yield while maintaining their plant genetic base. For many other species however, information is virtually non-existent. Germplasm material have to be collected and characterized in terms of the diversity of its responses to environmental factors such as cold, heat and drought stresses, resistances to disease pathogens, insect pests, as well as potential to contribute to more efficient yields. This task has begun, and substantial germplasm banks have been created, but it is far from complete.

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[2]International Center for Agricultural Research in the Dry Areas.

[3]International Plant Genetic Resources Institute - West Asia and North Africa Program.

7. The countries/authority of the Fertile Crescent and West Asia as a whole, have largely depended on these and other international institutions, though they are now allocating resources to develop or enhance their own collections. However, *ex-situ* conservation is only suitable for very small and genetically restricted populations of certain species which are unlikely to be viable in the wild. *Ex-situ* conservation has the limitation that only a small proportion of existing genetic resources may be sampled. It is impossible to maintain in germplasm banks a representative sample for large and varied populations, whose genetic make-up is constantly evolving in response to environmental changes. Such naturally occurring and evolving diversity can only be maintained *in-situ* in their natural environments or on-farm in the case of landraces and local varieties.

8. Another form of biodiversity conservation under the baseline would be protection of species within designated national parks and nature reserves which do not consider agrobiodiversity and the plant genetic resources it contains. Furthermore, it is not feasible to establish protected areas in productive agricultural areas of these developing countries/authority where rich agrobiodiversity is concentrated, because this would conflict with national goals for agricultural production. Conservation of agrobiodiversity in these areas must be based on *in-situ* and on-farm conservation and sustainable use of these biological assets. This is an area which, globally, has received much less attention than *ex-situ* conservation or protected areas management, and for which few guidelines exist. To conclude, under the current baseline, the genetic erosion of globally significant agrobiodiversity would not be tackled.

9. There is currently no *in-situ* conservation activity relating to the target species in any of the selected target areas. Wild relatives and landraces of wheat, barley and lentil and forage and pasture legume species were collected in the two Jordanian sites, in Baalbek in Lebanon and Sweida area in Syria and are now conserved in *ex-situ* collections held at ICARDA. Syrian and Jordanian germplasm is also maintained *ex-situ* at the respective national gene banks. None of the fruit tree species has even been collected in the target areas, therefore no *ex-situ* back-up exists to support the planned *in-situ* conservation activities.

Global Environmental Objective

10. The global environmental objective of this project is towards conservation, enhancement and sustainable use of the biodiversity of globally agriculturally important species, and by so doing, maximizes global food security. The strategy is to focus on the development of sustainable agricultural management strategies in the agro-ecosystems of the Fertile Crescent, the center of origin for many global agricultural species whose genetically diverse wild relatives and landraces are under threat.

GEF Alternative

11. Develop new, transferable, integrated approaches for the conservation and sustainable use of agrobiodiversity within agriculturally productive areas by addressing the proximate and intermediate causes of biodiversity erosion in the Fertile Crescent, and testing alternative

agricultural and resource management practices through community-based, participatory actions in selected target areas in the countries/authority.

12. Through the GEF alternative, the shortcomings of national actions noted in the baseline will be overcome. In particular, the project will (i) inventorize and monitor the genetic diversity of target species of global signicance in the target areas, (ii) document and map the current land use and management practices affecting agrobiodiversity, (iii) evaluate Government/Authority policies with respect to agrobiodiversity conservation, (iv) establish a GIS as a tool for analysing the above information and developing plans and guidelines to enhance agrobiodiversity on the national and regonal scales, (iv) develop, facilitate and test community-driven measures for the conservation and sustainable use of agrobiodiversity; (v) promote local and national social and economic measures (policies, legislation, and public institutions) in support of agrobiodiversity conservation; and (vi) ensure sustainability of the program by strengthening national capacities in management, research and awareness, through participation, training and regional networking.

13. With the proposed GEF project focusing on Jordan, Lebanon, the Palestinian Authority and Syria, and with the existing GEF plant genetic diversity project in Turkey, the Fertile Crescent will be managed as a whole for the benefit of the globe, by securing global agrobiodiversity and food production.

System Boundary

14. The geographical system boundary of this project is the modern territories of the Fertile Crescent: Jordan, Lebanon, the Palestinian Authority and Syria. Specifically, the project refers to the conservation and sustainable use of agrobiodiversity of selected target species within productive agricultural systems in these countries/authority. Since the target areas of the project are representative of the agro-ecosystems of the whole region, and because the approaches taken in this regional project aim for replicability, the impacts of the project will be seen both within and beyond the boundaries of these target areas and the participating countries/authority. To some degrees, other biodiversity (non-target plant species and associated fauna) within the agro-ecosystems concerned also benefit from the project as a result of improved habitat and resource management. With a very strong institutional and capacity building component, a highly community-driven, participatory approach, and considering the time it may take for damaged ecosystems to recover, the momentum and wide-ranging impacts of the project will go well beyond the project period, although the present systems boundary in terms of time horizon have been set to the five year project intervention.

Incidental Domestic Benefits

15. The alternative will provide the same domestic benefits as the baseline: improved agricultural production. Additional domestic benefits from the alternative will include (i) the reduction of risk in productivity in these highly variable environments, by utilizing the specific adaptation of landrace, wild relatives and other biodiversity assets in the farming systems; (ii) better managed resources, especially soil and water, for present and future

agricultural develoment, (iii) strengthened human resources to cope with agricultural and environmental challenges, and (iv) greater public awareness of environmental and biodiversity concerns in general. These incidental domestic benefits will accrue over a longer period of [illegible] and can not be monetized within the time frame of the present project. The potential additional benefits from alternative income initiated by the project will be small and only noticeable at the village level. No immediate national benefits in monetary terms is expected.

7. Costs

The GEF contribution is US$ 7.99 million allocated as follows:

	$ (million)
Agrobiodiversity and Socio-economic Inventory and Monitoring	1.370
Community-based Agrobiodiversity Management	2.215
Social Economic Policy and Property Rights	1.410
Institutional and Human Resource Capacity Strengthening	1.595
National and Regional Coordinators	0.795
Project Support Services	0.739
TOTAL	**8.124**

8. Incremental Cost Matrix. See below.

9. Agreement

The technical contents of the project, including the incremental cost analysis have been negotiated with the Governments of Jordan, Lebanon and Syria as well as with representatives of the Palestinian Authority.

Incremental Cost Calculation
Incremental Cost Matrix

Project Component	Cost Category	Cost ($million)	Domestic Benefits	Global Environmental Benefits
Agrobiodiversity & Social Economic Inventory and Monitoring	Baseline	$5.575	Storage, characterization and evaluation of *ex-situ* germplasm collections to provide knowledge on special characteristics and quality of tested crops.	*Ex situ* conservation of the genetic diversity of wild relatives and landraces of globally important agricultural species.
	Alternative	$7.485	Data-gathering & analyses of agrobiodiversity in relation to agricultural & land use practices. This provide **baseline for monitoring & planning framework to optimize agricultural production.**	**Knowledge base essential for *in-situ* and on-farm conservation** of the genetic diversity of target crop species of global significance.
	Increment (GEF)	$1.910 ($1.370)		
Community-based Agrobiodiversity Management	Baseline	$8.890	Increased agricultural productivity through the introduction of improved agricultural technology & rational land use systems.	Supply of globally important agricultural crops.
	Alternative	$18.090	**Sustainable livelihood and reduced production risk** by using locally adapted landraces, local varieties & wild relatives saved by **improved, community-based species and habitat management.**	**Conservation & longterm availability of dynamic and evolving genetic resources of globally significant agricultural species**, for utilization now and in the future by the global community.
	Increment (GEF)	$ 9.200 ($2.215)		
Social and Economic Policy Measures	Baseline	$2.125	National agricultural policies, strategies and instruments that support sustainable agricultural production.	Tested models and policy recommendations transferable to other dry areas for sustainable agricultural production.
	Alternative	$4.870	Integration of appropriate, additional **social & economic policy measures in support of agrobiodiversity conservation *in-situ* and on farm**, by bringing about financial sustainability.	**Transferable socio-economic policy measures for *in situ* and on farm conservation of globally significant species.**
	Increment (GEF)	$2.745 ($1.410)		

