



Global Environment Facility

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March 19, 2003

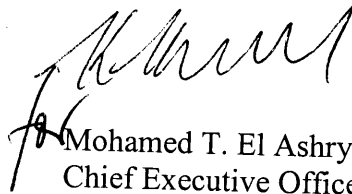
Dear Council Member,

The World Bank, as the Implementing Agency for the project, ***Jordan: Conservation of Medicinal and Herbal Plants***, has submitted the attached proposed project document for CEO endorsement prior to final approval of the project document in accordance with the World Bank procedures.

The Secretariat has reviewed the project document. It is consistent with the proposal approved by the Council in October 2002 and the proposed project remains consistent with the Instrument and GEF policies and procedures. The attached explanation prepared by the World Bank satisfactorily details how Council's comments and those of the STAP have been addressed. I am, therefore, endorsing the project document.

We have today posted the proposed project document on the GEF website at www.gefweb.org. If you do not have access to the Web, you may request the local field office of the World Bank or UNDP to download the document for you. Alternatively, you may request a copy of the document from the Secretariat. If you make such a request, please confirm for us your current mailing address.

Sincerely,



Mohamed T. El Ashry
Chief Executive Officer and Chairman

cc: Alternate, Implementing Agencies, STAP

OFFICE MEMORANDUM

DATE: March 10, 2003

TO: Mr. Mohamed El-Ashry, CEO/Chairman, GEF

FROM: Lars Vidaeus, GEF Executive Coordinator



EXTENSION: 34188

SUBJECT: **Jordan - Conservation of Medicinal and Herbal Plants Project
Submission for Final CEO Endorsement**

1. Please find attached the electronic file of the GEF Project Document for the above-mentioned project for your final review and endorsement. This project was approved for Work Program entry at the October 15, 2002 Council meeting, under streamlined CEO endorsement procedures. The scheduled Board date for this project is May 29, 2003. The Government of Jordan has requested the World Bank to reschedule an earlier Board date. This request will be addressed pending on the timing of CEO endorsement. We would appreciate receiving your response, so that we may finalize the Bank Board submission, by March 21, 2003.
2. The GEF Project Document is fully consistent with the objectives, scope, and overall cost of the proposal approved at the October 2002 Council meeting. Specific changes related to project scope and financing have been introduced during final project preparation. The main revisions are outlined below.

A. Project Focus

3. Development Objective. As agreed upon in the Quality Enhancement Review (QER) Meeting of February 11, 2003 the Development Objective was streamlined as follows: The Development Objective of the proposed project is to design and test models to improve the conservation of medicinal and herbal plants and the livelihood of rural communities through the management, and sustainable use of medicinal and herbal (M/H) plants for human and livestock needs in specific areas of Jordan (the Central Upper Slopes of the Rift Valley and the Mujib Nature Reserve) while ensuring effective *in-situ* protection of threatened habitats and ecosystems in these areas.
4. Implementation Arrangements have been finalized to reflect the full participation of key stakeholders in the project. Project implementation will be coordinated by a small Project Management Unit (PMU) housed with the Enhanced Productivity Program (EPP) of the Ministry of Planning (MOP). The PMU will be guided by a Steering Committee, to be chaired by the Secretary General of the Ministry of Planning. The PMU will coordinate the activities of all implementing agencies: RSCN, NCARTT and NCARTT/EFJ. In addition, the project will link and coordinate with several key

institutions to address project objectives: e.g. the MOP, MOA, MOENV, MOH, MOE, MOIT; NGOs; and the private sector.

5. Key Performance Indicators for Close Monitoring of the Development Objectives of the Project have been more precisely refined and quantified based on the results of the PDF-B surveys and the QER.
6. Project Design.
 - a) The design of the project has been simplified. The in-situ sites were reduced from 3 to 2, thereby eliminating one implementing agency. The ex-situ component has been further defined.
 - b) The role of the private sector has been further clarified in close consultation with NCARTT. Prototype pilot demonstration farms will be implemented in partnership between the private sector and NCARTT. This innovative partnership between NCARTT and the private sector promotes private sector investment, and at the same time has increased responsiveness on NCARTT's side to farmer demands and needs. Financially, the private sector contribution to the project amounts to \$790,000.
7. Micro-Credit Scheme. Although micro-credit schemes will not be funded by the project, cooperative arrangements with on-going initiatives that aim to provide micro credit to the poor have been explored. These include the Enhanced Productivity Program of the Socio-Economic Development Programme, King Abdullah II Foundation, USAID AMIR project, and USAID Jordanian-US Business Partnerships.
8. Critical Risk Rating have been updated and reassessed.
9. Environmental and Social Safeguards: The Environmental Action Plan for this Category B project was received from GOJ on September 22, 2002 and forwarded to PIC. An updated EA was received from the GOJ on February 6, 2002. Social aspects are intrinsically incorporated in project components based on the results of the sociological surveys carried out under the PDF-B preparation grant.
10. External Funding for Component 4 "Income Generation Activities: M/H Quality Enhancement and Product Development". The GOJ is committed to securing funding for Component 4 amounting to a total of \$3.5 million over the life of the project. This has been reflected accordingly in the PAD, Grant Agreement and Minutes of Negotiations. The MOP has already committed to funding this component for 2003 and 2004 in the amount of \$1.4 million. The activities funded by the MOP under Component 4 are to start by March 2003. EJADA/EU has expressed interest in co-funding and the government of South Africa is also exploring co-funding to promote joint ventures between South African and Jordanian farmers.

B. Specific GEF Council Comments

11. Comments were received from UNDP, the Constituency of Germany and Switzerland. They are addressed below.

B1. German Comments on a GEF Project Proposal. October 8, 2002

1. The project foresees under component 1 (iv) the establishment of standards, safety and efficacy testing, etc. for M/H plants and products. These activities fall under the development of the industrial processing of medicinal plants, and are thus far beyond the scope of work of the project. It is recommended not to carry out these activities in the frame of this project, as it would otherwise lead to many other activities related to the processing industry.

In line with the GCEP Biodiversity Strategy, the establishment of health and safety standards for M/H plants practices (component 1.4) will be instrumental to the crucial conservation of in-situ M/H plants of global importance in-site protection. The Bureau of Standards will be involved in this effort.

Given the fact that GOJ has identified, in its National Strategy for Agricultural Development, the conservation and promotion of production M/H plants for local use and exports, as one of the six priority areas under the rain-fed sector, the Government supports the production of M/H plants ex-situ with the objective to conserve plants in-situ, and to ensure that they have actual or potential economic value resulting in viable income for the farmers. GOJ has committed itself to link the proposed strategy project with this project and provide the needed funding for this non-GEF component accordingly. Component 4 "Income Generation Activities: M/H quality enhancement, product development", will mainly provide local and national benefits. Without these activities, it is doubtful if the protection of globally important M/H plants would be effective, especially in the long run. This component includes standardization of M/H plants, rare materials and processing, and is funded through non-GEF sources.

2. The project costs are estimated at US\$12.85 m, with 58% of co-financing. US\$ 5.0 m will be contributed by an international donor. For the understanding of the project concept, it would be worthwhile to explicitly say which donor will co-finance the project, and what the status of these funds are (expression of interest? commitment? funds already available?). Co-financing is an integral part of the project, and the timely release of these additional sources should be considered as project risk.

Further fine tuning of the project components costs and financing has been undertaken since initial submission.

The projects costs are US\$14.21 million. The 2003 Ministry of Planning (MOP)/Enhanced Productivity Program (EPP) budget already includes \$404,600 in support in cash for the PMU. The National Center for Research and Technology Transfer (NCARTT) counterpart funding amounts to \$2 million, the Royal Society for the Conservation of Nature (RSCN) counterpart funding amounts to \$1.3 million, the Government of Jordan (GOJ) contribution to the Mujib

Nature Reserve land rental is \$1.21 million. ECOHERB Farms of Jordan's (EFJ) counterpart funding amounts to \$79,000.

As reflected in the Minutes of Negotiations and other relevant documents, the Jordanian delegation confirmed funding allocation to component 4 in 2003 and 2004 in the amount of US\$1.4 million as well as commitment to secure the remaining funding of US\$2.1 million. E.U. and South Africa have already expressed interest in co-funding this component.

Parallel Financing:

- USAID (AMIR Program): \$250,000 for EPP;
- Together for Birds and People in the Jordan Valley Agency: \$577,000 for Wade Mujib activities;
- Swiss Development and Coordinating Agency: \$460,000 for Wade Mujib Activities;
- Jordan Telecom: \$97,000 for Wade Mujib Activities;
- Euro-Jordanian Action for the Development of Enterprise (EJADA): \$40,000 for EFJ activities;
- USAID (Education and Information to Improve Irrigation and Water Use Efficiency): \$10,000.

3. The overall budget seems adequate, although ways should be sought to reduce the high administrative costs (PMU, US\$1.25 m).

This is the first project that addresses conservation and sustainable use of M/H plants in Jordan and involves a large number of stakeholders from different sectors. There was no institutional mandate for such conservation prior to the project. It is crucial that a strong coordinating role is provided to link the key players. The administrative costs reflect the work of all partners, including the Ministries of Environment, Health, and Education as well as their training .

4. The upcoming medium-sized project “Conservation and Sustainable Use of Biodiversity in Dibeen Nature Reserve” is not mentioned in the proposal. The project foresees a number of income-generating activities for the local population, and there may be many opportunities to develop synergies between both projects.

The Royal Society for the Conservation Nature (RSCN), who is the implementing Agency of the Conservation and Sustainable Use of Biodiversity in Dibeen Nature Reserve, is also one of the main implementing agencies of the project (Component 2 Pilot-Sites Conservation: *in-situ* conservation in the Mujib Nature Reserve, and Component 3: Public Awareness and Education). The illegal collection of M/H herbs in the Dibeen Forest was identified as one of the main threats. A number of M/H plants are collected from the area for the use of local people, or to be sold at M/H plants shops in Amman. Synergies between both projects, especially in the field of conservation of M/H plants, management of hotspots, income generating and marketing activities have already started. References to this project are in Section D2 and EG.3 of the Project document.

5. The objectives of the GEF/UNDP project “Conservation and Sustainable Use of Medicinal Plants in Arid and Semi -Arid Ecosystems” being implemented in Egypt are very similar, as are the framework conditions. It seems absolutely necessary to develop formalized cooperation mechanisms which ensure the exchange of knowledge and experience. Non-binding statements such as “interaction with other countries of the region will be explored” are not adequate.

Important lessons from ongoing M/H plant projects and community based natural resources management projects are and will be used to develop the Jordan M/H plants project. This knowledge will deepen through information sharing, study tours and staff exchange throughout the project preparation and implementation. During project preparation the Project Coordinator of the Jordan M/H Plants project participated in the Implementing Workshop of the Ethiopia Medicinal Plant Conservation, Management and Sustainable Use Project, which is supported by GEF and IDA/LIL funds. The Coordinator of the Jordan Project met with the Project Coordinator of the Egypt Project to discuss lessons learnt, technical and organisational issues. Naturally, the Egypt and the Jordan Project have some similarities in design and output and the cooperation between these two projects, as well as with other project (e.g. Ghana Northern Savannah Biodiversity Conservation Project, Sri Lanka: Conversation and Sustainable Use of Medicinal Plants Project), will be enforced during implementation.

Under component 1.5 “Establishment of a national M/H plants database, GIS and plant gene bank” links will be established or expanded to databases throughout the world. Through networking, contacts will be made worldwide on M/H plants and the flow of information and materials will be of importance to the project. The PMU and implementing agencies will co-manage the database with NCARTT.

B2. Swiss Technical Comments, Council Work Program GEF/Biological Diversity

Although the project is fully consistent with GEF principles and of great interest and value in its objectives, we want to stress the fact that we consider its submission to GEF council premature, as key information is not yet available. Still, we recognize a great potential in this ambitious and highly relevant project and we particularly appreciate the attention brought to participatory approaches and gender issues (although little information is given about effective implementation of these approaches). The key involvement of NGOs which are already working on a large scale with the local population and will be executing bodies of part of the project is also worth mentioning.

1. Among the issues that remain unclear, we would underline the following which deserve particular attention and need considerable clarification and additional information to be given at a later stage:

- a. Very complex coordination mechanisms to be developed (considering, as an example, that at least 4 Ministries are involved)**
- b. Huge needs in capacity building, necessary to be brought into the local context to address issues as different as management plans or intellectual property rights legal framework**
- c. Institutional and implementation arrangements (described as being currently under review), including the problem of clearly assessed and recognized weakness of some key institutions (NCARTT)**

d. Sustainability, at all levels, seemingly low and particularly weakly addressed; note that financial sustainability is not at all mentioned.

The implementation and coordination mechanism were simplified and finalized during appraisal. A Project Management Unit (PMU) to be housed in the Enhanced Productivity Program (EPP) of the Ministry of Planning (MOP) will have overall responsibility for project implementation. The PMU will coordinate project activities of the three sub-implementing agencies: the National Center of Agricultural and Technology Transfer (NCARTT), the Royal Society for the Conservation of Nature (RSCN) and ECOHERB Farms of Jordan (EFJ). Under Component 1 "Institutional Strengthening," crucial inter-sector links between the various ministries and the beneficiaries will be developed. These links will be reflected in the Steering and Technical committees, which will weigh in on topics like strengthening national policy and regulatory capacity. In addition, the Steering Committee, chaired by the Secretary General of MOP, will ensure the smooth running of the project and thereby support the conservation of M/H plants and their sustainable expansion and use. Capacity building and training needs are addressed under component 1.6 and component 3: Public awareness and education.

Long-term sustainability is crucial. It will depend on the impact of the project being of value and profitable. Significant improvements in marketing M/H plants and cost recovery measures depend on farmer participation and engagement and will lead to farmer's interest and support. Due attention has been given to ensuring sustainability during the design of the project and will be a main focus of implementation. The relevant sections of the Project Document have been updated accordingly.

2. Considering the particular interest of the project, due to its potential reliability in those fragile and insufficiently documented ecosystems and to its interesting model of cooperation between numerous sectors of the society, we regret that it reaches Council at such an underdeveloped stage. Our main concerns outlined above should be taken into consideration in the further development of the project and we will be looking for satisfactory responses upon second review.

The concerns expressed have been duly taken into account and are reflected in the revised project design and implementation arrangements. The PDF B grant has been instrumental in solving the concerns highlighted and securing the readiness of the project for implementation. EPP RSCN, NCARTT and EFT have demonstrated during the last 4 months exemplary collaboration and have started operations on the ground. At negotiations, the Jordanian delegation requested retroactive funding to start crucial operations. The preparatory grant has enabled NCARTT to demonstrate that it has moved to responding to the demands of small farmers, NGOs and the private sector in the field of M/H plants. This is unprecedented and demonstrates NCARTT's commitment to move away from supply-driven activities.

3. As we already had to do in GEF council No. 19, we regret that STAP review is particularly irrelevant and brings only very few constructive criticisms. It is not acceptable to submit a project for STAP review with insufficient information, which appears to be the basic problem here. We take the STAP review process very seriously and will have to intervene in Council, should this problem become permanent.

The STAP review process was taken very seriously. The reviewer was suggested by the GEFSEC as the STAP roster specialist for M/H plants. The first review was rejected as non-satisfactory. The second review is the best we could obtain.