Project Component	Cost Category	Cost ($million)	Domestic Benefits	Global Environmental Benefits
Institutional and Human Resource Capacity Strengthening	Baseline	$2.715	National/regional capacities in agricultural resource management, land use and *ex situ* agro-biodiversity conservation.	Transferable knowledge and skills in agricultural resource management, land use and *ex situ* agro-biodiversity conservation.
	Alternative	$5.460	In addition, **enhanced national/regional capacities in community-based, participatory approaches to *in-situ* and on-farm agrobiodiversity conservation, research and development,** through training awareness promotion and networking.	**Strengthened institutional and human capacity for conservation of globally significant agrobiodiversity; Transferable expertise, knowledge and increased awareness for *in- situ* and on-farm conservation and sustainable use of agrobiodiversity.**
	Increment (GEF)	**$2.745 ($1.595)**		
Regional and National Coordination	Baseline	0		
	Alternative	$1.078		Effective programme management to achieve global objectives of project.
	Increment (GEF)	($0.795)		
Project support services	(GEF)	($0.739)		
Totals	Baseline	$19.305		
	Alternative	$37.722		
	Increment (GEF)	**$18.417 ($8.124)**		

ANNEX 2

GOVERNMENT REQUESTS

بسم الله الرحمن الرحيم

THE HASHEMITE KINGDOM OF JORDAN
MINISTRY OF PLANNING
AMMAN

المملكة الأردنية الهاشمية
وزارة التخطيط
عمان

Ref. 5/3/4/3669
Date 25/6/1996

الرقم
التاريخ
الموافق

Ms. Inger Andersen
Regional GEF Coordinator
RBAS

Subject: Government request for Regional project RAB/95/G42 - "Conservation, Management and Sustainable Use of Dryland Biodiversity within Priority Eco-system in the Near East".

In view of the importance given by the Government of Jordan to the conservation and sustainable use of agro-biodiversity resources, and further in view of the Government's commitment to the conservation of biodiversity, signified by the ratification of the Biodiversity Convention, the Government of Jordan is requesting GEF support for the regional project entitled: "Conservation, Management and Sustainable Use of Dryland Biodiversity within Priority Eco-system in the Near East" which has been elaborated during the past two years with financial support from ICARDA, IPGRI and the GEF.

This project is fully in line with the GEF Operational Strategy (Arid and Semi Arid Eco-System) which states that: "Special attention will be given to the demonstration and application of techniques, tools and methods to conserve traditional crops in their original habitats".

I would therefore appreciate GEF support for the above mentioned proposal.

Sincerely yours,

Rima Khalaf Hunaidi
Minister of Planning

Mr Andersen

7 96

RAB/95/G42.

REPUBLIQUE LIBANAISE
MINISTERE DE L'ENVIRONNEMENT

LE MINISTRE

1201/3

Mr. Ross Mountain
Resident Representative
UNDP
Fax No.: 603 460/1

Beirut, July 4th 1996

Subject: **Conservation, Management and Sustainable Use of Dryland Biodiversity within Priority Eco-systems in the Near East**

Dear Mr. Mountain

With reference to the above subject, I am pleased to know that GEF is finalizing a regional project proposal. In this respect I would like to note that in view of the importance given by the Government of lebanon to the use of agro-biodiversity resources and in view of the Government's commitment to the conservation of biodiversity, signified by the ratification of the Biodiversity Convention, the Government of Lebanon is seeking and would appreciate GEF support for the regional project entitled: "Conservation, Management and Sustainable Use of Dryland Biodiversity within Priority Eco-systems in the Near East" which has been elaborated during the past two years.

Sincerely Yours,

Pierre Pharaon
Minister of Environment

cc: Ms. Inger Anderson - Regional GEF Coordinator - RBAS

cc: I Anderson
11 1 96
RAB/95/G42

SYRIAN ARAB REPUBLIC
GENERAL COMMISSION FOR
ENVIRONMENTAL AFFAIRS
G. C. E. A.

الجمهورية العربية السورية
الهيئة العامة لشؤون البيئة

الرقم .....

١٩٩٦/٧/١٨

السيد الممثل المقيم لبرنامج الأمم المتحدة الانمائي

نظرا لاهتمام الجمهورية العربية السورية بحماية التنوع الحيوي و الاستخدام المستديم للموارد الحيوية، و بما أن سورية قد صادقت على اتفاقية التنوع الحيوي بتاريخ ١٩٩٦/١/٤ يرجى الطلب من مرفق البيئة العالمي (GEF) دعم المشروع الاقليمي RAB/95/G42 – الحماية و الادارة و الاستخدام المستديم للتنوع الحيوي النباتي في المناطق الجافة.

شاكرين حسن تعاونكم

الدولة لشؤون البيئة
الصيد المنجد

Unofficial Translation

SYRIAN ARAB REPUBLIC
GENERAL COMMISSION FOR
ENVIRONMENTAL AFFAIRS
G.C.E.A.

---

18 July 1996

To the Resident Representative of the United Nations Development Programme

Considering the importance that the Syrian Arab Republic gives to the protection of biodiversity and the sustainable usage of biotic resources, and since Syria ratified the Convention on Biodiversity on January 4th of 1996, we hereby request from the Global Environment Facility (GEF) the financing of the regional project - RAB/95/G42 "Conservation and Sustainable Use of Dryland Agro-biodiversity of the Fertile Crescent."

Thank you for your assistance.

Minister of State for Environmental Affairs

(signed and sealed)
Abd Al-Hamid Al Menajed

ANNEX 3

TECHNICAL REVIEW

1. Overall Impression

This is an outstanding proposal and I congratulate the team that prepared it. The project paper is well-written, well argued, and clear, a pleasure to read.

The global importance of the endemic plants of the Fertile Crescent can not be overemphasized. This is the home of wheat -- arguably the most important single crop in the world -- barley, lentil, and many other crops, including fruits and nuts, and many pasture crops. The landraces and wild relatives of these plants comprise a major global resource, and it would be hard to find any place, anywhere, more important to the welfare of humankind and its food supplies than the Fertile Crescent. The countries/territories involved that comprise the western end of the Crescent can serve as a good base for this project.

The mix of institutions involved is impressive. ACSAD, ICARDA and IPGRI have long experience in research and development in plant genetic resource work in the region, as well as in natural resource management, and have close working relationships with most of the proposed government agencies. The project is oriented to building baseline information and knowledge based on research and community actions in a participatory context. Community participation in the project appears well reasoned and developed. The project will build on the efforts of other projects, and the additional funds leveraged by this project are impressive in their amounts and diversity.

2. Relevance and Priority

This is a high priority project with great relevance to the countries involved, but even more so to the rest of the world. The Fertile Crescent is a center of diversity for wheat, barley, lentils; important pasture legumes including vetch, medics, and clovers; Allium; and trees crops such as olive, apricot, cherry, plum, almond, pear, pistachio, and fig. This project would be relevant and of high priority if just one of these crops was involved.

Covering, as it does, ten target crops and eight target research locations, it promises to yield much important information and operational experience and serve as a prototype for other projects in the centers of origin of crops, or in places of great biodiversity, and where significant changes in rural life and agricultural production are taking place.

3. Background and Justification

The countries involved are experiencing great changes in agriculture and land use, including increasing pressures on both cultivated and non-cultivated lands, soil erosion, and threats to the small amounts of forest still standing. Existing landraces of crops as well as their wild relatives are under threat. The project proposal spells out these threats well, and builds a strong case, inter alia, for: research, building an information base, achieving reliable and replicable on-farm conservation

and in situ conservation in mostly-agricultural areas, employing community action to achieve agro-diversity conservation. Target areas have been identified on the basis of carefully-selected criteria, resulting in what appears to be a diverse set of environments and habitats.

4. Scientific and Technical Soundness

This is a sound proposal, as would be expected from two international agricultural research centers, a regional research and development center, and the countries involved. This project should help a great deal to build a scientific knowledge base regarding both on-farm conservation and in situ conservation in a non-reserve setting, each of which suffers from a lack of reliable information, but still appear to be accepted rather uncritically as major conservation strategies. Building an information base on the ten target crops is a worthy objective. I also like the idea of building the project around target areas within the four countries/territories. The project paper reflects a sound system of planning the technical and scientific work envisioned, and in building a community of cooperators for what is envisioned as a regional participatory effort.

5. Objectives

These include: (1) building an information base on ten target crops, (2) an approach for conservation and sustainable use of agro-diversity within agriculturally productive ecosystems, (3) national environmental, land use, social and economic policy measures that affect agro-diversity, and (4) strengthened national capacity to achieve sustainable agro-biodiversity in the countries and region.

These objectives should be attainable, given the strength and experience of some of the major participants in this project. ICARDA, IPGRI and ACSAD bring considerable scientific and technical talents to the project, as do some of the other participants. Previous successful partnerships between these institutions give me confidence that the objectives can be achieved, and the fact that the main institutions have had previous experience in working together is a strength. This is important, since the project is quite complex and requires many actions by many actors, and confidence between parties will be crucial in achieving success.

6. Activities

Key elements of this project are: "involvement of land users as primary participants" in agro-diversity management, and innovative approaches to in situ and on-farm conservation. All are crucial. Finding ways to involve land users can be very difficult, especially as regards agreed-upon conservation measures for on-farm conservation in cultivated lands, as well as in situ conservation in non-cultivated lands near cultivated fields. Not much is known about how to carry out these approaches to conservation; however, I believe this group of institutions, especially ICARDA and IPGRI, working with the countries and institutions involved, presents a special opportunity to study and understand these approaches in a participatory, community-based setting. The difficulty of doing this should not be underestimated, but I consider this project the best one I have seen to help resolve at least some of the major questions and problems concerned.

The scientific knowledge base for in situ conservation lags behind that of ex situ conservation, which itself suffers from a weaker scientific knowledge base than is desired. Unless the knowledge

problem for in situ conservation is overcome, the present large investments being made in in situ conservation could face in the future difficult times. This project could help greatly in improving the knowledge base and provide experience in (1) managing on-farm conservation, and (2) managing in situ conservation in non-reserve settings, alongside lands where intensive or extensive agriculture is practiced.

7. Participatory Aspects

The project is organized to be participatory, involving scientists from international and national organizations, local leaders, and land users including farmers and herders. It is hard to see how it could be made more participatory.

8. Global Benefits

Potential global benefits are many: (1) conservation and improvement of important world crops including cereals, grain legumes, forage and pasture plants, and fruit and nut trees; (2) a prototype project for improving the knowledge base for both on-farm and in situ conservation; (3) a prototype project for participatory management of genetic resources; (4) marshaling funds from many different sources, private and public.

9. GEF Strategies and Plans

This project fits very closely GEF strategies and plans, namely: (1) "to anticipate, prevent and attack the causes of significant reduction or loss of biological diversity at source"; (2) "integration of the conservation and sustainable use of biodiversity within national, and, . . . subregional and regional sustainable development plans and policies"; (3) involvement of "the cross-sectoral area of land degradation", including, "drylands are the center of origin of many important food crops (e.g., wild wheat, lentil, barley, olive and pistachio", "protect biodiversity and promote sustainable use in arid, semi-arid and mediterranean-type ecosystems", "prevent deforestation and promote sustainable use or sustainable management of forests or forested areas . . .", (4) three categories of biodiversity operations, "operation programs for long-term protection" and "enabling activities", "use of local and regional expertise". The project paper clearly identifies these GEF strategies and plans, and does it very well, all within the proper context of the particular objective or activity.

10. Replicability

This project has been designed by experts in genetic resource conservation and utilization, in close collaboration with land, water and natural resource management specialists, and local communities. Such careful planning and design should help ensure replicability from what I consider to be a prototype project.

11. Capacity Building

Capacity building is a key component of the project for each country/territory. It appears that the project plans to take into account training needs, networking possibilities, and public awareness needs. I find these plans to be very acceptable.

12. Project Funding

The funding picture is really quite remarkable. It appears that GEF funding will leverage considerably more funds from ICARDA, IPGRI, ACSAD, developed country universities, and projects funded by bilateral and multilateral donors. I attribute this to the great interest of scientists and the informed public in the target crops and their genetic resources that originated or had significant evolution or development within the Fertile Crescent. The project is complex and includes many institutions, so judging optimum or minimum funding levels is very difficult. I would say, however, that the funding level is not excessive, considering its complexity and levels of effort required, and that the expenditures planned are easily justified by the project's importance.

13. Time Frame

Much can be achieved in five years, but to reach its full potential a prototype project like this will require more than five years to complete.

Training efforts to build capacity should be completed within the project term, as will testing of some participatory models of biodiversity management. Eco-geographic studies of the ten target crops and eight target locations should be largely completed. and characterization of some germplasm should be completed. Some of the follow-on scientific studies will likely be completed by ICARDA, IPGRI and ACSAD as part of their on-going core programs.

14. Secondary Issues

There is a clear linkage to the land degradation cross-cutting issue in this agro-biodiversity project, involving and reclamation, land management, crop management and water management.

15. Additional Comments

This should be a superb project and I strongly support it for GEF funding.

ANNEX 4

CULTIVATED PLANTS ORIGINATING IN THE FERTILE CRESCENT

A short list of cultivated plants identified as originating in the Fertile Crescent. The list is intended to be indicative, not exhaustive. Based on J.R. Harlan (1975) *Crops and Man.* 2nd Edition. pp. 69-70. (GEF Project will address species marked in **bold** and with an **asterisk**)