4. Beside the important technical points already mentioned, we would stress the need for a sensible approach to all issues in connection with nomadic groups or any segments of the population that are highly dependent on the wild natural resources.

The Mujib Nature Reserve is managed by the Royal Society for the Conservation of Nature (RSCN) which has preliminary scientifically based-knowledge of the site. The suggested approach will be insured during implementation by RSCN. Baseline ecological surveys conducted by RSCN during 1998 revealed clear evidence of over grazing of the natural vegetation cover and disturbance to soil profiles and plant community structures through the casual planting of fodder crops and on-site feeding of concentrates and hay. The grazing pressure is largely confined to the eastern edge of the Reserve. In response to the grazing problem, the local livestock owners and RSCN agreed to design and implement written agreements to zone grazing use. These agreements have been implemented for four years. They define seasonal zoning uses of these areas for grazing animals within the reserve, but there are no limitations on stocking density. The agreements cover an area of 40 square kilometers and there are no limits to grazing during spring and autumn. In order to compensate for any possible socio-economic negative effects created by the grazing agreements implemented during the summer and winter, RSCN has started a programme of alternative income generation opportunities, targeted at livestock owners. These include tourism initiatives and handicrafts, as well as agricultural projects outside the reserve boundary. The M/H Plants project will update this program through the *ex-situ* activity of growing M/H plants for local community benefits, and training in rangeland management.

5. We would point out, as an example, the possible contradiction occurring between the objective of mitigating pressure on M/H plants resources by providing ex-situ cultivation opportunities to the local population and that of new income generation through development of related industries; that could result in a first stage in enhancing the demand and thus increasing the pressures on wild plants from the poorest or most disadvantaged population groups.

The project will closely monitor this possible contradiction during implementation and will introduce amendments as necessary. The implementation of the environmental management plan is meant to mitigate this contradiction.

B3. UNDP Comments

1. The development objective of this project is well presented in the brief, but a description on how this objective will be achieved is less clear. Partnerships with similar initiatives are thought of, but the involvement of the private sector, already working on commercialization of medicinal plants, is not apparent and poorly documented although consultations with farmers, government and NGO stakeholders seem to have taken place.

These comments have been addressed throughout further preparation.

The private sector through ECOHERB Farms of Jordan (EFJ) will be one of the co-implementing agencies (Component 2.2.2 Pilot Prototype Farm Demonstrations). The transfer of NCARTT's

knowledge base as further developed by EFJ, based on its own knowledge bank and continuous research at its prototype farm, will be instrumental in providing incentives to M/H plants farmers. The project will support demonstrations in this pilot-prototype farm in implementing the following strategy to develop the *ex-situ* cultivation trials in Jordan:

1. The screening process for the M/H plants to be cultivated in the *ex-situ* farms will be developed.
2. In order to encourage the adoption of sound environmental practices, Integrated Pest Management (IPM) and nitrogen fixing plants will be promoted and organic farming will be encouraged. Standards will be used for the dosage and purity of M/H plants and these will comply with international norms. Potential *ex-situ* farms will be identified for organic practices and certified as organic farms if they meet all the criteria. These farms will serve as prototypes for future expansion of organic farming practices for M/H plants. EFJ will also lobby and assist in developing quality benchmarks for various endogenous M/H plants. The objective will be to equate Jordanian *ex-situ* M/H plants with the connotation of high quality and specific standards, thereby enhancing the protection of *in-situ* plants.
3. A label will be developed for organic quality products for Jordan so as to contribute to the sustainability of the protection of *in-situ* plants by limiting harvesting and processing to *ex-situ* sites.
4. A prototype contract-farming model to standardize the relationship between the growers and EFJ will be developed. This will contribute to propagating threatened M/H plants outside the *in-situ* areas.
5. Stakeholders in the M/H plants sector will be trained on the ground in environmentally friendly techniques and procedures so as to conform to European cultivation and processing standards.
6. The level of progress of the *ex-situ* cultivation will be monitored and evaluated. Corrective measures will be taken as necessary.

A memorandum of understanding has been adopted between NCARTT and EFJ.

2. Apart from the Mujib reserve, which is under RSCN management, the baseline situation in the other two areas under consideration seems to be weak. In this regard, the government commitment in support of the baseline scenario is promising, but a mechanism of how this commitment will be honored to complement the GEF global environmental objectives is to be strengthened. The threat-root cause analysis as presented in the brief is weak and it is not fully guaranteed that project activities will be adequately addressing the root causes of the mentioned threats (overgrazing, arable agricultural expansion, urbanization, and industrialization). Also, while it is not clear that excessive collection of plant herbs is a major threat facing ecosystem integrity, conservation, management and collection agreements as well as planning and production processes should keep in mind the high degree of dependence of local village and farmer communities on traditional herbal medicine.

Section B 3 of the project document has been rethought to address the above comments.

3. The section on institutional and management arrangements for the coordination of execution and implementation of such a complicated and ambitious project lacks detail and clarity and could benefit from special attention prior to project implementation. The poor capacity of government institutions to deal with conservation and sustainable use of medicinal plant diversity is noted and the lack of coordination between these and other relevant stakeholders need to be strengthened. A clear and feasible mechanism ensuring good and efficient coordination is needed.

The Project institutional and management arrangements have been streamlined and specified during further preparation. Project implementation will be coordinated by a small Project Management Unit (PMU) housed with the Enhanced Productivity Program (EPP) of the Ministry of Planning (MOP). The PMU will be guided by a **Steering Committee**, to be chaired by the Secretary General of the Ministry of Planning. A **Technical Committee**, chaired by the Project Manager will have the mandate to provide technical guidance in implementation and monitoring and evaluation of activities. The PMU will coordinate the activities of all implementing agencies: RSCN, NCARTT and NCARTT/EFJ. In addition, the project will link and coordinate with several key institutions to address project objectives: e.g. the MOP, MOA, MOENV, MOH, MOE, MOIT; NGOs; and the private sector.

The PMU will coordinate the project activities of three implementation entities:

1. NCARTT which will implement the M/H plants database and gene bank (Component 1.6), the Central Upper Slopes of the Rift Valley *in-situ* subcomponent (Component 2.1) and part of the *ex-situ* sub-component (Component 2.2);
2. Royal Society for the Conservation of Nature (RSCN), which will implement the Mujib Nature Reserve *in-situ* component (Component 2.1);
3. ECOHERB Farms of Jordan (EFJ), which will implement the pilot farm of the *ex-situ* component with TA from NCARTT (Component 2.2).

The PDF-B grant has been instrumental in testing the work and collaboration of implementing entities during the last four months. Tests have been successful.

4. In addition to Intellectual property rights, we also encourage the project to look into developing community based property rights in support of conservation and management of medicinal plants.

Component 1.3 addresses the developing intellectual property rights (IPR) policy and guidelines for indigenous knowledge and use of M/H plants for medical and other purposes by humans and livestock. A committee will formulate the policy and guidelines. This will be carried out in collaboration with the Achievement of Market Friendly Initiatives and Results Program (AMIR), funded by USAID. Part of the committee's task will be to develop community-based property rights. RSCN will play an instrumental role.

5. Finally, in view of the fact that existing laws affecting land use are weak in Jordan and are not properly enforced, and due to the multiplicity of stakeholders and the sort of incentives proposed for locals through the micro-credit programs, a self enforcement mechanism based on respect for conservation prerogatives becomes necessary to ensure

that the project success in medicinal plant production does not backfire on conservation and management objectives.

One of the best ways to conserve plants is to ensure that they have actual or potential economic value. Then farmers will look after them in the wild, want to manage them sustainably and grow them *ex-site* as a cash crop. The project will monitor closely during implementation any potential backfire on conservation. The environmental management plan has been designed to mitigate this potential backfire. Adjustment will be made during implementation, if necessary.

12. Please let me know if you require any additional information to complete your review of the project document. We look forward to receiving your endorsement of the project for Bank Board approval.

Many thanks.

Attachments

Project Appraisal Document
Signed Minutes of Negotiations

cc: Messers./Mmes. King, Kumari, Castro (GEFSEC); Obeng, Darghouth, Aklilu, Arif, Brackmann, Collier, El Hanbali, Glineur, How Yew Kin, Msellati, Salang, Soliman, Tanimichi (MNSRE); Mackinnon, Khanna, Wedderburn, Aryal (ENV); Al-Mahamel (LEGMS); Ambrose (LOAG1); ENVGC ISC, MNSRE & IRIS Files

Document of
The World Bank

Report No: 25468-JO

GEF PROJECT DOCUMENT
ON A
PROPOSED GLOBAL ENVIRONMENT FACILITY GRANT
IN THE AMOUNT OF US\$5 MILLION
TO THE
HASHEMITE KINGDOM OF JORDAN
FOR A
CONSERVATION OF MEDICINAL AND HERBAL PLANTS PROJECT

March 5, 2003

Middle East and North Africa Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective February 2003)

Currency Unit = Jordanian Dinar

JD 0.7 = US\$1.0

US\$1.4 = JD 1.0

FISCAL YEAR

January 1 -- December 31

ABBREVIATIONS AND ACRONYMS

AMIR	Achievement of Market Friendly Initiatives and Results Program (USAID)
BRDP	Badia Research and Development Program (Under the Higher Council for Research & Tech.)
CAS	Country Assistance Strategy
CBD	Convention on Biological Diversity
CDD	Community Driven Development
CI	Conservation International
CIDA	Canadian International Development Agency
COP	Conference of Parties
DD	Drug Directorate
DOF	Department of Forestry
EFJ	ECOHERB Farms of Jordan
EIIIWUE	Education and Information to Improve Irrigation and Water Use Efficiency (USAID)
EJADA	Euro-Jordanian Action for the Development of Enterprises
EMP	Environmental Management Plan
EPP	MOP Enhanced Productivity Program
EU	European Union
EUREPGAP	Euro-Retailer Produce Working Group Good Agricultural Practice
FAO	The Food and Agricultural Organization of the United Nations
FMR	Financial Monitoring Report
GALP	Germplasm for Arid Land Program
GCEP	General Corporation for Environment Protection
GEF	Global Environment Facility
GIS	Geographic Information Systems
GOJ	Government of Jordan
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
IAPSO	Inter Agency Procurement Services Office
ICARDA	International Center for Agricultural Research in the Dry Areas
IFAD	International Fund for Agricultural Development
IPM	Integrated Pest Management
IPR	Intellectual Property Rights
IUCN	The World Conservation Union
JEPAFV	Jordan Exporters and Producers Association for Fruit and Vegetables
JICA	Japan International Corporation Agency
JSCD	Jordan Society to Combat Desertification
JSEP	Jordan Society for Environmental Protection
M&E	Monitoring and Evaluation System
M/H	Medicinal and Herbal (plants)
MHAEP	Medicinal Herbs Agri-Enterprises Project
MNA	Middle East and North Africa
MOA	Ministry of Agriculture
MOE	Ministry of Education

MOENV	Ministry of Environment
MOH	Ministry of Health
MOIT	Ministry of Industry and Trade
MOP	Ministry of Planning
MOU	Memorandum of Understanding
NCARTT	National Center for Agricultural Research and Technology Transfer
NCC	Nature Conservation Club
NEAP	National Environmental Action Plan
NGO	Non Government Organization
NHF	Noor Al-Hussein Foundation
NSAD	National Strategy for Agricultural Development
OP	Operational Program
PAD	Project Appraisal Document
PCD	Project Concept Document
PCMU	Project Coordinating & Monitoring Unit
PDF	Project Development Funds
PIP	Project Implementation Plan
PMU	Project Management Unit
PRA	Participatory Rural Appraisal
RCCDP	Rural Community Cluster Development Program
RM	Rangeland Management
RSCN	Royal Society for the Conservation of Nature
SOE	Statement of Expenditures
STAP	Scientific and Technical Advisory Panel
TA	Technical Assistance
TOR	Terms of Reference
UNEP	United Nations Environmental Programme
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
USDA	United States Department of Agriculture
WHO	World Health Organization

Vice President:	Jean-Louis Sarbib
Country Manager/Director:	Joseph P. Saba
Sector Manager/Director:	Salah Darghouth/Letitia A. Obeng
Task Team Leader/Task Manager:	Nicole Glineur

JORDAN
CONSERVATION OF MEDICINAL AND HERBAL PLANTS PROJECT

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JORDAN
Conservation of Medicinal and Herbal Plants Project

GEF Project Document

Middle East and North Africa Region
MNSRE

Date: March 5, 2003 Sector Manager: M. Salah Darghouth Country Director: Joseph Saba Project ID: P069847 Focal Area: B - Biodiversity	Team Leader: Nicole Glineur Sector(s): General agriculture, fishing and forestry sector (100%) Theme(s): Biodiversity (P), Other environment and natural resources management (S), Gender (S)
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Project Financing Data

Loan Credit Grant Guarantee Other:

For Loans/Credits/Others:

Amount (US\$m): \$5.00

Financing Plan (US\$m):	Source	Local	Foreign	Total
BORROWER/RECIPIENT		5.71	0.00	5.71
GLOBAL ENVIRONMENT FACILITY		0.00	5.00	5.00
FOREIGN SOURCES (UNIDENTIFIED)		3.50	0.00	3.50
Total:		9.21	5.00	14.21

Borrower/Recipient: HASHEMITE KINGDOM OF JORDAN

Responsible agency: THE ENHANCED PRODUCTIVITY PROGRAM (EPP) OF THE MOP

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Estimated Disbursements (Bank FY/US\$m):

FY	2004	2005	2006	2007	2008			
Annual	1.50	1.30	0.80	0.80	0.60			
Cumulative	1.50	2.80	3.60	4.40	5.00			

Project implementation period: Over 5 years

Expected effectiveness date: 06/16/2003 **Expected closing date:** 06/16/2008

A. Project Development Objective

1. Project development objective: (see Annex 1)

The Development Objective of the proposed project is to design and test models to improve the conservation of medicinal and herbal plants and the livelihood of rural communities through the management, and sustainable use of medicinal and herbal (M/H) plants for human and livestock needs in specific areas of Jordan (the Central Upper Slopes of the Rift Valley and the Mujib Nature Reserve) while ensuring effective *in-situ* protection of threatened habitats and ecosystems in these areas.

Project Global Objectives: (see Annex 1)

The global environmental objective is the improved conservation and sustainable use of M/H plants (several of which are rare and endemic, and thus of global importance) at the national and the local levels for the selected areas through achieving the following targets over and above the Baseline Scenario: (i) establishing a framework for M/H plant biodiversity conservation and management, (ii) strengthening institutions and implementing a coordination program, (iii) promoting in-situ conservation and sustainable use of M/H plants in 2 pilot sites, and (iv) designing and implementing a communication strategy.

2. Key performance indicators: (see Annex 1)

The key performance indicators directly linked to the above development objectives are:

- Capacity established to sustainably manage the wild genetic resource base of M/H plants.
- Threats to M/H species are diminished and key biodiversity areas are identified and protected.
- A database, gene pool and monitoring system are established and operational.
- Active participation of communities in: conservation, management, and income generating programs established in project areas.
- Livelihood of rural communities improved.
- Public awareness, including environmental education of M/H plants improved.

B. Strategic Context

1. Sector-related Country Assistance Strategy (CAS) goal supported by the project: (see Annex 1)

Document number: 25228-JO **Date of latest CAS discussion:** January 2003

1a. Global Operational strategy/Program objective addressed by the project:

The World Bank Country Assistance Strategy (CAS) of Jordan emphasizes a development agenda based on the core themes of: (i) accelerating economic growth, emphasizing higher level of private investment, export development and tourism; (ii) promoting human development; (iii) undertaking public sector reforms; and (iv) improving water resource management and environmental protection. The proposed project is fully consistent with the CAS as it would support theme (iv) through micro-catchment initiatives, more effective wastewater use and the protection of endangered species and fragile ecosystems. It would also contribute to the other themes with varying degrees through the promotion of sustainable use and management of M/H plants and their further processing. Specific project actions that support the CAS goals are (i) social and rural development through capacity building; (ii) poverty

reduction through income generating activities and better management of high demand natural resources; and (iii) involvement of the private sector.

The project also covers many goals highlighted in the World Bank Middle East and North Africa (MNA) Region Strategy Paper. The target for regional development is to focus on five areas namely: (i) Public sector efficiency; (ii) Private sector development; (iii) Education; (iv) Water; and (v) Gender. The project is aligned with all aspects of the MNA strategy directly and indirectly. In Jordan, women are intimately involved in the collection and use of M/H plants. One aim of the project is to train women (and other disadvantaged people) in the conservation and sustainable management of M/H plants, both *in-situ* and *ex-situ*, and to use these plants to develop products that will bring them greater benefit. The cultivation of M/H plants is a potentially viable income generation activity for resource-poor people, in particular women who undertake about half the gathering, processing and marketing of M/H plant materials. The public sector, in particular National Center for Agricultural Research and Technology Transfer (NCARTT) of the Ministry of Agriculture (MOA), in association with the private sector will assist the women and other community groups in demonstrating various techniques, including water harvesting and waste water use, to improve the management and use of M/H plants. Additionally, part of the project covers formal and informal environmental education, especially relating to M/H plants, the establishment of a database and gene pool for such plants and access to micro-credit to encourage cottage industries base on these sustainable resources.

The proposed project also supports the MNA Rural Development Strategy through: (i) promoting sustainable use of natural resources; and (ii) attenuating vulnerability of rural populations.

1.(b) GEF Global Operational Strategy/Program Objective Addressed by the Project:

Jordan signed the Convention on Biological Diversity in 1992. Thus, the objectives of this project are in line with the policy of Government of Jordan (GOJ) and are fully consistent with the GEF Operational Program 1 on "Arid and Semi-Arid Zone Ecosystems." Whereas the main thrust of the project is biodiversity conservation, the project has vital components and cross links to land degradation and desertification. In addition, the project is consistent with the GEF Operational Strategy for Biodiversity, as well as Article 8 (j) of the Convention of Biological Diversity (CBD) regarding the protection and conservation of M/H plants, capacity building and protection of indigenous knowledge. Also, the project's objectives are consistent with the GEF Operational Program 13 "Conservation and Sustainable Use of Biological Diversity Important to Agriculture."

Global Importance

The flora of Jordan is rich in medicinal and aromatic plants, as well as herbs and spices, mainly the *Umbelliferae*, *Labiatae* and *Compositae*. Many of them grow in sub-serial or successional communities in various states of ecological development or degradation, and are adapted to arid or semi-arid conditions. M/H plants in Jordan are distributed all over the country from the eastern desert to the western highlands and from the semi-arid north to the extremely arid south. The importance of these plants as a source of preventive and/or curative health value (for both people and livestock) has been recognized by local people since time immemorial. A few studies related to the identification of endemic, rare and endangered flora have been carried out in Jordan. An estimated 100 species of endemic plants comprising about 2.5 % of the total flora are recognized. A total of 485 species of medicinal plants, which belong to 330 genera and 99 families, are reported from Jordan (Oran and Al-Eisawi, 1994). The identified medicinal plants are herbs, shrubs and trees. The endemic species include *Iris petrana*, *Cousinia dayi*, *Plantago maris-mortui*, *Crucianella transjordanica*, *Centaurea procurrens*, *Scrophularia nabataerum*, *Tamarix tetragyn*, and *T. palaestina*. A preliminary survey by the

Royal Society for the Conservation of Nature (RSCN) in the Mujib Nature Reserve identified the presence of rare species including *Adiantum capillus-veneris*, *Sternbergia clusiana*, *Pistacia atlantica*, *Caralluma aaronis*, *Pergularia tomentosa*, *Equisetum ramosissimum*, *Crocus moabiticus*, *Micromeria sinaica* (endemic; also on IUCN list), *Teucrium leucocladum*, *Ajuga chamaeptytis*, *A. iva*, *Lavandula pubescens*, and *Withania somnifera* (new to the area). Endemic species in the Mujib Nature Reserve include *Withania obtusifolia*, *Micromeria sinaica*, and *Crocus moabiticus*. (See Annex 8: Documents in Project File for a detailed listing in the Mujib Nature Reserve and other rare and endemic M/H species in Jordan).

Jordan's flora is considered rich and diverse due to its location at the junction of three continents: Europe, Asia and Africa. Al-Eisawi (1985) indicated the presence of four bio-geographical regions and thirteen vegetation types. Since time immemorial, M/H plants have played important roles, including furnishing ecological, genetic, social, cultural, economic, and scientific values (Al-Khalil, 1995; Al-Eisawi and Takruri, 1989). In addition to enhancing health care and rural well being for local communities, many M/H plants contribute to reducing soil and water loss as they cover about 20% of the rangeland and forest areas in Jordan.

The major difficulties in assessing the importance of M/H plants and developing a strategy for their conservation and sustainable use are: insufficient knowledge concerning the species that are used, their detailed distribution, how they are collected or harvested, the species in cultivation (by location), the quantities involved in collection, consumption, and the quality and quantity of species traded, etc. Trade statistics are notoriously unreliable as is the identity of material traded under such names as oregano; this covers plants belonging to more than one genus and several species. Some countries, e.g. Spain, have produced acceptable assessments of the uses and trade in medicinal and aromatic plants, while important surveys for other Mediterranean countries have been prepared under the auspices of the MEDUSA¹ organization as part of data gathering regarding the potential for sustainable use of wild species of the region. However, for most parts of the Mediterranean, detailed information is lacking and an overall survey for the region would be a significant contribution towards developing a strategy for this important group of plants. One aim of the project is to establish a database of all M/H plants and to undertake an oral survey of the past and present uses, including the use for and by domesticated animals.

The sector is undergoing major changes. The domestic demand for M/H plants and their extracts is increasing and is satisfied through over-harvesting of wild plants, a little cultivation, or by substitutable import crops, which amount to about US\$ 6 million per year, with exports about \$ 0.4 million annually. The project intends to promote the sustainable use of M/H plants, through managing the wild plants and by increasing, where possible, the *ex-situ* cultivation of the high-demand species.

2. Main sector issues and Government strategy:

In June 1998, the General Corporation for Environment Protection (GCEP-transformed into the Ministry of Environment since January 2003), in collaboration with the United Nations Environmental Programme (UNEP), and the United Nations Development Programme (UNDP), prepared the Jordan Country Biodiversity Study. One of the long-term objectives of this study is to ensure the protection and conservation of the broadest possible range of global biodiversity and its rational use. The proposed project is consistent with the recommendation of this study to carry out

¹ MEDUSA is an acronym for the 'Identification, Conservation and Use of Wild Plants in the Mediterranean Region'. It was formerly established in June 1996 by CIHEAM (Centre International des Hautes Etudes Agronomiques Méditerranéennes) and its constituent organ MAICh (Mediterranean Agronomic Institute of Chania). The Network is financially supported partly by the Directorate General I of the E. U. and partly by CIHEAM.

extensive work to protect Jordan's rich diversity of M/H plants. The commercialization of M/H plants is also recognized as a key component of GOJ's poverty alleviation and rural development objectives. The project is also consistent with the 1996 National Environment Action Plan's (NEAP) recommendation to improve measures to combat Jordan's loss of its natural heritage embodied in M/H plants.

Environmental Law No. 12, Article No. 21, of 1995 states that "Regulations shall determine the specifications and conditions that must be found in any natural reserve for wild and marine life or national parks, and the preservation and environmental protection thereof". The Royal Society for the Conservation of Nature (RSCN) is mandated to establish and manage wildlife reserves in Jordan under the supervision of the Ministry of Environment (MOENV). The 1996 Charter of the Ministry of Agriculture (MOA) recognizes the importance of conservation and sustainable use of M/H plants to meet agricultural diversification objectives and enhance the efficiency of land and water use. In December 2002, GOJ endorsed the National Strategy for Agricultural Development (NSAD) for the decade ending in 2010. The strategy highlights the importance of conserving and expanding M/H plants in the environmental and production systems in Jordan and has identified M/H plants as one of the six priority areas under the rain-fed agriculture sector that should be implemented to achieve the Strategy's goals and objectives. Within MOA, the National Center for Agricultural Research and Technology Transfer (NCARTT) is mandated to conserve M/H plant genetic resources, identify cultivation practices, and, where appropriate, seek the cropping of M/H species with commercial value.

Despite the fact that conservation of M/H plants figure as priorities in the NEAP (1996), the Jordan Country Biodiversity Study (1998), and the NSAD (2002), no work has been undertaken in this field except for those conducted during the implementation of the GEF PDF-Block B grant.

The GEF PDF-Block B grant studies included obtaining preliminary baseline data to: (i) establish a M/H plant inventory; (ii) estimate the demand and supply of M/H plants used for human and livestock health care and other needs; (iii) compile a database of M/H plants; and (iv) list M/H species suitable for possible *ex-situ* cultivation to relieve *in-situ* pressure. Information from these studies was instrumental in formulating the sector issues and designing some of the project components. As such, the following sector issues were identified as priority issues to be addressed: (i) lack of institutional and technical capacity; (ii) lack of understanding and addressing of the causes of biodiversity loss and barriers to its sustainable use; (iii) lack of demand responsive applied research; and (iv) lack of product and market development approaches.

At present, there is little capacity to implement the project's development objective and no clear mechanism to facilitate effective collaboration and cooperation between MOENV, MOA, MOH, RSCN, other ministries and agencies, the private sector, NGOs, and the users regarding the long-term conservation, management and sustainable use of M/H plants in a manner that would fulfill the objectives identified above. Hence, there will be strong emphasis in the project on capacity building.

3. Sector issues to be addressed by the project and strategic choices:

The proposed project will be the first to address the conservation of M/H plants and give concrete content to the field of M/H plants, thereby addressing the priorities of the NEAP (1996), the Jordan Country Biodiversity Study (1998) and the NSAD (2002). Furthermore, it will initiate and strengthen the institutional and technical capacity of key partners in this area including: EPP/MOP, MOA/NCARTT, RSCN, the private sector and the subsistence farming community, with a special focus on increasing community participation and empowering women.

The over-harvesting and over-grazing of M/H plants in their natural habitats, combined with the increasing demand for such plants, have led to depletion of natural stocks in the wild. The project will address the root causes of biodiversity loss and barriers to sustainable use. The project will provide essential links between the *in-situ* conservation activities and the propagation of M/H plants *ex-situ* to relieve *in-situ* over-harvesting and over-grazing pressures, hence ensuring conservation *in-situ* of global species. The project will enhance GOJ strategy by: (i) promoting sustainable management systems in *in-situ* pilot sites, (Section C.1, Component 2, which addresses collection practices, grazing agreements, etc.); and (ii) identifying cultivation practices for high-demand M/H plants used for human and livestock health care and other needs.

The project also responds to the feedback obtained throughout preparation from all stakeholders (from subsistence farmers to the private sector), i.e. that NCARTT should move away from supply driven research towards demand responsive applied research on the ground. During project preparation, NCARTT has already initiated this instrumental strategic shift through listening and responding to the demands of all stakeholders and involving for the first time the private sector. This strategic shift should fully materialize through the implementation of the concrete on-the ground activities with subsistence farmers, NGOs and the private sector of Component 2.

A non-GEF component focusing on sound product and market development will contribute to the sustainability of the project by providing market outlets for rural communities involved in M/H plant cultivation. To this end, the project will facilitate a process of close collaboration between relevant institutions and organizations such as MOA, especially the veterinary department and MOH to enhance the conservation, management and sustainable use of affordable phytomedicines as well as to foster private sector investment in this area.

In summary, the strategic choices initiated by this project are: strengthening the institutional and technical capacity of key partners, including partnering with the private sector for the first time; addressing the root causes of biodiversity loss and barriers to sustainable use; moving away from supply driven research towards demand responsive applied research on the ground; and fostering product and market developments, through participatory approaches involving all stakeholders. The adoption of these strategic choices should result in best practices to protect and manage M/H plants, which could be replicated to other sites in Jordan and elsewhere in the Middle East Region.

C. Project Description Summary

1. Project components (see Annex 2 for a detailed description and Annex 3 for a detailed cost breakdown):

The proposed project components will comprise of activities at the national level and at the site-specific level. GEF will fund the incremental costs of the first three components. MOP is funding Component 4 for 2003 and 2004 in the amount of \$1.4 million. The activities funded by MOP under Component 4 are to start by March 2003. MOP has committed to secure funding for the total amount of \$3.5 million over the life of the project. Securing remaining funding of \$2.1 million for the implementation of this component will be part of the PMU's activities, with support from the EPP/MOP and the World Bank.

Component	Indicative Costs (US\$M)	% of Total	Bank financing (US\$M)	% of Bank financing	GEF financing (US\$M)	% of GEF financing
1. Institutional Strengthening	2.54	17.4	0.00	0.0	1.95	36.4
2. Pilot-Sites Conservation	6.92	47.5	0.00	0.0	2.71	50.7
3. Public Awareness and Education	1.25	8.6	0.00	0.0	0.34	6.4
4. Income Generation	3.50	24.0	0.00	0.0	0.00	0.0
5. PDF-B	0.35	2.4	0.00	0.0	0.35	6.5
Total Project Costs	14.56	100.0	0.00	0.0	5.35	100.0
Total Financing Required	14.56	100.0	0.00	0.0	5.35	100.0

Component 1. Institutional Strengthening (US\$ 2.54 million)

This component focuses on strengthening the institutional and technical capacity of key players. Six sub-components are included as follows:

1.1 Developing and providing an organizational mechanism for project implementation. A Project Management Unit (PMU) will be established to implement the project. Apart from management, administration, finance and procurement, the PMU will be charged with monitoring and evaluating the various components and sub-components, and developing training and public awareness programs.

1.2 Developing crucial inter-sector links (MOA, MOE, MOIT, MOH, MOENV, NGOs, pharmaceutical industry, consumers, producers) and regulatory instruments. The institutional arrangements will be agreed between the concerned ministries (MOA, MOH, MOP, MOENV), the government bodies (Governorates), and representatives of producers, consumers and private industry. These links will be reflected in the Steering and Technical committees, which will weigh in on topics like strengthening national policy and regulatory capacity. In addition, the Steering Committee will ensure the smooth running of the project, and thereby support the conservation of M/H plants and their sustainable expansion and use.

1.3 Developing intellectual property rights (IPR) policy and guidelines for indigenous knowledge and use of M/H plants for medical and other purposes by humans and livestock. A committee will formulate the policy and guidelines. This will be carried out in collaboration with the Achievement of Market Friendly Initiatives and Results Program (AMIR), funded by USAID. Part of the committee's task will be to record the oral history of past and present use of M/H plants.