Cereals	
Avena spp.	Oats
***Hordeum vulgare**	**Barley**
Secale cereale	Rye
***Triticum* spp.**	**Wheat**
***Aegilops* spp.**	
Pulses	
Cicer arietinum	Chickpea
Lathyrus sativus	Chickling
***Lens esculenta**	**Lentil**
Lupinus albus	Lupin
Pisum sativum	Pea
Vicia ervilia	Bitter vetch
Vicia faba	Broadbean/Faba bean
Root and Tuber Crops	
Beta vulgaris	Beet
Brassica rapa	Turnip
Daucus carota	Carrot
Raphanus sativus	Radish
Oil Crops	
Brassica napus	Rapeseed
B. nigra	Mustard
Carthamus tinctorius	Safflower
Linum usitatissimum	Flax, Linseed
***Olea europea**	**Olive**
Papaver somniferum	Poppy
Fruits and Nuts	
Corylus spp.	Hazelnut
Cucumis melo	Melon
Cydonia oblinga	Quince
***Ficus carica**	**Fig**
Juglans regia	Walnut
Phoenix dactylifera	Date palm
***Pistacea vera**	**Pistachio**
***Prunus* spp.**	**Plum; Apricot; Cherry; Almond**
Punica granatum	Pomegranate
***Pyrus communis**	**Pea**
Vitis vinifera	Grape vine
Vegetables, Herbs and Spices	
Asparagus spp.	Asparagus
***Allium* spp.**	**Onion; Garlic; Leek**
Arethum graveolens	Dill
Brassica oleracea	Cabbage, etc.
Capparis spp.	Caper
Carum carvi	Caraway
Ceratonia siliqua	Carob
Coriandrum sativum	Coriander
Cuminum cyminum	Cumin
Foeniculum vulgare	Fennel
Lactuca sativa	Lettuce
Lepidium sativum	Garden Cress
Petroselinum sativum	Parsley
Pimpinella anisum	Anise
Portulaca oleracea	Purslane
Trigonella foenumgraecum	Fenugreek
Fiber Plants	
Cannabis sativa	Hemp
Linum usitatissimum	Flax
Forage Crops	
Agropyron spp.	Wheatgrasses
Agrostis spp.	Bentgrasses
Bromus inermis	Brome grass
Dactylis glomerata	Cocksfoot
Festuca arundinacea	Fescue
Lolium spp.	Ryegrasses
***Medicago* spp.**	**Alfalfa/Lucerne; Medics**
Melilotus spp.	Clovers
Onobrychis viciifolia	Sainfoin
Phalaris spp.	
Phleum pratense	Timothy
Sorghum halepense	Johnson grass
***Trifolium**	**Clovers**
***Vicia* spp.**	**Vetches**
Drugs, Medicinal Plants	
Atopa belladonna	Belladonna
Digitalis purpurea	Digitalis
Glycyrrhiza glabra	Licorice
Hyoscyamus muticus	Henbane
Papaver somniferum	Codeine, morphine, opium
Platago psyllium	Psyllium

TARGET AREAS DESCRIPTIONS

A. JORDAN

1. Ajlun

Location: North Jordan, 75 km north of Amman (Figure 4). Two nature reserves exist near this site, Zobia for its flora and fauna and Dibbine for the flora.

Topography: It is a mountainous area ranging from 500 - 1250 m above sea level (Table 2), with steep slopes, valleys, and numerous springs.

Climate: It has a sub-humid Mediterranean climate, situated within Jordan's highest rainfall region (300-600 mm). Highest temperatures occur in August (mean maximum 34°C) and lowest temperatures in January (mean minimum -4.2°C). The mean annual relative humidity is 63%.

Soil: Eighty percent of the soils in this region are shallow. High rainfall has leached most of the calcium carbonate. On the flat sites true vertisols exist.

Land use: The area consists of indigenous forest (14,225 ha) planted forests (665 ha), cultivated areas and rangelands. Fruit tree cultivation (olives, grapes, figs, pomegranate and almond) and dryland farming of wheat barley, food and feed legumes are practiced. Both goats and cattle graze the rangeland. 65% of the land is privately owned (Table 2).

Flora and Agrobiodiversity Significance:

This area has the highest forest cover in Jordan. In the indigenous forest where *Pinus* sp., *Quercus* sp. and *Ceratonia* sp. predominate, wild relatives of pistachio, apricot and almond are still found. Ancient local cultivars of fruit trees, especially olives, are grown in cultivated areas. Wild relatives of wheat, barley and forage species are also abundant. Local varieties of onion and garlic can be found in irrigated fields (Table 3).

Threats: Deforestation and overcutting are major threats to the wild fruit trees in this area (Table 1). Overgrazing is not a serious problem here. Replacement by improved, cultivated varieties is a common, widespread threat to almost all the landraces and local varieties of the target crop species (cereal, forage and fruit/nut crops) which occur here.

Existing Projects: There is no existing project directed to this site, except for two national and regional projects (i) NCARTT - Genetic Resource Conservation, a large *ex situ* conservation project, and (ii) AFESD/IFAD - Regional Adaptive Research Programme for the Development of Integrated Crop-Livestock

Producation in the West Asia and North Africa (Annex 7).

Incremental Activities:
- *In-situ* conservation of wild relatives, especially in the natural forest.
- On farm conservation of landraces and local varieties.
- Forest rehabilitation and soil conservation in deforested areas.
- Others (Table 4).

2. Muwaqqar

Location: This site, referred to as Muwaqqar, is in two parts, both close to Amman (Figure 4). One part is located 30 km southeast of Amman while the other is a western extension located south of Amman in an east-west orientation (also referred to Amman S-W).

Topography: The site southeast of Amman is undulating and hilly with differences in soil and moisture content along the slopes. This site represents the steppe zone in the region which covers 13% of Jordan. A similar ecosystem exists in the western extension. In addition, this area includes a plateau area and a more hilly area, representative of other ecosystems found widely in Jordan and other areas of the Fertile Crescent. The entire area ranges from 300 m to 950 m (Table 2).

Climate: The steppe zone is arid, with rainfall which fluctuates from year to year and generally occurs and high intensity thunderstorms. Mean maximum and minimum air temperatures during January are 13°C and 3°C respectively, and in August 33°C and 17°C respectively. Absolute maximum and minimum temperatures in August and January respectively are 41°C and -3°C. On the plateau, rainfall is much higher, reaching 370 mm; in the hilly area, 250-300 mm.

Soil: Soils are highly calcareous and fragile in the steppe zone. Gypsum is found in soils at high topographic positions. The soil occurring in this area has been modified and eroded by wind and water, accentuated by overgrazing. This is also the situation in the hilly areas of the extension zone where soil erosion has been accentuated by terrace building. Soils on the plateau are deep and red.

Land use: Open grazing is the predominant land use of the steppe zones, especially in spring, when the natural rangeland is heavily used. In dry years, grazing includes also barley from dry farming fields, while in good years, the barley is cropped and the herds graze the crop residues. Around the settlement areas, there are supplementary irrigated orchards with olive, apricot, onion and garlic and other vegetables. Along the valleys, a variety of fruit trees are grown using traditional irrigation practices. 95% of the entire area is privately owned.

Flora and Agrobiodiversity Significance:

A 1000 ha of indigenous forest exist in the area although plant cover is sporadic in the steppe zone. Short grasses and small xerophilous shrubs predominate along waterways and

depressions. Wild forage species of *Vicia* and *Lathyrus*, which have potential for rehabilitation of this kind of rangeland, still survive in overgrazed areas (Table 3). Wild barley occurs in abundance and its landraces which are resistant to drought and adapted to steppe conditions are cultivated. Local varieties of olive, grapes, figs, pomegranate, almonds and dates are grown in valleys. Crops grown around the settlements are valuable local cultivars.

Threats: Overgrazing is a key threat to this area although replacement of landraces and local varieties threatens all the target crops concerned in this area. The plateau area is heavily cultivated.

Existing Projects:

- Three complementary projects exist for the southwest Amman portion of this area: (i) Jordan Government Highland Development Project ending in 1997 to combat soil erosion, renabilitat rangelands, and increase farmers income on sloping land; (ii) Income Diversification Project including support for women in agricultural activities; (iii) Rangeland Protection Project ongoing to manage range reserves (Annex 7).
- The EC Project for Improvement of Agricultural Productivity in Arid and Semi-Arid Zones is targetted at the southeast portion of this area, to improve crop and livestock production techniques and landuse for arid areas (Annex 7).

Incremental Activities:

- Rehabilitation of degraded rangeland by controlled grazing to encourage indigenous forage legume species which still exist in the soil seed bank. Research indicates good potential for the recovery of this zone (Table 4).
- On farm conservation of local varieties of fruit and vegetable species in the hilly area and surrounding steppe settlements. Develop small scale water harvest to assist this. The closeness of this site from the capital Amman, will give these products relatively high economic value.

B. LEBANON

1. Baalbek

Location: This area extends from the town of Baalbek in a semi-circle of 15 km radius to the north, south and west (Figure 4).