1.4 Establishing health and safety standards for M/H plants and products. In line with the MOENV Biodiversity Strategy, the establishment of standards and international certification practices will be instrumental to *in-situ* protection as they would result in the disqualification of harvested M/H plants *in-situ* due to their high dust content, hence directly increase their protection. The MOIT Bureau of Standards will be involved in this effort to formulate standards for M/H plants and their products, work out testing methodologies with the pharmaceutical and food industries, agree on safe dosages and award seals of approval for products complying with the standards, etc. In addition, international certification of organically grown M/H plants will be adopted and legally endorsed and national certification procedures will be based on these practices. Independent certification personnel will be trained and registered and farms will have to comply with procedures in order for their crops to qualify as sites of organically grown products. The Jordan Exporters and Producers Association for Fruit and Vegetables

(JEPAFV) may also play a role in the certification of M/H plants for export under EUREPGAP standards. This will also be carried out in close collaboration with AMIR.

1.5 Establishing a national M/H plants database/GIS and plant gene bank that will provide an inventory of Jordan's M/H plant species, distribution, status (common – rare) and an herbarium collection. The gene bank will be linked to the global field crop gene bank. This data base and gene bank will act as a pool of rare and endangered species and form the basis for propagating such species as well as a source for expanding the commercial production of M/H plants.

1.6 Capacity Building through designing and implementing a Training Program. The training program will include: short-term on site instruction courses for counterpart and project staff; short-term workshops, courses, study tours, staff exchange, information sharing, educational visits both in and outside Jordan; training for local communities on topics including on IPM; graduate applied research grants for on-the-ground transfer of knowledge. Further design and implementation of the training program will be coordinated by the PMU and delivered through Components 1.6, 2, and 3.1.

Component 2. Pilot-Sites Conservation (US\$ 6.92 million)

As part of the PDF-B preparation process, studies and baseline surveys were undertaken relating to M/H plants, namely: an inventory; cultivation practices; a database; a socio-economic survey; and an institutional capacity assessment. These studies and survey results were used in formulating the project. They are available as working papers (Annex 8). During implementation, the baseline surveys will act as reference points when judging the project's progress. Similar surveys will be undertaken as part of the monitoring and evaluation process as a main PMU function. The two conservation sub-components covering (i) the *in-situ* conservation and use of M/H plants and (ii) the *ex-situ* pilot cultivation of selected M/H plants to relieve *in-situ* pressure were formulated based on the results from the above surveys. They are summarized below.

2.1 *In-situ* conservation and sustainable use of M/H plants. During the survey of M/H plants, ten areas were highlighted as potential conservation sites. Initially, it was felt that the project could only handle two areas, based on the institutional capability and available funds, (see Section D. 1). The two pilot areas for *in-situ* conservation are Mujib Nature Reserve adjacent to the Dead Sea, and the Central Upper Slopes of the Rift Valley covering the Madaba area. These areas cover important sites of M/H plants. Other areas can be incorporated into M/H plants conservation in later periods, based on the experiences gained from these pilot initiatives.

- The Mujib Nature Reserve is a 215 sq. km reserve, adjacent to the Dead Sea, in the central-west region of Jordan. While the reserve is Department of Forestry (DOF) land, the DOF has delegated its management to the Royal Society for the Conservation of Nature (RSCN). The rainfall in this reserve ranges from 250 to 350 mm and is a water-stressed and eroded area. Four bio-geographical regions can be found in the Mujib Nature Reserve, namely, Irano-turranian, Sudanian, Transitional Mediterranean, and the Mujib river. Out of the thirteen vegetation types existing in Jordan, four are present in the reserve containing 396 identified flora and fauna species. These vegetation types are: Non-forest Mediterranean Steppe, Steppe, Wadi Systems, and semi-tropical. A vegetation survey, including M/H plants, was undertaken by the RSCN. Communities inside and outside the reserve graze sheep and goats. Grazing areas and grazing patterns within the reserve were agreed upon by the shepherds and RSCN, and have been followed except during drought. This working relationship will serve as a basis for the identification and conservation of M/H plants and to gather information from shepherds and their families as to the traditional uses of these plants. Such information will be

used to formulate management plans for the sustainable use of these resources. Because of the high water stress levels and the incidence of severe erosion, the management plans will incorporate water conservation measures such as micro-catchment and erosion control initiatives, including the planting of local M/H shrubs and trees. Individual areas will be used for demonstration purposes as well.

- The Central Upper Slopes of the Rift Valley. The National Center for Agricultural Research and Technical Transfer (NCARTT) started preliminary work in the field of M/H plants two years ago in the Madaba area. Field trials for thyme, cumin, chamomile and other high-demand medicinal, spice and essential oil species have been planted with the objective of identifying sustainable cultivation practices under rainfed condition. Such areas and information will be used as part of the *ex-situ* sub component. Within this rift valley area, some *in-situ* "Hotspot" sites for the conservation and management of M/H plants have been identified and others will be investigated. The annual rainfall ranges from 300 to 500 mm and, therefore, the area contains different classes of flora (and fauna) compared to Mujib Nature Reserve. Managing the M/H plants in this area may be somewhat different than in the Mujib Nature Reserve because of the greater biomass production and thus, a larger carrying capacity for livestock. Again, demonstration plots will be established to show improved management techniques to local farmers and communities in similar agro-ecological zones.

Site community management plans will be developed and implemented to enhance the sustainable use of M/H plants in the above 2 pilot *in-situ* areas. These plans include grazing agreements with the local community, water-catchment and harvesting measures, enrichment planting, contour planting with shrubs to reduce erosion and planting at right angles to the prevailing wind with M/H shrubs and trees (including nitrogen fixing perennials) to improve the micro-climate, soil fertility and provide nutritious feed for the animals, and preparing guidelines for sustainable harvesting. In addition, income-generating activities will be promoted based on local resources, and mitigation measures to relieve population pressures in the project sites will be pursued. As the two sites will be implemented by different entities (RSCN and NCARTT), there should be a healthy competition to out-perform one another. However, at the same time there should be cooperation and a constant flow of information and ideas between the entities, encouraged as need be by the PMU.

Part of the task for each agency will include: (i) preparation and implementation of site conservation management plans, including development and implementation of appropriate management tools for sustainable use of M/H plants and their products, where warranted; (ii) piloting of farmer-based cultivation trials for a selected number of threatened and indigenous medicinal species in home gardens, and as boundary and buffer zones in the reserve; and (iii) monitoring and evaluation. All these sites will have demonstration components so that lessons learned can be passed on to farmers in the area and in similar agro-climatic zones. Also, the best practices could be transferred to some or all of the other eight sites identified for conservation in the preliminary survey.

2.2 Ex-situ cultivation trials. As mentioned above, trials in the *in-situ* areas could be used for *ex-situ* production of M/H plants to relieve *in-situ* pressure. Two types of trials will be tested under this sub-component: (2.2.1) *ex-situ* farming demonstrations, and (2.2.2) pilot-prototype farm demonstrations.

2.2.1 Ex-situ farming demonstrations. Based on the results of the Socio-economic Survey undertaken during the PDF-B phase, villagers/farmers will have be identified for on-farm pilot propagation and cultivation trials of M/H plants to remove pressure on wild populations. This should include pilot cultivation trials of threatened, rare and high demand M/H plants used for human and livestock health care, culinary purposes and even species used by the cosmetic industry.

As stated above, NCARTT has started trials under rainfed conditions with thyme, cumin, black cumin, chamomile and other M/H plants at their research center at Madaba. Their objective is to demonstrate cost-effective and profitable cultivation methods for various high-demand M/H species that can be reproduced by farmers at minimal cost and, at the same time, give added-income, provide increased crop diversification and make better use of available moisture. At present, the farmers provide some land as demonstration plots, but NCARTT plants, cultivates and harvests the various species and takes a percentage of the harvest. However, once the techniques have been thoroughly tested, the farmers should be ready to undertake all the activities themselves. In order to promote M/H plants it is envisaged that nurseries will be established, first by the project, but later as private nurseries. Training will be given on project nurseries in the production of M/H seedlings and cuttings.

Other areas will be identified throughout the country and a plan will be drawn up to extend *ex-situ* planting over the lifetime of the project. All activities in the *ex-situ* initiatives will serve a demonstration purpose. Thus, farmers from all over Jordan and beyond are expected to visit the sites to observe and learn new techniques. Information will be provided to all interested parties including mass-media initiatives. This will be part of Component 3: Public Awareness and Education.

2.2.2 Pilot-Prototype Farm Demonstrations at ECOHERB Farms of Jordan (EFJ). The transfer of NCARTT's knowledge base as further developed by EFJ, based on its own knowledge bank and continuous research at its prototype farm, will be instrumental in providing incentives to M/H plants farmers. The project will support demonstrations in this pilot-prototype farm in implementing the following strategy to develop the *ex-situ* cultivation trials in Jordan:

1. The screening process for the M/H plants to be cultivated in the *ex-situ* farms will be developed.
2. In order to encourage the adoption of sound environmental practices, Integrated Pest Management (IPM) and nitrogen fixing plants will be promoted and organic farming will be encouraged. Standards will be used for the dosage and purity of M/H plants and these will comply with international norms. Potential *ex-situ* farms will be identified for organic practices and certified as organic farms if they meet all the criteria. These farms will serve as prototypes for future expansion of organic farming practices for M/H plants. EFJ will also lobby and assist in developing quality benchmarks for various endogenous M/H plants. The objective will be to equate Jordanian *ex-situ* M/H plants with the connotation of high quality and specific standards, thereby enhancing the protection of *in-situ* plants.
3. So as to contribute to the sustainability of the protection of *in-situ* plants by limiting harvesting and processing to *ex-situ* sites, organic cultivations practices will be introduced for graduation into organic cultivation practices within the time required for certified conversion and a label will be developed for organic quality products for Jordan.
4. A prototype contract-farming model to standardize the relationship between the growers and EFJ will be developed. This will contribute to propagating threatened M/H plants outside the *in-situ* areas.
5. Stakeholders in the M/H plants sector will be trained on the ground in environmentally friendly techniques and procedures so as to conform to European cultivation and processing standards.
6. The level of progress of the *ex-situ* cultivation will be monitored and evaluated. Corrective measures will be taken as necessary.

Component 3. Public Awareness and Education (US\$ 1.25 million)

This component would include the development of public education (including school and college curricula) and mass awareness campaigns on the relevance of conserving and managing Jordan's M/H plants and their importance in the country's biodiversity. It will be carried out in cooperation with NGOs, schools, universities, and the private sector. It consists of two sub-components.

3.1 Environmental Education. Consultants hired through the project will work closely with the Ministry of Education to expand environmental education to include information about M/H plants and their importance in Jordan. Schools will be encouraged to establish or expand school nurseries and raise M/H plants for the children to plant at school or take home to gardens. At the tertiary level, technical colleges and universities will be lobbied to introduce or expand courses in M/H plants and their products. M.Sc. and Ph.D. students will conduct applied research with farmers and/or the private sector, in topics pertaining to various aspects of M/H plant establishment, tending, harvesting and product manufacture. At the informal level, environmental education will be provided to relevant communities.

3.2 Public Awareness. Public awareness covers a whole gamut of activities including: distributing information to the stakeholders through the project Website, leaflets, newsletters, reports, etc.; providing the mass media, (e.g. radio and TV stations) with information and videos about the project; publishing articles in scientific journals; exchanging information with farmers, communities, government and donors; and delivering workshops and training courses for the beneficiaries. In this sub-component, emphasis will be given to the needs of disadvantaged groups and women in particular. A detailed training program and public awareness initiatives will be outlined by the start of the project.

Component 4. Income Generation Activities: M/H Quality Enhancement, Product Development (US\$ 3.5 million)

One of the best ways to conserve plants is to ensure that they have actual or potential economic value (see Annex 17). Then farmers will look after them in the wild, want to manage them sustainably and grow them *ex-situ* as a cash crop. The purpose of this component is to add value to M/H plants for local use and for exports by producing organically grown and certified plants, ensuring proper handling and grading of M/H plants, and using the correct processing procedures to ensure quality products. This will be backed up by providing market intelligence to the farmers and producers and searching for new markets and products based on M/H plants. In order to ensure that the disadvantaged, including women, can play an active role in the M/H plant industry (from growing to the finished product), the availability and access to micro-credit schemes will be essential.

Three sub-components will be included as follows:

4.1 Standardization of M/H plants raw materials and processing. This covers a whole range of activities from cleaning the raw material to quality control. Product preparation includes cleaning, grading, labeling and compliance with standards. Processing covers extraction, purification, chemical analysis and quality control. For all these activities standards have to be set, people trained, equipment (from cleaning to chemical analysis) has to be in place and there has to be good market intelligence for the kind and quality of products required. The pharmaceutical, cosmetics and food processing industries will be partners in this sub-component and will be encouraged to research the making of new or improved products.

4.2 Product promotion. Income generation through product promotion is a vital ingredient for the development of the M/H plant sector. At present, it is estimated that the annual imports of M/H plant products is of the order of US\$ 6 million, whereas exports are under \$0.4 million. Many of the M/H plant products that are imported could be produced from indigenous M/H plants. Also, Jordan has some unique M/H plants, but these are usually exported in the unprocessed state, with little value added. Therefore, this sub-component includes providing information on packaging, pricing, processing, marketing opportunities, market niches and general market intelligence for M/H plants and products. Similarly, the pharmaceutical, cosmetics and food processing industries will be partners in this sub-component. Training will be given in all aspects of promoting and trading goods, including contract and product liability, etc.

4.3 Facilitating Access to Micro-Credit. Obtaining credit for income generating activities is vital, especially for the disadvantaged who have little, if any, collateral as a loan security. Cooperative arrangements with on-going initiatives that provide micro-credit to the poor, including the Enhanced Productivity Program of the Socio-Economic Development Programme, King Abdullah II Foundation, and USAID's Jordanian-US Business Partnerships, will be explored.

2. Key policy and institutional reforms supported by the project:

A key aim of the project will be to promote capacity building through the PMU and through the implementing agencies managing the pilot sites for the sustainable conservation and management of M/H plants. This will include strong collaboration between the relevant Ministries (Agriculture, Health, Planning, Education, Environment, Industry and Trade) and government bodies (Governorates), universities, the private sector, NGOs and donors. The Steering and Technical Committees (Annex 15) should cement this collaboration. Stakeholders will contribute to the conservation, management and sustainable use of M/H plants. A process to validate traditional phytomedicines will be established, building on traditional medicinal evaluation guidelines of the WHO.

3. Benefits and target population:

At the global level, benefits will be obtained through: (i) the protection of endangered species, (ii) the sustainable use of M/H plants and natural habitats, (iii) improved agro-pastoral practices, (iv) better water management and reduced erosion, (v) enhanced capacity building of government agencies, research institutes and communities and (vi) income generation for disadvantaged communities. At the regional level, the project would promote an inter-change of ideas and thus build capacity in dealing with the protection of M/H plants. Also, there would be a gene pool and a source of material to expand the production of endangered, rare or popular M/H species in Jordan and the region.

The primary beneficiaries would be the rural communities in and around the different project sites. While the project sites are not areas of high population density, they are inhabited by the poorest segment of the population. For example in the Central Upper Slopes of the Rift Valley, it is estimated that about 20 communities of 600 families would benefit from the *in-situ* activities in that area. They would benefit from on-farm improvements, clear guidelines for the management of M/H plants, improved marketing channels and alternative sources of income from M/H plants and other natural resources, such as honey production. This would include farmers, with a focus on women, as important producers of M/H plants in local communities. The health of communities and livestock will improve through the dissemination of reliable information on safety, efficacy and dosage levels of selected medicinal formulations. Global biodiversity would be preserved through the sustainable use of natural resources and rural communities will benefit from enhanced environmental, soil and water management.

4. Institutional and implementation arrangements:

Project implementation will be coordinated by a small Project Management Unit (PMU) housed with the Enhanced Productivity Program (EPP) of the Ministry of Planning (MOP). The PMU will be guided by a **Steering Committee**, to be chaired by the Secretary General of the Ministry of Planning. A **Technical Committee**, chaired by the Project Manager will have the mandate to provide technical guidance in implementation and monitoring and evaluation of activities. The composition of these committees is detailed below. The PMU will coordinate the activities of all implementing agencies: RSCN, NCARTT and NCARTT/EFJ as reflected in Annexes 12, 14, and 16. In addition, the project will link and coordinate with several key institutions to address project objectives: e.g. the MOP, MOA, MOENV, MOH, MOE, MOIT; NGOs; and the private sector. A five-year period is envisaged for the implementation of this GEF project. The project's management organigramme is presented in Annex 12.

The EPP meets the criteria necessary for optimal project implementation and sustainability. EPP is well positioned to provide the GOJ counterpart funding along with MOA and NCARTT, can attract external funding for the implementation of the fourth component, and has the environment to attract high caliber staff. The Government's commitment to the EPP, the flexibility and the accountability of the EPP are highly valuable essentials for project implementation. For the project to be successful, it is crucial that the PMU is able to operate in a flexible and transparent manner, as well as to attract competitively recruited eminent staff with project management experiences and TORs acceptable to the Bank.

During the early stages of project implementation, the performance of the PMU within the EPP will be closely monitored as it would be the first experience of EPP to channel GEF/World Bank funds with its multifaceted provisions. The EPP will establish the PMU and process essential procurement contracts prior to project effectiveness. MOP/EPP's contributions include: (i) input from staff counterparts: i.e. the EPP Project Coordinator and the EPP Contracting Officer as well as from other staff, such as the M&E and the Public Affairs officers, as warranted; and (ii) office space, equipment and communication tools (e-mail, direct phone and fax lines; and desk computers) and two vehicles. The EPP Project Coordinator will be directly responsible for the supervision of the project for the GOJ.

Co-financing is as follows: Total EPP contribution to the PMU is \$404,600 and this amount is included in the MOP/EPP 2003 budget. NCARTT counterpart funding of \$2 million consists of the secondment of 2 NCARTT staff full time to the lead M/H plants function, and input from the staff of 5 research stations, one vehicle and portable computer for the M/H plants lead specialist, operational cots, land rental, and agricultural equipment. RSCN counterpart funding of \$1.3 million includes allocation of: top management and operational staff time, vehicles, site-accommodations, and operating costs. GOJ's contribution to Mujib Nature Reserve land rental is \$1.21 million. ECOHERB Farms of Jordan's counterpart funding includes, management time, know-how, knowledge transfer, consultation services, offices, infrastructure, facilities and land amounting to \$790,000.

Project management:

The PMU will:

1. prepare annual work plans and budgets;
2. supervise implementation of project components;
3. ensure liaison, communication, collaboration, and joint problem-solving between the implementing entities and other stakeholders;
4. promote the active participation and contribution of the local population, the private sector, and NGOs;
5. procure services and equipment in accordance with World Bank procurement guidelines;

6. account for project expenditures and present accounts for audit annually; and
7. provide quarterly and annual progress reports in a format acceptable to the World Bank.

The PMU will coordinate the project activities of three implementation entities:

1. NCARTT which will implement the M/H plants database and gene bank (Component 1.6), the Central Upper Slopes of the Rift Valley *in-situ* subcomponent (Component 2.1) and part of the *ex-situ* sub-component (Component 2.2);
2. Royal Society for the Conservation of Nature (RSCN) which will implement the Mujib Nature Reserve *in-situ* component (Component 2.1);
3. ECOHERB Farms of Jordan (EFJ) which will implement the pilot farm of the *ex-situ* component with TA from NCARTT (Component 2.2).

The PMU will have a crucial coordinating role in linking the key players. NCARTT will have a prominent role as the technical service provider. The PMU will be staffed with a Project Manager, a lead local specialist in M/H plants; a Monitoring & Evaluation and Training Specialist; a Financial Management/Procurement Specialist (3 years); one Administrative Assistant and one Driver. Since this is a new area for Jordan, the positions of the project manager and the M/H specialist will be coupled with an international expert position for the first three years in order to transfer knowledge and technology. Terms of Reference for these positions are in Annex 13. Other local and international experts will be hired as consultants with expertise in fields such as M/H conservation techniques, monitoring and evaluation, standardization and certification, update of beneficiary and scientific surveys, etc. Each PMU position will have EPP or NCARTT staff as counterparts. All staff will be recruited competitively. Small implementation units will be established at the two pilot conservation areas. These units will be under the supervision of the PMU. Two organizations will manage these pilot sites, namely RSCN at Mujib Nature Reserve and NCARTT in the Central Upper Slopes of the Rift Valley. The PMU will be supervising all the component and sub-component activities outlined in Section C above.

Financial Management

The project will be implemented by a PMU to be housed in the EPP in the MOP. The PMU will be responsible for financial management of the project within the overall payment authority of the Finance Department of the MOP. The PMU will be responsible for maintaining all financial and accounting records, preparing accounting entries, reviewing, posting and preparing monthly bank reconciliations, as well as recording all disbursements from GEF funds. It will also prepare quarterly project Financial Monitoring Reports (FMRs) and the annual project financial statements and arrange for their auditing by a qualified auditor acceptable to the Bank. The PMU will be staffed with a qualified financial management specialist (FMS), who will be selected prior to Board presentation, to undertake these activities according to terms of reference acceptable to the Bank. In the meantime, the EPP has appointed a qualified consultant to prepare a financial management manual and design a computerized accounting system in order to have an adequate financial management system acceptable to the Bank in operation by September 30, 2003. The financial management manual will describe, inter alia, the project accounting policies and procedures, internal control procedures, key staff job descriptions, financial arrangements with other project stakeholders, disbursement from the Special Account, internal and external reporting and auditing arrangements.

FMRs will be prepared for the project on a quarterly basis within 45 days of the end of each quarter. The set of FMRs will include: (i) project progress summary; (ii) sources and uses of funds; (iii) costs planned and incurred during the quarter and to date per project component, along with explanations for major variances; and (iv) procurement summary for all contracts, including those below the prior review

threshold.

Auditing:

The PMU will appoint an independent auditor acceptable to the Bank, who will undertake an annual audit in accordance with International Standards on Auditing. The auditor will give an opinion on (i) the project financial statements (project balance sheet, Special Account statement, and cash flow); (ii) statements of expenses; and (iii) the special account. The audited financial statements, along with the auditor's opinion, will be sent to the Bank within six months of year-end.

Disbursement:

To facilitate project implementation and disbursement against eligible expenditures, assurances would be sought that a Special Account would be established in the Central Bank of Jordan, which would be operated under terms and conditions satisfactory to the World Bank (see Annex 6). The special account would have an authorized allocation of US\$500,000 and will be periodically replenished on the basis of withdrawal applications, which would be supported by appropriate documentation.

A well-designed **monitoring and evaluation system** (M&E) is critical to ensure the project's timely and successful implementation and to enhance its impact through a systematic analysis of lessons learned and their effective dissemination. The project's M&E will be the responsibility of the PMU. Monitoring will be based on the five baseline surveys already undertaken during the PDF-B phase. Further baseline surveys may be required in the Central Upper Slopes of the Rift Valley. The PMU will monitor and evaluate performance annually by conducting beneficiary surveys. In addition, scientific surveys should be undertaken every two years to monitor M/H plants and the farming systems, etc. and evaluate changes. In addition, under the umbrella of the Steering Committee, the EPP Monitoring and Evaluation Unit will carry out an independent M&E assessment every 6 months during the first year of the project.

The PMU will design a simple Management Information System for M&E, reporting formats for each component and sub-component, including targeted annual performance objectives and monitoring indicators using Annex 1 as the basis. Quarterly reports are required covering the implementation progress, the use of funds and the project's impact. These reports will be consolidated by the PMU into yearly progress reports to be submitted through the MOP to the Bank within two months of the end of the fourth quarterly report due on December 31. These progress reports will also include an implementation plan and a work program for the next year. The format of the reports will be agreed with the Bank. A mid-term review will be carried out to assess overall progress. Lessons learned, with recommendations for improvements, if any, would be used to restructure the project if necessary.

Composition of the Steering and Technical Committees (Annex 15)

The PMU will be guided by a **Steering Committee**, to be chaired by the Secretary General of the Ministry of Planning. The Steering Committee will itself consist of a core of five voting permanent members (the Secretary General of the Ministry of Planning, the Director of NCARTT, the Director of RSCN, the Chairman of EFJ and the Project Manager). In addition the Committee will include the Ministry of Health, the Ministry of Education, The Ministry of Environment, the Ministry of Agriculture, the Director of the MOP Department of Environment, Water and Tourism, the Director of the Department of Standards and Measurement of the Ministry of Industry and Trade, the EPP Acting Director and Project Coordinator, the Director of NCARTT, the Jordan Exporters and Producer's Association for Fruit and Vegetables, representatives from the farming community, and a representative of local communities. The project Steering Committee has the mandate to supervise and direct the implementation of the project activities (including the prompt resolution of bottlenecks) and will approve

annual work programs and budgets.

A **Technical Committee**, chaired by the Project Manager, will be composed of the heads of relevant project components or sub-components, the PMU staff, representatives of academia (Universities of Jordan and Science and Technology), the private sector, NGOs (Jordan River Foundation, the Hashemite Fund, the Noor Al Hussein Foundation and RSCN), an architect, and representatives of the EU, GTZ, and USAID. It will have the mandate to provide technical guidance in implementation and monitoring and evaluation of activities.

Role of MOA

The Minister of Agriculture is the head of NCARTT. As mentioned above, NCARTT will be the leading technical service provider. MOA will have a prominent role in the project in four areas as detailed below and reflected in Annexes 12, 14, 16, and 17: (i) The Director of NCARTT is a core member of the Steering Committee and the Secretary General is a committee member; (ii) NCARTT is seconding staff to the project (iii) NCARTT will manage the *in-situ* Rift Valley sites; (iv) NCARTT will provide technical support for the *ex-situ* component; (v) the national M/H plants database and plant gene bank will be managed by, and located in, NCARTT; and (vi) MOA will implement some activities under Component 4 as part of the National Strategy for Agricultural Development. In addition, NCARTT is providing counterpart funding for: 2 counterpart positions with the PMU, input from staff of 5 research stations, land, and equipments.

D. Project Rationale

1. Project alternatives considered and reasons for rejection:

At present, there has been little or no concerted effort or programs to conserve M/H plants in Jordan. The project preparation team considered the following options: (i) intensifying the proposed conservation strategy by including more pilot protection areas and broadening the scope of the project; (ii) using international agencies as executing agencies of the project; (iii) partnering with Rum Agricultural Company; and (iv) adding additional components and sub-components. These alternatives were rejected for the following reasons:

(i) Number of pilot areas. Originally ten sites were proposed as pilot areas. However, given: (a) the lack of capacity and resources; (b) the complexity of initially managing a large number of sites; and (c) the fact that it is the first time that a full-fledged project will address the priority issue of M/H plants conservation, it was concluded that such an ambitious program has little chance of succeeding. It was agreed that the project needs to focus on a limited number of sites with a large level of expressed community interest and a variety of problems to provide a broad range of lessons and achievements for future replication. Selection criteria for the sites included: incidence of globally significant medicinal plant species; occurrence of representative agro-climate zones; potential of threatened species to respond to conservation measures; and presence of communities with their income base mainly from pastoral agriculture. It is expected that the pilot activities to be carried out at the selected sites will provide “learning by doing” results, which will allow the transfer of positive management activities to other sites in the future and thereby enhance the project’s sustainability. At the PCD stage, three pilot sites were selected. Feedback on simplifying design for this first operation led to a reduction of the number of pilot sites to two for the first phase of the project (Mujib Nature Reserve and the Central Upper Slopes of the Rift Valley).

(ii) Using International Agencies as executing agencies of the project. Three alternatives, with

different international agencies were identified under the PDF-B Institutional Assessment. These alternatives are described in the PCD. However, GOJ and Bank practices dictate that existing country institutions should be chosen in order to build-up local capacity and to ensure the continuity of the initiative after the project ends. Therefore, these three alternatives were rejected. In addition, the suggested options of using RSCN and the Department of Forestry/MOA as executive agencies were explored. These options were also rejected because RSCN's experience in the production of M/H plants has only been acquired on a very small scale and DOF is already over committed. Thus, RSCN is an implementing agency of the project but not an executive agency.

Another option explored was having a PMU, with strong technical assistance. The PMU option was selected in order to maximize organizational, managerial efficiency; transfer knowledge to promote sustainability; prevent institutional overlapping; and optimize participation of crucial actors in the area of M/H plant conservation and management. The housing of the PMU was explored with many entities including: the Jordan River Foundation, JEPAFV, and EPP. GOJ considered that EPP was the best positioned to allow for the flexibility needed by the PMU to achieve project objectives.

(iii) Private Sector Partnership. One of the aims of the project is to encourage wide and open participation of the private sector in testing pilot prototype farms demonstrations which could be replicated to potential associations of subsistence farmers. The main criteria for participation are: readiness to work with communities and provision of substantial investment. During project preparation, extensive consultations with the private sector took place to enlist their support and participation in this project. Several workshops and subsequent meetings were held with the agricultural private sector at large which resulted in two companies (Rum Agricultural Company and EFJ) willing to partner with this project, including providing counterpart funding and readiness to work with the small farmers community at large. Whilst the Rum Agricultural Company met the criteria, given GOJ's strategy to phase out of agriculture in the Disi area, the Wadi Rum area was not considered suitable for participation in this project.

(iv) Additional components and sub-components. The following components and sub-components were originally envisaged: a research component; a M/H plants conservation policy initiative; additional socio-economic surveys versus updating of the ones already undertaken during preparation, etc. Under present conditions, these proposed components, while useful, would have added only a marginal contribution to the expected outcomes, while adding more burden to the management at greater costs.