Topography: The area is made up of a flat plateau rising steeply on one side to an elevation of 1500 m.

Climate: It has a semi-arid Mediterranean climate, with a gradient of rainfall related to altitude. Average annual rainfall ranges from 350-550 mm (Table 2).

Soils: Soils are highly calcareous and of a light texture.

Land use. The agro-ecosystem includes both dryland farming (wheat, barley, food and feed legumes) and irrigated crops (potatoes, onions and other vegetables, forage crops as alfalfa and maize and recently tobacco). 70% of the land area is privately owned.

Flora and Agrobiodiversity Significance:

The flora of the site harbours more than 500 plant species of which 60 are endemic. Landraces of crops are commonly grown, while border fallow strips along the fields support wild relatives of crops, including the wild relatives of wheat, barley, lentils and forage legumes, such as *Aegilops* sp., *Hordeum* sp. and *Medicago* sp. (Table 3). Trees are found on the mountain slopes, particularly *Quercus* spp. Parts of an exploited, degraded oak forest still remains.

Threats: Replacement of landraces by improved varieties is the main threat to many of the target crops, while habitat fragmentation and loss is threatening the wild "progenitors" and wild relatives. Indigenous oakwood is processed as charcoal, leaving the soil vulnerable to erosion.

Existing Projects:

The Regional Economic and Social Development Programme supported by the Government, multilateral and bilateral donors and UN agencies provides immediate assistance to small and medium scale farmers and their families. The UNDP Support Programme which aims at building the capacity needed for the development covers assistance to coordination and regional planning, management of rural credit, decentralized public services, applied research and extension, micro-investments, etc. (Annex 7).

Incremental Activities: The project at this site will focus on on farm conservation of landraces and rehabilitation of forest and rangelands (Table 4).

2. Aarsal

Location: This site is situated North East of the Baalbek Valley, a part of the Anti-Lebanon mountain range (Figure 4).

Topography: A high plateau of 1,400-1,700 m asl (Table 2).

Climate: The climate is arid and semi-arid Mediterranean. Rainfall fluctuates from year to year but generally averaged at 400-500 m.

Soil: The soil is calcareous, deep in the valleys and plains and shallow on the slopes. Alluvial soils exist in the valleys.

Land use: Traditionally the area is used for open grazing, and dryland farming of cereals, legumes and fruit trees. During the last ten years, horticulture (grapes and cherries) is expanding, especially where the soil is alluvial and deep. 40% of the land area is privately owned.

Flora and Agrobiodiversity Significance:

The Anti-Lebanon of which this site forms part, is considered as one of the richest parts of Lebanon for endemic flora. The vegetation is mainly grassy steppe of *Aegilops* sp., *Agropyron* and *Avena* sp., with scattered trees and bushes of low palatability (*Artemesia, Salsola* and *Poterium*), but most importantly, wild relatives of the fruit trees *Pyrus, Prunus, Crataegus,* and *Amygdalus* (Table 3). Several important grass forage plants and legume forages, vetch, *Lathyrus* and medics are also present.

Threats: Deforestation and overgrazing.

Existing Projects: A small IDRC Project - Sustainable Improvement of Marginal Lands in Lebanon: Aarsal - a Case Study, focussing on changes in resource management systems, sustainable community development, and soil and water conservation, will be completed in 1997 (Annex 7).

Incremental Activities:

The project at this site will focus on *in situ* conservation of the wild relatives of the target fruit trees, and regeneration of rangeland by promoting indigenous forage grasses and legumes, thus enhancing their conservation (Table 4).

C. PALESTINIAN AUTHORITY

1. Hebron Area

Location: This site is made up of two areas, one to the west of Hebron city towards the borders of Beit Lahem province in the north, and the armistice lines in the west, and the second, southeast of Hebron city, from the south-western borders of Hebron province including the eastern areas in Hebron province and Beit Lahem up to Wadi Nar (Figure 4).

Topography: The site to the west of Hebron city covers the mountains and the western slopes of Hebron province (Table 2). The south and east area forms a gradation from the hills towards the Dead Sea.

Climate: It is a mountainous sub-humid variant of the Mediterranean climate.

Soil: Soil in the mountainous areas is Terra rossa, but dark Rendzina can be found in

certain locations. Alluvial soils exist in plains and valleys.

Land Use: Parts of the hilly and mountainous regions are forested, however large numbers of sheep and frequent droughts have led to overgrazing. Grazing of sheep and goats depends partly on the natural plant cover, and partly on residues of crops. Cultivated land is concentrated typically in the plains and valleys where the soil is deep and field crops such as wheat and barley). The majority of land is under fruit tree cultivation. Most of the agriculture is dryland farming. Irrigated land is only found around the villages. 75% of the land is privately owned.

Flora and Agrobiodiversity Significance:

This area represents the far south of eastern Mediterranean flora. In the mountainous regions (West Hebron) *Marquis* forest exists. It is rich in an array of plant species including medicinal plans and wild relatives of fruit trees notably wild pear, cherries and almond (Table 3). It is the only region which contains remnants of apple and pear trees. In addition last remnants of oak forests still exist. In the cultivated areas, ancient cultivars of olives, grapes, nuts, plum, almond, peaches and cherries are grown. There are many landraces of wheat, barley, food and feed legumes and some local varieties of vegetables.

Threats: Overgrazing by sheep and goats is severe. Unpalatable bushes and poisonous plants now predominate in the lower areas towards the Dead sea, where degradation through overgrazing is severe.

Existing Activities:

No agricultural project exist for this particular area although an environment profile has been prepared for the West Bank.

Incremental Activities:

On-farm conservation of local varieties of crop plants and fruit trees, and rangement rehabilitation with indigenous forage grasses and legumes, will be the focus of the project at this site (Table 4). However, due to the lack of baseline information on the agrobiodiversity of the area, much efforts will be devoted to inventory surveys at the initial period. Soil and water conservation will help conserve the habitats of wild species.

2. Jennin

Location: The site extends from Abada village, southeast of Jennin city, to the main road across the Jordan River (Figure 4).

Topography: The region is hilly with a gradient down towards the Jordan Valley, at 0-300 m (Table 2).

Climate: The site represents a gradient from semi-arid to arid climate. It is semi-arid steppe.

Soil: Soils in the valley plains are alluvial and on the mountain slopes a dark Rendzina with some wide pockets of Terra Rosa soil. Basaltic pockets exists at the edge of the area with yellow soils capable of holding moisture. Soils are being lost through overgrazing.

Land use: The 44200 ha area is composed of 7500 ha of agricultural land; 4400 ha for wheat, barley, lentil, chickpea, *Vicia* sp., forage peas and spices (cumin, anise etc.), 1400 ha for rainfed vegetables, 1700 ha for olives and 350 ha other fruit trees. Open grazing for cattle, sheep and goats occupies a large area. In addition, closed areas and natural reserves exist in the area.

Flora and Agrobiodiversity Significance:

This site is an area of semi-arid steppe with scattered trees. The flora includes more than 1000 species, many of which are at risk through habitat destruction by overgrazing. Belts of Oak, Lentisk and Carob forest exist with numerous indigenous trees and shrubs although only wild Pistachia is represented among the target crop species (Table 3). Wild species of wheat and barley, *Ononis* sp., *Papaver* sp. and annual legumes and forage species, wild *Vicia* and *Medicago*, also exist.

Threats: Overgrazing is endangering range and forage plants in this region, notably *Trifolium*, *Medicago* and *Lathyrus* species.

Existing Activities:

No agricultural project exist for this particular area although an environment profile has been prepared for the West Bank.