2. Major related projects financed by the Bank and/or other development agencies (completed, ongoing and planned).

Sector Issue	Project	Latest Supervision (PSR) Ratings (Bank-financed projects only)	
		Implementation Progress (IP)	Development Objective (DO)
Bank-financed			
Improved Agriculture Practices	Jordan - Agriculture Sector Technical Support Project (ASTSUP) (P005321-LN.3818-LO)	S	S
Biodiversity Conservation	Second Tourism Development Project (JO-PA 35997, \$44 million, under Implementation)	S	S
	Strengthening of RSCN and Conservation of the Dana Wildlands (JO-UN20482, GEF/UNDP funding, Bank execution, completed)	HS	HS
Medicinal and Herbal Plants Conservation and Management	Sri Lanka Conservation and Sustainable Use of Medicinal Plants Project (P035828, GEF TF 028070, approved Dec. 18, 1997, \$5.0 million, under implementation)	S	S
	Ethiopia Medicinal Plant Conservation, Management and Sustainable Use Project (ET-PE-52315/ET-GE-35147, approved Feb. 15, 2001, \$1.8 million, under implementation)	S	S
	Ghana Northern Savanna Biodiversity Conservation (NSBC) Project (PO67685-LEN-BBGEF, \$ 7.6 million, under implementation)		
Other development agencies			
UNDP/GEF - Medicinal and Herbal Plants	Egypt - Conservation and Sustainable Use of Medicinal Plants in Arid and Semi-Arid Ecosystems (EGY/G3-/00, \$9.0 million, under implementation)		

UNDP/GEF-Agro Biodiversity in Agriculture	MNA Regional Use of Dryland Agro-Biodiversity Project (ongoing)		
ICARDA - Improved arid land management	Initiative for Collaboration to Control Natural Resource Degradation of Arid Lands in the Middle East.		
IFAD/ICARDA - Improved rangeland management	Rangeland Management in Faisaliy and Buseira Area		
UNDP/GEF SGP/Gvt of France	Conservation and Sustainable Use of Biodiversity in the Dibeen Nature Reserve (GEF \$1million-French Gvt. \$2.2 M)		

IP/DO Ratings: HS (Highly Satisfactory), S (Satisfactory), U (Unsatisfactory), HU (Highly Unsatisfactory)

3. Lessons learned and reflected in the project design:

This is the first fully fledged project in Jordan focusing on the conservation of M/H plants. Hence, lessons learned from experience gained elsewhere in this sector and, through community-driven development projects in general, will be incorporated into the project. These lessons include: (i) the project design should include technical and stakeholder reviews before it is finalized; and (ii) clearly defined goals and objectives are essential to focus project efforts, monitor progress, and to demonstrate impacts.

Important lessons emerging from ongoing M/H plants projects and community-based natural resources management projects are or will be used to develop this initiative. This knowledge will deepen through information sharing, study tours and staff exchanges throughout project preparation and implementation. The principal lessons from individual M/H plants projects considered by this project are as follows:

- Jordan: Conservation of the Dana Wildlands and Strengthening of the Royal Society for the Conservation of Nature [RSCN] (GEF/World Bank/UNDP). The key factor behind the success at Dana was the continuous involvement of the local population. By building on local skills and initiatives, opportunities were created to gain a livelihood from the nature reserve without destroying it. Carefully regulated eco-tourism provided other opportunities while “putting nature first”. The institutional strengthening component of the RSCN revitalized and presented it with a clear mission and a management by objectives system, with a trained and motivated staff. Most importantly, it gave it the will to make the protection of Jordan’s natural heritage succeed. This proposed project builds on that experience by including in the project design a participatory process involving all interested parties, especially local communities.
- The first Bank-GEF funded medicinal plant project was the 1998 Sri Lanka Conservation and Sustainable Use of Medicinal Plants. Five Medicinal Plant Conservation Areas (MPCAs) were identified with community participation. Communities are having difficulty in understanding that conservation does not exclude sustainable uses. To date, no actual demand has been determined for the medicinal plants identified in need of protection. Nurseries have been established in all 5

MPCAs and cultivation trials initiated. Plantations have also been established in second-growth areas around the MPCAs. The project is training 160 individuals in government and agricultural institutions who will serve as trainers of other villagers. The project has prepared IPR legislation documents: “Legal Framework to Safeguard Traditional Knowledge Relating to the Use of Medicinal Plants” and “Recommendations on New Legislation Required for the Regulation of Access to Genetic Resources”. These documents could be the model for other cases in the GEF portfolio, including this one, where similar questions arise.

- The Ethiopia Medicinal Plant Conservation, Management and Sustainable Use Project is supported by GEF and IDA/LIL funds. The objective of this project is the conservation, management and sustainable use of medicinal plants, and integrating selected phytomedicines and traditional health care into the primary health care system. Because there are 12 project stakeholders ranging from conservationists to bio-medicinal researchers, implementation was delayed by three months to ensure all participants fully understood their TORs and MOU. Stakeholder activities proceed according to an agreed schedule. The Project Coordinating and Monitoring Unit (PCMU) is based in the Institute for Biodiversity Conservation and Research and its position as lead agency was agreed to by all participating agencies. The PCMU has financial, procurement and disbursement officers who have developed a good working relationship with stakeholders. It benefits from a Technical Steering Committee, of whom many members were part of the development phase. Project management is also assisted by an Advisory Committee.
- The Ghana Northern Savanna Biodiversity Conservation (NSBC) Project's global objective is to improve the livelihood and health of communities through the conservation and sustainable use of natural resources, including medicinal plants. The project recognizes the role and knowledge of medicinal plant use by women, healers, and pastoralists. An important project component is the establishment of a close working relationship between the Ministry of Health and its Department of Traditional and Alternative Medicine and the lead ministry, namely the Ministry of Lands, Forestry and Mines. The latter is responsible for the conservation and management of natural resources, including M/H plants. IPR will also be addressed. The project has established good liaison with the healers in the three northern regions and will assist them to establish Traditional Healer Associations. Communities will be responsible for the identification of threatened high-demand M/H plants and, in collaboration with research scientists, identifying cultivation practices.

The objective of the GEF/UNDP Egyptian Conservation and Sustainable Use of Medicinal Plants in Arid and Semi-Arid Ecosystems project is to conserve globally significant medicinal plant species and associated habitats in St. Katherine's protectorate. The lessons learned are: (i) immediately document medicinal plant uses to highlight where conservation efforts are required and to provide market intelligence in efforts to promote M/H plant products and services; (ii) recognize that M/H plant use knowledge is an integrated part of their total economic value, hence clear policies and legislation recognizing the legal rights of individuals and communities should be affirmed; (iii) laws pertaining to IPR, trade regulations, proper handling and safe utilization of M/H plants are missing and need to be addressed; (iv) the subject of medicinal plant conservation requires effective coordination between government agencies, research institutions, NGOs and local beneficiaries with skilled team coordination and clear definition of roles and areas of expertise. These lessons were used in formulating this project.

4. Indications of borrower and recipient commitment and ownership:

Jordan ratified the Convention on Biological Diversity (CBD) on 12 November 1993 and the Desertification Convention in 1996. It has been one of the most successful countries at implementing key Community Driven Development (CDD) Conservation activities, including the "Strengthening of RSCN and Conservation of the Dana Wildlands Project" and the "Gulf of Aqaba Environmental Action Plan Project" .

The proposed project is consistent with the recommendation of the National Biodiversity Study (1998) that recommends more extensive work to protect Jordan's rich diversity of M/H plants. Sustainable use of M/H plants is one of the key priorities identified by the study. The 1996 Policy Charter of the Ministry of Agriculture explicitly recognizes the importance of conservation and sustainable use of these plants to meet agricultural diversification objectives and to enhance the efficient use of land and water.

In September of 1999, the Government requested assistance from the World Bank to prepare a project for the Conservation of M/H Plants. The PDF-B grant was executed by MOP and MOA/NCARTT. An inter-ministerial Steering Committee and a multi-member Technical Committee were formed to assist in its preparation. Although currently there is a lack of capacity, there is commitment at the highest levels to implement a model project for M/H plant conservation. Also, the Government has clearly stated that it has learned from the difficulties encountered during the implementation of the PDF-B grant. It is fully committed to ensuring that these difficulties are not repeated during project implementation.

5. Value added of Bank and Global support in this project:

The Bank and the GEF have fruitfully collaborated with GOJ in implementing CDD conservation activities, such as the "Strengthening of RSCN and Conservation of the Dana Wildlands Project", the "Gulf of Aqaba Environmental Action Plan Project " and the "Second Tourism Development Project". The Bank's involvement in the GEF-assisted M/H plant projects allows valuable lessons to be incorporated into this project and affords the opportunity to promote an exchange of ideas, facilitate cross-fertilization with other GEF-projects and create a M/H plants network.

The principal value added of GEF support is based on its global experience in designing, implementing and financing biodiversity conservation projects. The GEF support is justified by the global significance of M/H plants in Jordan, the existing threats to ecosystem integrity and species survival and the commitment of the Government and NGOs to implement the project. The GEF support will enable the project to target globally valued and threatened M/H plants and, to a limited extent, address international water conservation issues, reduce the threat of desertification and increase carbon sequestration.

The GEF conservation alternative will build on the baseline scenario of 'without project intervention' by strengthening conservation management in the pilot sites. The GEF support would enable key information to be gathered on the socio-economic and biological data of *in-situ* M/H plants harvested, their status and their habitats. This information can be used to derive appropriate management practices within the pilot sites.

Currently, national efforts to regulate the harvesting of M/H plants are very limited. Also, there is little, if any, integration of M/H plant cultivation into agricultural systems. At present, training programs do not exist and the knowledge base is relatively small. Similarly, experiences with public awareness programs of M/H plants is limited to a few NGO groups. Therefore, the GEF alternative would:

- Actively link the development of guidelines for conserving M/H plant hotspots and the sustainable

management and harvesting of M/H plants with community needs and commercial demands.

- Monitor and evaluate the status of key rare/threatened M/H plants. This will serve as an important indicator of ecosystem health and human demand in the selected areas.
- Integrate pastoral farming with the sustainable use of rangelands to reduce the threat of wind and water erosion and with the long-term aim of increasing the presence of M/H plants.
- Expand the database and gene pool for M/H plants.
- Intensify current efforts to capture traditional knowledge and expand knowledge of the botany of M/H plants and their use in Jordan.
- Support the development of training programs in scientific institutes and for farmers that focus on sustainable management and harvesting techniques.
- Promote public awareness on a national scale through financing formal and informal education and public awareness initiatives in all aspects of M/H plants conservation.

E. Summary Project Analysis (Detailed assessments are in the project file, see Annex 8)

1. Economic (see Annex 4):

- Cost benefit NPV=US\$ million; ERR = % (see Annex 4)
- Cost effectiveness
- Incremental Cost
- Other (specify)

An incremental cost analysis was undertaken. This specified the additional costs accruing to Jordan for protecting its invaluable biodiversity resources. The project design seeks to emphasize cost-effectiveness through minimizing budget impact, maximizing involvement of the local communities, using existing institutions, and building on lessons learned.

Incremental costs. The incremental costs cover project expenditures of activities that have global benefits. The baseline expenditure scenario was calculated to establish current and planned funding amounts for activities that would occur without the GEF M/H plants project. The estimated difference between the cost of the baseline scenario and the cost of GEF alternative represents the incremental costs. The incremental costs will contribute to: (i) achieving global environment benefits through conserving rare and endangered M/H plant species; (ii) completing a database and gene pool of all M/H plants in Jordan; (iii) strengthening the institutional framework; (iv) developing mechanisms for sustainable use; and (v) enhancing public awareness of global environment issues pertaining to M/H plants conservation. It is expected that the GEF contribution towards the incremental costs would be in the order of US\$ 5 million, with estimated additional contributions of about US\$ 9.21 million from the GOJ, RSCN, EFJ and beneficiaries.

2. Financial (see Annex 4 and Annex 5):

NPV=US\$ million; FRR = % (see Annex 4)

Total project costs, exclusive of the PDF-B, are estimated at US\$ 14.21 million. Usually, the conventional financial rate of return analysis is not carried out for GEF biodiversity projects. Total Government financing during the project implementation period is estimated to be about US \$ 7.01 million. Mainly, this will go towards meeting baseline costs that result in primarily national benefits. The incremental costs, which generate the global environmental benefits, will be financed through the GEF grant and will be an estimated US\$ 5 million. The following parallel financing are provided: USAID (AMIR/EPP; \$250,000), USAID (EIIIWUE; \$10 million), Swiss Development and Coordination Agency (Mujib Nature Reserve; \$460,000), Together for Birds and People in Jordan Valley (Mujib Nature Reserve; \$577,000), Jordan Telecom (Mujib Nature Reserve; \$97,000) and EJADA (EFJ; \$40,000). A financial mechanism for ensuring the long-term sustainability of project benefits is being

addressed. Its main emphasis is on developing financially viable products and services based on M/H plants.

As the project encourages the long-term use of M/H resources, the financial benefits to individual households, rural communities and urban dwellers would be apparent as the project evolves and widespread sustainable practices are adopted.

Fiscal Impact:

The project is not expected to have a significant fiscal impact on the GOJ budget. The total non-GEF financing during the implementation period is estimated at US\$ 9.21 million. The Government is committed to supplying 76% of this total, beneficiaries, RSCN and EFJ 24%. Recurrent costs are estimated at about US\$ 300,000 annually. This represents a negligible amount of the total recurrent budget of GOJ.

3. Technical:

The technical capacity and training needs of the collaborating institutions have been assessed during PDF-B grant period and adapted, where appropriate, during project implementation. The project will establish models of best practices for the sustainable use and management of M/H plants in order to replicate these experiences in other regions and mainstream their importance in the conservation policy.

The project will focus on M/H plants conservation through stakeholder participation and technological integration into the ecosystem and habitats. Such an approach implies solutions that are comprehensive, often based on traditional knowledge, and adapted to participatory planning and decision-making processes. Already, Jordan has acquired experience with such an approach, but never in this sector. Defining and agreeing on a resource-use approach that is both acceptable to the communities and favorable to the conservation of M/H plants will be the challenge. Technical inputs will be required for the sustainable conservation of M/H plants, as well as for monitoring progress, and for the processing and marketing of M/H products.

Replicability: Results may be slow in the conservation and sustainable management of M/H plants in the pilot areas. Thus, it may take time before some replicable data are available. Through public awareness thrusts, the Government of Jordan intends to disseminate to all interested parties the positive lessons learned as soon as they become available. The partnership with the private sector should sponsor dissemination of state-of-the-art practices to the farming community at large which have a high potential for replication not only in Jordan but also in the region.

4. Institutional:

Of note is the fact that this is the first project that addresses conservation of M/H plants in Jordan. There was no institutional mandate for such conservation prior to the project. Institutional and implementation set-ups have been designed to enable sustainability and minimize recurrent costs. The institutional arrangements are detailed in Section C.4. They result from analyses carried out at the preparation, PCD, and pre-appraisal stages. Criteria for implementation arrangements included demonstrated autonomy, sound financial and accounting systems in place, and low overhead costs. Options explored are included in the PDF-B Institutional Assessment, the PCD, and correspondence of October 30, 2002 to MOP.

4.1 Executing agencies:

See Section C.4.

4.2 Project management:

See Section C.4.

4.3 Procurement issues:

All procurement of goods, works and services financed in whole or in part by the GEF grant under this project would be competitively bid and contracted in accordance with World Bank Guidelines: Procurement Under IBRD Loans and IDA Credits (Revised January 1999). All recruitment of consultants for project activities, such as selecting, contracting and monitoring of consultants would be implemented in accordance with the Guidelines: Selection and Employment of Consultants by World Bank Borrowers (Revised May 2002). A detailed procurement plan has been prepared (Annex 6). Vehicles will be procured through UNDP IAPSO. EPP Special Tendering Committee will ensure: (a) compliance of guidelines; and (b) and prompt procurement of goods and services.

4.4 Financial management issues:

See Section C.4.

5. Environmental: Environmental Category: B (Partial Assessment)

5.1 Summarize the steps undertaken for environmental assessment and EMP preparation (including consultation and disclosure) and the significant issues and their treatment emerging from this analysis.

An Environmental Assessment (EA) of the project activities has been conducted by the GOJ and an Environmental Management Plan (EMP) has been prepared to address potential environmental impacts and to design mitigation and Monitoring and Evaluation (M&E) measures. Close consultation with NCARTT, MOA, MOP/EPP, NGOs, farmers and other stakeholders took place. The EMP is based on background studies and surveys, namely: an inventory of M/H plants, a cultivation study, a socio-economic survey, a database, and an institutional capacity assessment. The EMP was received by the Bank on September 22, 2002 and disclosed in Jordan on the same date. An updated EMP was received by the World Bank on February 6, 2003. The GOJ updated the governmental webpages with the revised EMP. The PMU/EPP will have the overall responsibility for implementation of the EMP in close coordination with the implementing agencies. In summary, the EA determined that:

- Large areas of the rangelands are deteriorating because of drought conditions exacerbated, among others, by overgrazing and over-harvesting of M/H plants. This has contributed to reducing biodiversity on these lands and there is an incipient loss of minerals from the soils, including carbon due to decreased vegetation cover. This is compounded by an increase in wind and water erosion, as a result of non-sustainable practices, leading to a spiral of decline in the carrying capacity of the land. Some arable land is in poor condition due to repeated failure of grain crops and the invasion of noxious weeds. Alternative M/H crops have been tried by NCARTT on a limited experimental basis. These hold some promise as they mature earlier and require less water.
- Some flora (and fauna) is under threat as a result of these deteriorating conditions (as is the livelihood of farming communities). If little or nothing is done to halt this decline then many rangeland areas and marginal arable areas will slowly degrade and become non-viable even as pastoral land. This will directly affect the livelihood of rural communities as M/H plants are a major source of accessible and affordable health care for human and livestock.
- Some of these lands will eventually reach desert status with adverse national, regional and even global consequences for biodiversity, carbon sequestration and the quality and quantity of water flow. The proposal to identify and utilize cultivation practices for threatened high-demand M/H plants does not pose an environmental risk.

5.2 What are the main features of the EMP and are they adequate?

The project's objectives are to achieve good conservation and management practices of M/H plants. Thus, the main features of the EMP, as listed below, are to demonstrate best practices for *in-situ* conservation and *ex-situ* cultivation of M/H plants in pilot areas. No pesticides will be procured under the project. Integrated Pest Management (IPM) and nitrogen fixing plants will be promoted and organic farming will be encouraged. Potential *ex-situ* farms will be identified for organic practices and certified as organic farms if they meet the criteria. These farms will serve as prototypes for future expansion of organic farming practices for M/H plants. The implementation of the EMP will be flexible over the course of project implementation in close collaboration with the beneficiaries.

The main features of the EMP, which are integrated within the relevant project components, include:

- Establishing *in-situ* and *ex-situ* pilot sites to demonstrate management methods to protect, propagate and manage these areas.
- Monitoring all project sites for compliance with best environmental practices.
- Designing and implementing a community based participatory Monitoring and Evaluation Program (including plants biodiversity, changes in the habitat, especially wind/water erosion, and the changes in the attitude of people to the environment). Baseline surveys of M/H plant biodiversity in the Mujib Nature Reserve and the Central Upper Slopes of the Rift Valley will be completed and regularly updated.
- Undertake surveys of M/H 'hotspots' and take measures to protect them.
- Developing and implementing site community management plans to enhance the sustainable use of M/H plants in the Mujib Nature Reserve and the Central Upper Slopes of the Rift Valley. These plans will include, e.g. grazing arrangements with the local community, enrichment planting, contour planting.
- Improving the database, gene pool and seed sources for M/H plants needs.
- Developing and implementing a training and awareness program to build capacity of local community stakeholders, farmers and other beneficiaries in conservation and sustainable use of M/H plants. This program will include: water conservation and the proper use of waste and groundwater, sustainable harvesting methods, organic farming, integrated pest management, best farming practices, etc.
- Developing and implementing an environmental education program which will aim at introducing knowledge about M/H plants in formal and informal education.
- Exposing farmers to demonstration sites and providing them with advice.
- Working with the MOE and RSCN to enlarge environmental education in schools and at the tertiary level, especially concerning M/H plants.
- Encouraging the planting of M/H plants in and around houses and schools, along contours for erosion control, along permanent or seasonal rivers/streams and as shelterbelts to improve the microclimate.
- Encouraging private nurseries to provide seedlings and cuttings of M/H plants.

5.3 For Category A and B projects, timeline and status of EA:

Date of receipt of final draft: February 6, 2003

The date of receipt of first draft was September 22, 2002, and the date of in-country disclosure was September 22, 2002. A revised version was received by the World Bank on February 6, 2003. The GOJ will update their governmental websites with this revised version. A copy of the recent version was sent to the InofShop on February 12, 2003.

5.4 How have stakeholders been consulted at the stage of (a) environmental screening and (b) draft EA report on the environmental impacts and proposed environment management plan? Describe mechanisms of consultation that were used and which groups were consulted?

From the start of the project identification there has been close consultation with the local administration and farmers in selected project areas and local population within the vicinity. Also, as part of the PDF-B surveys, potential beneficiaries, especially women, healers and herbalists, were consulted and their opinions sought. Consultation will be an ongoing project activity and the implementation of the EMP and its problems (and opportunities) will be reviewed periodically.

5.5 What mechanisms have been established to monitor and evaluate the impact of the project on the environment? Do the indicators reflect the objectives and results of the EMP?

The PMU/EPP will be responsible to implement a detailed M&E system, which is outlined in the EMP, to assess the impact of the project activities. M&E activities include: update of baseline surveys, demonstration programs, monitoring programs for M/H plants *in-situ* and *ex-situ*, biodiversity, erosion control, best farming practices, etc. A national database, GIS and gene pool for M/H plants will be maintained at NCARTT, seed multiplication of M/H plants will be controlled. Environmental management indicators have been reflected in the project design. Beneficiaries will be actively involved in the monitoring of the project.

6. Social:

6.1 Summarize key social issues relevant to the project objectives, and specify the project's social development outcomes.

The project is likely to have a positive social impact with the important objective of testing modesl to improve the livelihood of rural communities. As indicated above, participatory approaches will be part of the project's management planning process in order to ensure that local communities' concerns are addressed effectively and to reinforce a sense of ownership at all levels. It will build on lessons learned in community participation and management of completed and ongoing projects. A focus will be the training of extension workers in participatory and gender approaches. As M/H plants and traditional health systems are an important source of health care and diet for rural and urban poor, any effort to improve and standardize the safety and efficacy of commonly used herbal remedies will benefit the population.

A number of project components will address social issues as an integrated concern. The overriding problems of poverty, particularly in marginal and rural areas, will be addressed through the preservation, management, and cultivation of these valuable plant resources by the communities as a sustainable source of income. Health issues are also intricately linked to poverty, whereby the M/H plants provide the primary affordable health care needs of rural and Bedouin communities and their livestock. Ensuring their sustained and expanded use is of the utmost importance to the health and welfare of the poor.

Gender. Women are an integral part of the economic system built around M/H plants, whether as collectors, users, or sometimes healers. Social analysis of gender issues in the conservation, management and sustainable use of natural resources underscores the differences in terms of authority structures, status in the community, access to land, resources, benefits, income, training and education in the control and use of the environment. Surveys have already been undertaken to ensure that the women's opinions and wishes are recorded and that project activities will be designed to involve women as specific target beneficiaries. To bridge the gender disparity and to alleviate women's vulnerabilities in M/H plants utilization and management, the project will: (i) ensure that information relating to project activities reach both men and women, as well as preparing women to participate fully in the resource management process; (ii) target women in the communities, as well as women's organizations, for education and

awareness on biodiversity and M/H plants conservation and safe use; (iii) support women to conserve existing M/H plants through cultivation; (iv) promote mechanisms for the active and full participation of women, especially healers and birth attendants in Traditional Healer Associations; (v) target them for access to micro-credit facilities; and (vi) include them in grower's and producer's organizations.

Summary of key issues. During project preparation, 3 relevant studies were undertaken: (i) an Inventory of M/H plants, (ii) a Socio-economic Assessment, and (iii) a Cultivation Survey of M/H plants to deepen the understanding of the social aspects, which will be integrated into the project design of Component 2. A summary of the results of these 3 studies (see documents in Project File) is as follows:

The Inventory of M/H plants.

A rapid botanical assessment was carried out in five locations, representing different vegetation systems and bio-geographical zones in Jordan. These zones included: Ajloun Woodland Reserve, Safawi and Azraq, Mujib Nature Reserve, Wadi Araba and Shaubak area. Nine hundred plant species were recorded of which 122 species have medicinal uses. Ninety medicinal species were specifically identified by interviewees. 3 were identified as endangered, 18 as rare, 8 as decreasing in abundance, while the remaining 93 were common.

A botanical inventory was compiled for each location along with socio-anthropological and ethno-pharmacological assessments. Threats to future supplies of M/H plants include: (i) habitat destruction; (ii) ineffective legislation inside and outside protected areas; (iii) insufficient information on status, distribution, value and use of medicinal plants; (iv) absence of a national M/H plants conservation program; and (v) a high demand for effective species. It is estimated that 60% of the people rely on plant-based remedies for their daily health care needs.

Recommendations for conservation, management and sustainable use of M/H plants were proposed to overcome current threats. They include: (i) *in-situ* conservation programs that build on indigenous knowledge and use; (ii) effective plant collection and trade regulations; (iii) prevention of habitat destruction; (iv) strengthen resource management legislation; (v) *ex-situ* production; (vi) increase public education; and (vii) expanded awareness programs.

The Socio-economic assessment.

Dependable domestic statistics on production, processing and trade are unavailable. Marketing of M/H plants has always been a private sector activity and is dominated by indigenous healers and small traders. Retailers dictate the trade with four companies controlling 40% of the market. Activities are concentrated in Amman, Zarqa, Maa'n, Irbid, and Kark. Ninety-seven species of M/H plants are consumed in Jordan, (2.9 t/yr), and ten species account for 80% of the trade. Plants or their products are traded in either their raw state or with limited processing and with almost no quality control. The value of the trade has not been determined. Monographs for 76 M/H plants species considered to be important for cultivation were prepared. As mentioned previously, over-exploitation, destructive harvesting, habitat degradation, agricultural expansion and grazing are the major threats to Jordan's M/H plants.

The majority of private farms is small (between 5-20 dunums equal to 0.5-2 ha.), in rainfed areas and are labor intensive. Farmers are predominantly male and interested in expanding the cultivation of M/H plants (appropriate to their soils). Water is the major limiting factor to increased cultivation, especially in the Amman and Madaba regions. While women are the primary collectors and user/traders of wild plant sources, their activities indicate that harvesting guidelines are a priority need if local extinctions are not to occur. Income derived from the collection and/or cultivation of

M/H plants is minimal. Cultivation by several commercial operations supplies local markets with fresh and dried thyme, mint and meramyah and seeds of anise. Production is not focused on plants of value to the pharmaceutical companies.

The Cultivation survey.

It will be essential to make the appropriate cross linkages to the GEF Operational Program 13 (OP13) on agro-biodiversity because of the need to conserve and use the herbal, medicinal and aromatic germplasm for sustainable but economic exploitation. When the cultivation study was prepared, OP13 was not yet operational. The objective of OP13 is to promote: (i) the positive impacts and mitigate the negative impacts of agricultural systems and practices on biological diversity among and within agro-ecosystems; (ii) the conservation and sustainable use of genetic resources of actual and potential value for food and agriculture; and (iii) the fair and equitable sharing of benefits arising out of the use of genetic resources. OP13 is not intended to substitute for OP1 through 4 on conservation of biodiversity in various ecosystems, but rather to provide a framework for additional activities specific to conservation of agricultural biodiversity.

As mentioned previously, a total of 445 species of medicinal plants, which belong to 330 genera and 99 families, are found in Jordan. The cultivation study identified 76 M/H plants species that should be considered by the project within three categories: (i) vegetables to be cooked or used fresh in salads, (ii) plants which are grown as ornamentals in home gardens, and (iii) plants which are used as spices or for medicinal purposes. Some of these are indigenous to Jordan; some have global significance as a source of medicine; and some are already grown successfully in other countries. It is suggested that those with good potential and medicinal properties should be included in a breeding or selection program to improve their M/H properties. Under this group, the study identifies 39 plant species and classifies them into three groups; trees, shrubs and herbaceous plants. It will be critical to prioritize species within the categories identified, but remain flexible to the goal of delivering numerous production possibilities to growers and processors. The prioritization should be based on best chances of success. The project must stay focused on delivery of production packages that can be turned over to the private sector. The challenge will be to create the intersectoral links needed to sustain this chain of effort from discovery to exploitation, marketing and diffusion/replicability of results.

Monitoring of biological and economic indicators will be essential if the work is to continue beyond the GEF project duration. The work program must repeatedly assess progress from the baseline condition and take care to judiciously select verifiable indicators that will be practical to both measure and use when assessing the presence, absence, frequency, and biological density of biodiversity or rate of change in the trends of use for land races, under-utilized crops, and other rare species. Stress tolerant species are important, but there is a risk of devoting too much time on research towards understanding the principles of stress tolerance over exploitation of the stress tolerance in production systems.

Irrigation with treated wastewater can be used to produce M/H plants species containing compounds for industrial extraction. This offers a good opportunity to use this water without health or environmental hazards. The main thrust of the project should be to obtain feasible, usable results in supplying raw materials in sufficient quantity of an optimum quality to the pharmaceutical and M/H related industries. Organic farming was not mentioned in the report and should be considered in the future as an important means of adding value to the category of M/H plants used for human consumption.

These assessments identified environmental, social, economic and cultural opportunities, and constraints

that should be addressed in the management plans for the *in-* and *ex-situ* sites to be developed with the direct participation of beneficiaries, NGOs and government agencies. These plans should adhere to *Guidelines for Using Social Assessment to Support Public Involvement in World Bank-GEF Projects*.

6.2 Participatory Approach: How are key stakeholders participating in the project?

Participatory approaches in design and implementation are core elements of this project. Information sharing among all stakeholders are key in project design and implementation. During project preparation, active participation and partnership is expected by key agencies such as MOA/NCARTT, MOH, BRDP, RSCN, etc. It would build on lessons learned in community participation and natural reserve management in the GEF-financed “Strengthening of RSCN and Conservation of Dana Wildlands”. From the start, local communities have been involved in project preparation through community workshops, information sharing, consultation and collaboration. It is expected that local communities would identify management and enforcement criteria and play a major role in protecting *in-situ* M/H plants resources as well as growing plants on farm and in kitchen gardens. The private sector (including manufacturers, collectors, pharmaceutical industry herbalists and healers) provides the most important source of information regarding imported and exported M/H plants and their value for the Jordanian economy; it was involved and consulted from the beginning of project preparation. Jordan’s academia, especially the University of Jordan and Jordan University of Science and Technology, (Faculties of Agriculture, Pharmacy, Botany) have been and will continue to be involved in the M/H plants inventory and cultivation component.