Incremental Activities:

Rangeland rehabilitation and *in situ* conservation, especially through habitat restoration and improvement, will be the focus for this site (Table 4). As in the case of Hebron Area, however, much efforts will be devoted to inventory surveys at the initial period.

D. SYRIA

1. Slenfe

Location: This site is located to the east of Latakia (Figure 4).

Topography: The site forms part of the coastal mountains above 1000 m (Table 2). It includes part of the eastern slope and a bigger area on the western slope with varied topography.

Climate: The climate is humid and sub-humid mountainous Mediterranean.

Land use: 1200 ha of the area is indigenous forest. The remaining area is mixed dryland farming. 70% of the land is privately owned.

Flora and Agrobiodiversity Significance:

The vegetation includes a Cedar-Abies forest, which is considered a protected area and contains wild relatives of fruit tree species. Landraces and local varieties of cereals, food and feed legumes and fruit trees predominate in cultivated areas, notably wheat, olive, apricot and fig (Table 3). Natural vegetation covers marginal areas and field borders. The flora includes more than 500 plant species, of which a dozen are endemic. It includes wild relatives of forage crops (*Vicia, Lathyrus, Medicago*) and wild relatives of fruit trees such as *Pyrus, Prunus, Pistacia* and *Amygdalus*.

Threats: Cutting, deforestation, fire, overgrazing and agricultural expansion are especially damaging to the wild relatives of fruit trees and field crops. Replacement by improved cultivars is the major threat to all landraces and local varieties concerned.

Existing Projects:

The $20 million IFAD Project for the Central and Coastal Regions aims at increasing agricultural productivity in these regions. The activities include land reclamation (destoning), terraces and embankments establishment, modernized irrigation systems, country road construction, development of silk work industry and animal production, etc. (Annex 7).

Incremental Activities:

Both *in situ* and on farm conservation are essential in this area, alongside with forest rehabilitation (Table 4).

2. Sweida

Location: This site consist of two locations (Mshannaf-Sahwet) located in the northeast to southeast part of Sweida province, adjoining the Syrian-Jordanian border, and includes the mountain Jabal-el-Arab (Figure 4).

Topography: The area is characterised by hills, a mountain range and plains. Jabal-el-Arab is a basalt mountain, reaching 1500 m in altitude (Table 2).

Soils: The region is formed from basalt rock.

Land use: Much of the area is used for dryland farming and grazing. A great part of the region is occupied by wheat cultivation with some lentils, faba beans, vetches, and orchards of grapes, almonds and apricots. Less than half of the area is private (Table 2).

Flora and Agrobiodiversity Significance:

There are 900 plant species registered in the flora of this region, which is more than one third of the flora of Syria, indicating the rich floristic diversity of the region. More than 25 endemic species occur in the Jabal-el-Arab region. Sweida is a major site for genetic diversity of wild relatives of wheat (*Triticum spp.)*, barley (*Horderm spp.)*, food legumes (*Lens spp.)*, and species of forage grasses (*Vicia)* and legumes (Table 3). Ten *Allium* species, 34 *Trifolium* species, 9 *Trigonella* species, 10 *Medicago* species and 6 *Aegilops* species have been recorded. Of the fruit crops, the genetic diversity of the wild olive *(Olea oleaster)* here is estimated to be 40% of the world's wild olive known. In addition, *Amygdalus korschinki*, which is a close relative of almond is found, as is *Pistacia atlantica*, used as a rootstock of cultivated pistachio. *Pyrus syriaca* is a rootstock of cultivated pear, also found in this region. *Quercus calliprinos* forms stands of natural forest.

Threats: Overgrazing and agricultural expansion are the main threats to the wild relatives of the target crops here. Replacement by improved cultivars is a generic problem as in many other sites.

Existing Projects:

The $ 40 million IFAD Project for the Southern Region is aimed at increasing agricultural productivity (Annex 7). Activities include land reclamation (destoning), extension services, support to low income farmers, loans to women, development of small ruminant production. The smaller UNDP Technical Assistance ending in 1996 aims at providing training for farmers, especially women, to increase production on reclaimed land.

Incremental Activities:

This area is vitally important for *in-situ* conservation of the genetic diversity of wild wheats, barley, food and forage legumes. On farm conservation will be launched to manage field borders rich in wild species. Rangeland rehabilitation will be another major activity for this site.

TABLE 1. MAJOR THREATS TO TARGET CROP GERMPLASM

Crop	Germplasm	Threats							
		Overgrazing	Deforestation & Cutting	Settlement Expansion	Habitat Fragmentation & loss	Erosion & Desertification	Replacement with Improved Varieties	Crop replacement	Loss of Local Knowledge
Wheat	wild *Triticum*	XXX	X	X	XXX	X		XXX	
	Aegilops spp.	X		X	X			X	
	landraces						XYX	XX	XX
Barley	*H. spontaneum*	X		X	XX	X		XX	
	landraces						XXX	X	XX
Lentil	wild *Lens*	XX	X	X	XX	X		X	
	landraces						XXX	XX	XX
Vetch	wild *Vicia*	XX	X	X	X	X	X	X	
Lathyrus	wild *Lathyrus*	XX	X	X	X	X	X	X	
Medics	wild *Medicago*	XX		X	X	X	X	X	
Clovers	wild *Trifolium*	XX		X	X	X	X	X	
Olive	*Olea oleaster*	X	XXX	X	XX				
	local varieties						XXX		XX
Apricot	local varieties						XXX		XX
Cherries	local varieties						XXX		XX
Plum	local varieties						XXX		XX
Almond	wild *Prunus*	X	XXX	X	XX				
	local varieties						XXX		XX
Pear	wild *Pyrus*	X	XXX	X	XX				
	local varieties						XXX		XX
Pistachio	wild *Pistacia*	X	XXX	X	XX				
	local varieties						XXX		XX
Fig	local varieties						XX		XX
Allium	wild *Allium*	X		X	X			X	
	local varieties						XXX		X

XXX = high; XX = medium; X = low; blank = no threat

TABLE 2. TARGET AREA/DESCRIPTION MATRIX

Country	Site No:	Target Area	Altitude (m asl)	Rainfall (mm)	Area (ha)	Human population	Land tenure (private %)
Jordan	**1**	Ajlun	500-1250	300-600	42,000	95,000	65
	2	Muwaqqar	300-950	150-450	90,000	100,000	96
Lebanon	**3**	Baalbek	900-1500	350-550	35,000	30,000	70
	4	Aarsal	1400-1700	400-500	36,000	40,000	40
Palestinian Authority	**5**	Hebron Area	300-1000	400-600	12,000	35,000	80
	6	Jennin	0-300	250-450	20,000	26,000	70
Syria	**7**	Slenfe	1100-1600	800-1000	40,000	50,000	70
	8	Sweida	700-1500	300-400	20,000	30,000	40

TABLE 3. TARGET AREA/CROP GERMPLASM MATRIX

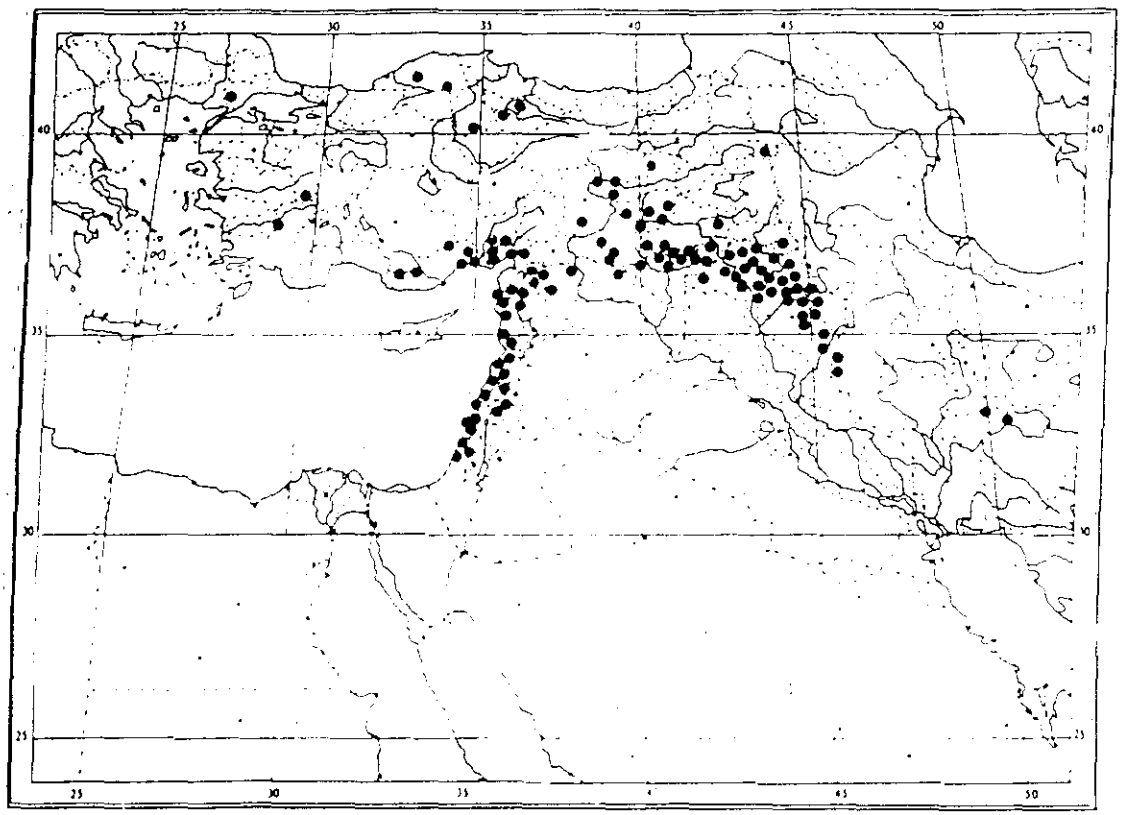
Crop	Germplasm	%[1]	Jordan		Lebanon		Palestinian Authority		Syria	
			Ajlun	Muwaqqar	Baalbek	Aarsal	Hebron Area	Jennin	Slenfe	Sweida
Wheat	wild *Triticum*	40	XX		XX		X	X		XX
	Aegilops spp.	30	XX	X	XX	X	X	XX	X	XX
	landraces	10	XX	X	X	X	X		XX	XX
Barley	*H. spontaneum*	30	X	XX	XX		X	X	X	XX
	landraces	10	XX	X	X		X		X	XX
Lentil	wild *Lens*	15	X	X	XX					XX
	landraces	10	X	X	X		X			X
Vetch	wild *Vicia*	20	XX	X	X	X	X	X	X	XX
Lathyrus	wild *Lathyrus*	20	X	X	X	X	X	X	X	XX
Medics	wild *Medicago*	25	X	X	X	X	X	X	X	X
Clovers	wild *Trifolium*	20	X	X	X	X	X	X	X	X
Olive	*Olea oleaster*	40								X
	local varieties	16	XX	XX			XX		XX	XX
Apricot	local varieties	15	XX			XX			XX	XX
Cherries	local varieties	10				XX	X		XX	XX
Plum	local varieties	10					XX		XX	
Almond	wild *Prunus*	25				X	X		X	X
	local varieties	15	XX	XX		XX	XX		XX	XX
Pear	wild *Pyrus*	30			X	X	X		X	
	local varieties	10		XX		XX	XX			XX
Pistachio	wild *Pistacia*	30	X			X	X	X	X	X
	local varieties	10		XX		X			XX	
Fig	local varieties	15	XX	XX	X	X	XX		XX	XX
Allium	wild *Allium*	20			X				X	
	local varieties	10	XX	XX		XX			XX	XX

[1] Percentage of germplasm of each target crop (on global scale) captured by the eight target areas.
XX = high presence; X = low presence; blank = target germplasm is absent

TABLE 4. TARGET AREA/ACTIVITY MATRIX

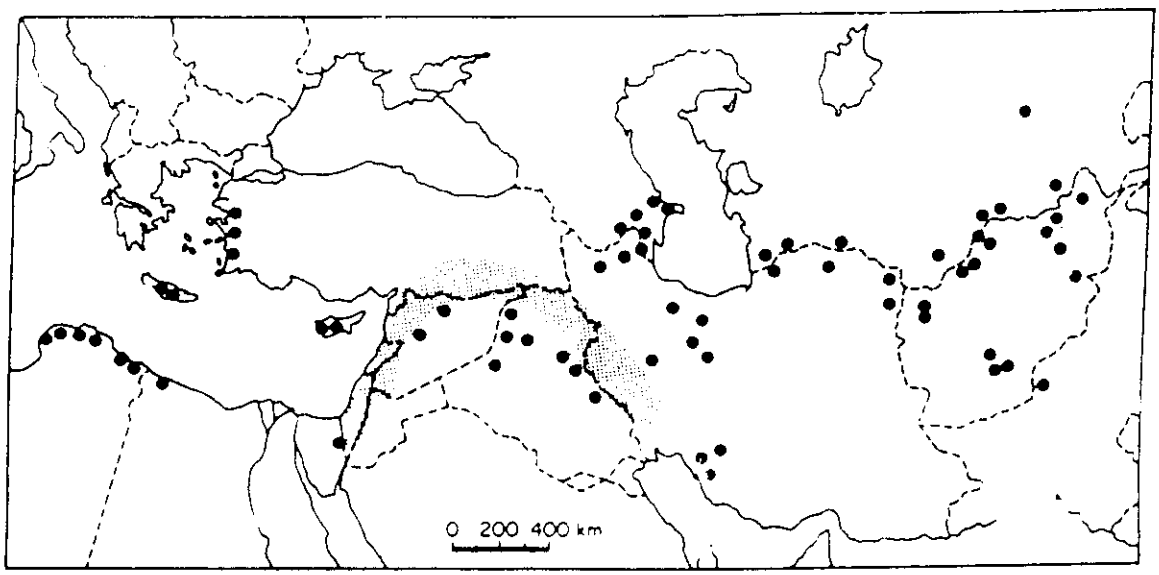
Activity	Jordan		Lebanon		Palestinian Authority		Syria	
	Ajlun	Muwaqqar	Baalbek	Aarsal	Hebron Area	Jennin	Slenfe	Sweida
1. Community based Agrobiodiversity Inventory and Monitoring								
1.1 Surveys	X	X	X	X	X	X	X	X
1.2 GIS	X	X	X	X	X	X	X	X
1.3 Monitoring	X	X		X		X	X	X
2. Community based Agrobiodiversity Management								
2.1 Species								
2.1.1 *In-Situ* conservation of Agrobiodiversity	X	X		X		X	X	X
2.1.2 On-farm conservation of landraces	X	X	X		X		X	X
2.2 Habitat								
2.2.1 Rangeland rehabilition		X	X	X	X	X		X
2.2.2 Forest rehabilitation	X		X	X			X	
2.2.3 Water Harvesting		X		X	X		X	X
2.2.4 Land and soil conservation	X	X	X		X		X	X
3. Social, Economic and Policy Issues								
3.1 Environmental & Landuse	X	X	X	X	X	X	X	X
3.2 Social & Economic Measures	X	X	X	X	X	X	X	X
4. Institutional Strengthening								
4.1 Agrobiodiversity Training	X	X	X	X	X	X	X	X
4.2 Public Awareness	X	X	X	X	X	X	X	X
4.3 Networks	X	X	X	X	X	X	X	X

Figure 1



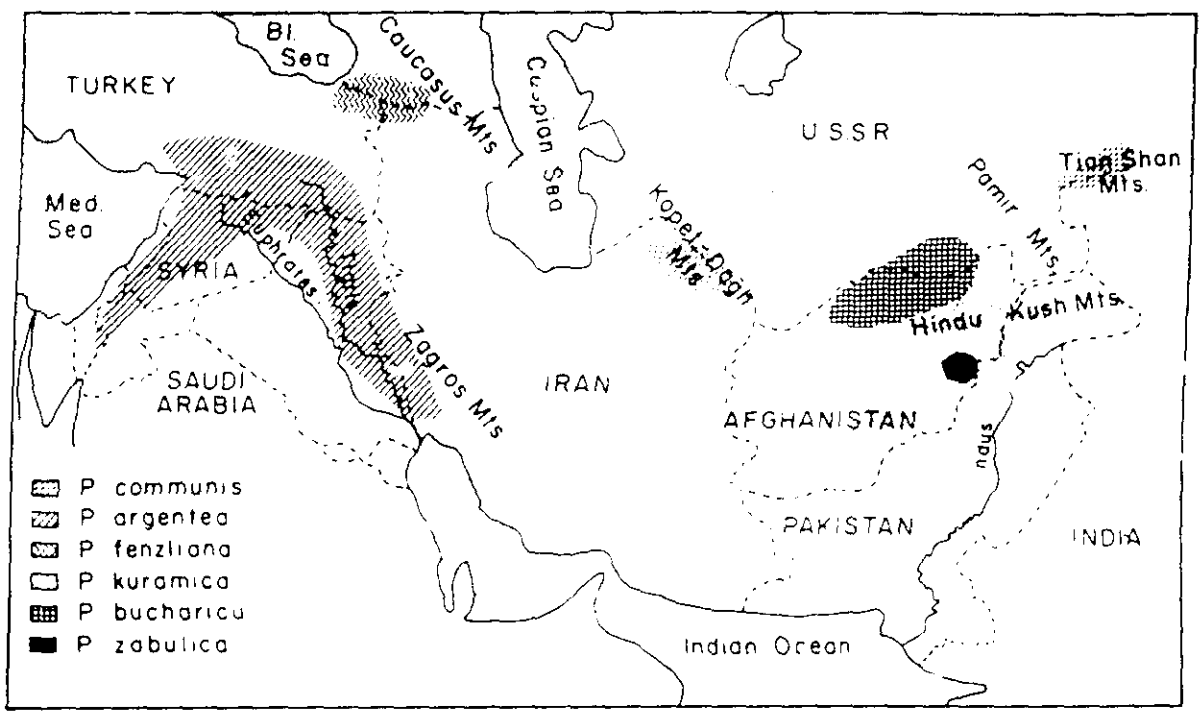
Distribution of *Aegilops speltoides* var. *speltoides* in the eastern Mediterranean and western Asia. Adventive locations in Europe not shown.

Figure 2



Distribution of wild barley, *Hordeum spontaneum*. The area in which wild barley is massively spread is shaded. Dots outside this distribution centre represent more isolated populations, usually of weedy forms. Towards the east, these populations extend beyond the boundaries of this map into Ladakh and Tibet. (Based on Harlan & Zohary 1966.)

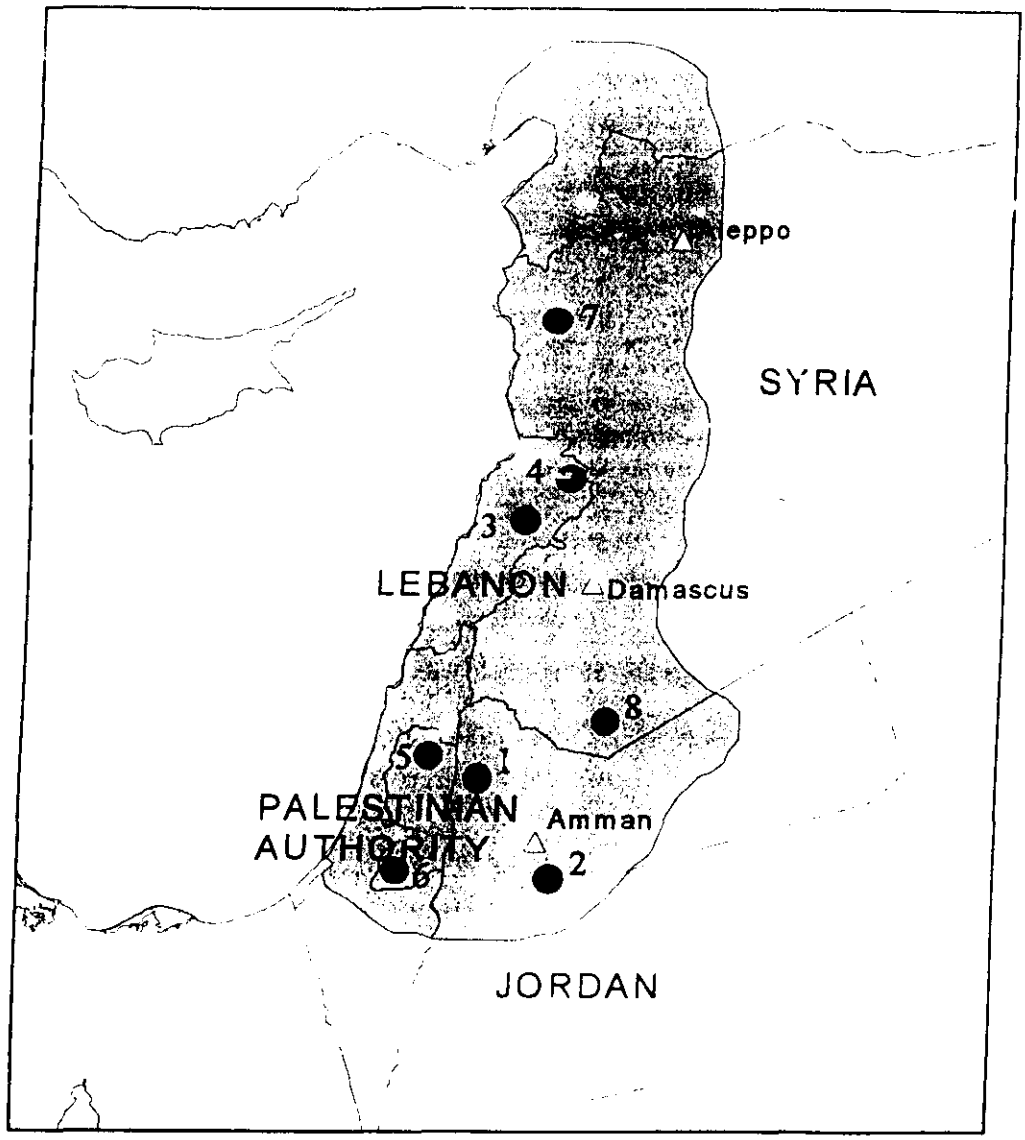
Figure 3



Distribution of almond species of the Section Euamygdalus (Grasselly, 1976, Browicz 1972).

Figure 4

Target Agrobiodiversity sites of the Fertile Crescent in relation to Levantine Uplands Centre of Plant Diversity



Key:

Shaded Area Levantine Uplands Centre of Plant Diversity

Target Sites:

1	Ajlun, Jordan	5	Jennin, Palestinian Authority
2	Muwaqqar, Jordan	6	Hebron Area, PalestinianAuthority
3	Baalbek, Lebanon	7	Slenfe, Syria
4	Aarsal, Lebanon	8	Sweida, Syria