Coordination with Stakeholders: MOH, BRDP, RSCN staff, private sector manufacturers of pharmaceutical drugs, professors of pharmacy plant ecology, private sector herbalists, healers and farmers were consulted during project preparation to determine the geographic distributions of M/H plants, the extent of M/H plants use, the most important problems faced concerning conservation, cultivation and marketing. A number of meetings were held with representatives of the pharmaceutical industry. These included the Arab Pharmaceutical Manufacturing Co. Ltd., Eden Natural Herbs Association, Delass Natural Products, and the Jordanian Pharmaceutical Manufacturing Co. Ltd. The RUM Agricultural Co. offered to provide space in the nursery to carry out preliminary cultivation trials using irrigation practices, and initiate trials in existing irrigated rows in between fruit trees and crop cultivation. Further offers should follow. The beneficiaries and stakeholders in the proposed project include:

	Ident./Preparation	Implementation
a. Primary beneficiaries and other affected groups: <ul style="list-style-type: none"> • farmers, community groups • special focus on women • NGOs • NCARTT, MOA, MOH, MOP, MOENV • Medicinal Plants Producers and Traders Association • Academia: University of Jordan, Jordan University of Science and Technology • Users (for human and livestock use) 	IS/CON/COL for all groups listed	IS/CON/COL for all groups listed
b. Other key stakeholders Donors: ICARDA, GTZ, USDA, USAID, EU, Govt. of South Africa	CON	IS/CON

IS - Information Sharing; CON - Consultation; COL - Collaboration

6.3 How does the project involve consultations or collaboration with NGOs or other civil society organizations?

During preparation, there were close consultations with village and community groups. Group approaches to resolve conservation, production and marketing problems will be developed during project implementation. There is strong NGO (RSCN) activity in Mujib Nature Reserve. RSCN is also the implementing agency for the Conservation and Sustainable Use of Biodiversity in the Dibeen Nature Reserve Project. The illegal collection of M/H plants in the Dibeen Forest was identified as one of the main threats. Synergies between the projects will be developed, especially in the areas of conservation of M/H plants and participatory approaches for the development of management plans, as well as income generating and marketing activities for the local population.

Also, the existence of a strong Pharmaceutical Association will help the project to improve standards for phytomedicines and expand or develop markets. Collaboration with local communities will involve cost sharing. This has to be worked out, but it is envisaged that the beneficiaries will provide cash or in-kind contributions and in turn benefit from the sale of M/H plants and products. This will foster an active and results-orientated participation in the project.

6.4 What institutional arrangements have been provided to ensure the project achieves its social development outcomes?

The PMU and the implementation units at the two pilot sites will ensure that the social development outcomes are obtained through regular monitoring and evaluation of project activities. The project activities are demand-driven to ensure that they represent stakeholder priorities and implementation will rely substantially on the active participation of key stakeholders. This approach should promote project sustainability and ownership by beneficiaries, the Governorates and central government. The institutional arrangements have been designed specifically to ensure transparency in the selection of partners used for demonstration activities.

6.5 How will the project monitor performance in terms of social development outcomes?

Monitoring is based on the baseline surveys undertaken during project preparation. Five studies were undertaken and extensive data were collected on existing M/H plants, their location, possible cultivation practices and social and economic factors. These are documented as working papers. An M&E system, including social indicators, will be developed by the PMU. This unit will track project performance through periodic beneficiary and technical surveys. The results of the M&E activities will be fed back into the implementation process as improved practices. A mid-term review will be carried out to assess overall progress. Lessons learned, with recommendations for any improvements, will be used to restructure the project when and if necessary.

7. Safeguard Policies:

7.1 Are any of the following safeguard policies triggered by the project?

Policy	Triggered
Environmental Assessment (OP 4.01, BP 4.01, GP 4.01)	<input checked="" type="radio"/> Yes <input type="radio"/> No
Natural Habitats (OP 4.04, BP 4.04, GP 4.04)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Forestry (OP 4.36, GP 4.36)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Pest Management (OP 4.09)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Cultural Property (OPN 11.03)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Indigenous Peoples (OD 4.20)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Involuntary Resettlement (OP/BP 4.12)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Safety of Dams (OP 4.37, BP 4.37)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Projects in International Waters (OP 7.50, BP 7.50, GP 7.50)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Projects in Disputed Areas (OP 7.60, BP 7.60, GP 7.60)*	<input type="radio"/> Yes <input checked="" type="radio"/> No

7.2 Describe provisions made by the project to ensure compliance with applicable safeguard policies.

An Environmental Assessment (EA) was carried out, and resulted in the EMP. The project will promote the conservation and sustainable management of M/H plants in the Mujib Nature Reserve and *in-situ* hotspots as well as *ex-situ*. This will lead to improved biodiversity protection. OP 4.09 is not triggered. No pesticides will be procured under the project. If farmers *ex-situ* are found to be using such chemicals on their own land they will be encouraged to use Integrated Pest Management (IPM) in line with FAO guidelines. IPM will be demonstrated as a viable alternative to the application of chemicals, as will the application of organic fertilizers in place of mineral fertilizers.

Project activities will not trigger OP 4.12 Conservation will take place without restriction of access to grazing lands in the Mujib Nature Reserve. *Ex-situ* activities will take place on farms that are interested in this and with the consent of the owners.

F. Sustainability and Risks

1. Sustainability:

Technical sustainability of the project will be ensured by: (a) enhanced biodiversity protection through water catchment and soil conservation measures and grazing contracts with local communities where warranted; (b) the establishment and maintenance of M/H plant database, GIS and gene bank; (c) NCARTT responding on the ground to the demands of farmers, NGOs and private sector to conduct demand driven applied research on M/H plants rather than basic research; and (d) the diffusion of conservation and cultivation best practices. Technical sustainability will be affected both by natural (e.g. drought) and market elements (e.g. pricing).

The institutional sustainability of the project will be ensured through: (a) capacity building of all stakeholders; (b) development of inter-sectoral links accompanied by definition of responsibilities; (c) direct involvement of farmers, local communities and other beneficiaries; (d) the refocusing of NCARTT's technology transfer to respond to demand and water saving measures; and (e) the implementation of the M/H plants conservation mandate through the farmers, NGOs and the private sector with support from NCARTT.

Social sustainability of the project will be ensured by: (a) the participation of local communities in management, decision making and monitoring of the pilot-sites conservation, (b) the implementation of a public awareness campaign for the conservation and sustainable use of M/H plants, (c) extensive prior experience demonstrated by RSCN with respect to community participation in the "Conservation of the Dana Wildlands and Strengthening of the RSCN" project (GEF/IBRD/UNDP).

Financial and economic sustainability of the project will be ensured by: (a) providing farmers with marketing analysis to identify most profitable plants to grow ex-situ; (b) improving the socio-economic conditions of targeted populations; and (c) minimizing the burden on GOJ budget through actively involving NGOs and the private sector in project implementation.

1a. Replicability:

Eight other *in-situ* sites have already been identified as candidates for *in-situ* conservation in the preparation phase. Thus, the project is expected to be replicable in these locations once conservation methods have been established in the two project sites. Also, more private sector involvement in M/H plants cultivation is expected through the ex-situ cultivation.

2. Critical Risks (reflecting the failure of critical assumptions found in the fourth column of Annex 1):

Risk	Risk Rating	Risk Mitigation Measure
From Outputs to Objective		
Government commitment towards conservation of M/H plants dwindles.	M	Government involved to ensure that the benefits accruing from conserving and using M/H plants through rural employment and income generation, erosion reduction, import substitution, and the development of the M/H plants sector.
Proposed MOP overall control of PMU and flow of funds result in delays in payment to consultants and contractors for services and equipment hamper the timely implementation on the ground of project activities by PMU, NCARTT, RSCN, and EFJ and thereby the achievement of project objectives.	H	Steering Committee and Bank to closely supervise implementation at the beginning. MOP Asst. Secretary of Administration & Finance committed to issuing payments for requests submitted by the PMU within 3 days and entrusted the responsibility of this commitment to a Finance officer hired for this project.
The competence of NCARTT to transfer knowledge on the ground remains limited.	S	NCARTT is already initiating the shift, sponsored through project preparation of ensuring response to demand of farmers and move away from supply driven research. Project will further promote this shift through TA. NCARTT is to demonstrate responsiveness to demand, for the first time, through the project, in particular through pilot-prototype farm demonstrations which will include the use of needed equipment outside the stations.

Decrease of M/H plants with the concurrent increased degradation of rangelands and inability of Government to avert further damage.	N	Project to promote national awareness program targeted at key audiences, including policy makers; and to demonstrate methods to conserve M/H plants and their role in reversing degradation.
Low/inadequate commitment from beneficiaries.	N	In-situ and ex-situ areas selected after detailed consultation and agreement with beneficiaries. Participatory approach implemented for development plans.
From Components to Outputs		
Slow processing of procurement of goods and services, which will hamper implementation.	M	The PMU includes a procurement specialist and EPP/MOP Special Tendering Committee whose responsibility will be to ensure the quality and timeliness of procurement.
Competent staff may be hampered by bureaucracy.	S	Steering Committee to ensure hiring of eminent staff. The PMU should have flexibility and the financial and procurement management should follow WB guidelines.
Inadequate collaboration between inter-agencies and with other stakeholders.	M	Inter-agency training courses and site visits will increase cooperation, especially as project proceeds. Collaboration started during project preparation. EPP well placed to foster coordination.
Other donor funding inadequate, private sector support lacking.	N	Relevant donors and the private sector have committed to, and started, providing support. Additional support is expected upon implementation of the project.
Implementing agencies for the pilot M/H plants conservation sub-component will not work together.	N	Collaboration and healthy competition between the implementing agencies should contribute to maximize their efficiency. Inter-site visits and frequent swapping of information should lead to a vibrant cooperation.
Implementing agencies may be unable to retain qualified staff, especially in the field.	S	Project will provide training and career development benefits and work towards loyalty in this professional field.
Overall Risk Rating	M	

Risk Rating - H (High Risk), S (Substantial Risk), M (Modest Risk), N(Negligible or Low Risk)

3. Possible Controversial Aspects:

N/A

G. Main Conditions

1. Effectiveness Condition

N/A

2. Other [classify according to covenant types used in the Legal Agreements.]

The Recipient will maintain a PMU under TOR and qualifications satisfactory to the Bank. The PMU shall have overall responsibility for proper implementation as set forth in the Project Implementation Plan (PIP) and in the Project Appraisal Document (PAD). For that purpose, the PMU shall: (a) design and implement a simple Management Information System for monitoring and evaluation (M&E); (b) prepare and furnish to the Bank annual work plans and budgets; and (c) provide quarterly and annual reports covering the implementation progress, the use of funds and project impacts in a format acceptable to the Bank.

The Recipient will provide funds, facilities, services and other resources needed for the Project.

The Recipient will secure funding for the remaining \$2.1 million gap under Component 4.

The Recipient will establish an operational PMU financial management system (including a financial management manual and a computerized accounting system) acceptable to the Bank by September 30, 2003.

The Recipient will maintain a financial management system acceptable to the Bank.

The Recipient will submit unaudited quarterly financial monitoring reports (FMRs) within forty-five (45) days of each quarter end.

The Recipient will have the project financial statements (project balance sheet, statement of sources and uses of funds, and Special Account statement) audited by an independent auditor acceptable to the Bank, no later than six (6) months after year-end

The Recipient will recruit members for the Technical Committee immediately following the establishment of the PMU.

The Recipient will implement the Environmental Management Plan (EMP).

The Recipient will maintain policies and procedures adequate to monitor and evaluate on an ongoing basis, in accordance with indicators satisfactory to the Bank, the carrying out of the project and the achievement of the project's objectives.

The Recipient will prepare, on the basis of guidelines acceptable to the Bank, and furnish to the Bank not later than six (6) months after Closing Date or such later date as may be agreed for this purpose between the Recipient and the Bank, a plan for the future operation of the project.

H. Readiness for Implementation

1. a) The engineering design documents for the first year's activities are complete and ready for the start of project implementation.

- 1. b) Not applicable.
- 2. The procurement documents for the first year's activities are complete and ready for the start of project implementation.
- 3. The Project Implementation Plan has been appraised and found to be realistic and of satisfactory quality.
- 4. The following items are lacking and are discussed under loan conditions (Section G):

Not applicable.

Following negotiations, GOJ has committed to launch the selection process for the PMU Project Manager and the Project Financial/Procurement/Disbursement Specialist and to select these two staff prior to presentation of the project to the Board of the World Bank.

Following negotiations, GOJ has committed to appoint the Steering Committee and initiate bids for equipment.

The procurement documents for the first year's activities are complete and ready for the start of project implementation.

The Project Implementation Plan has been appraised and found to be realistic and of satisfactory quality.

I. Compliance with Bank Policies

- 1. This project complies with all applicable Bank policies.
- 2. The following exceptions to Bank policies are recommended for approval. The project complies with all other applicable Bank policies.

This project complies with all applicable Bank policies.

Nicole Glineur
Team Leader

M. Salah Darghouth
Sector Manager

Joseph Saba
Country Director

Annex 1: Project Design Summary

JORDAN: Conservation of Medicinal and Herbal Plants Project

Hierarchy of Objectives	Key Performance Indicators	Data Collection Strategy	Critical Assumptions
<p>Sector-related CAS Goal: Improve water resource management and environmental protection. Promote human development in Jordan. Promote private sector investment.</p>	<p>Sector Indicators: Environmental degradation level Agricultural water efficiency (%) Rural income (number) Private sector investment volume (number)</p>	<p>Sector/ country reports: Reports National statistics Monitoring system Bank economic reports</p>	<p>(from Goal to Bank Mission) Political support at all levels for sustainable use of natural resources. Rural development and poverty alleviation.</p>
<p>GEF Operational Program: OP# 1: Arid and Semi-Arid Zone Ecosystem. OP#13: Land Degradation and Agro-biodiversity (cross-cutting areas).</p>	<p>Outcome / Impact Indicators: M/H plant conservation and management initiatives implemented for species of regional and global significance (number) Reduced land degradation as measured by increased vegetation cover in selected areas (%)</p>	<p>Monitoring program Government statistics Project reports</p>	<p>Government's ability to mobilize resources for environmental protection and build institutional capacity, particularly for the conservation and use of M/H plants and Biodiversity conservation, thus contributing to community development and the national economy.</p>
<p>Project Development Objective: Design and test models to improve the conservation of M/H plants and the livelihood of rural communities through the management and sustainable use of M/H plants for human and livestock needs</p>	<p>Outcome/Impact Indicators: New mechanisms for partnerships and working methods established (Y/N) Functioning models with community NGOs, and private sector operate beyond project life (Y/N)</p>	<p>Project reports: Project database M&E information Socio-economic surveys</p>	<p>(from Objective to Goal) Increased GOJ commitment, community participation and private sector investment.</p>
<p>Global Objective: Improved conservation and sustainable use of M/H plants.</p>	<p>Outcome / Impact Indicators: M/H plants of global importance collected, documented and categorized in gene bank (number) Successfully protected conservation species (number)</p>	<p>Project reports: Gene bank Baseline survey On-going field monitoring Progress reports Supervision reports Consultant reports</p>	<p>(from Objective to Goal) Species of global importance will be better managed. Information from gene bank is shared amongst all partners.</p>

Output from each Component:	Output Indicators:	Project reports:	(from Outputs to Objective)
1. Institutional Strengthening			
1.1 PMU operational including administration, finance, procurement, M&E system and training. Institutional collaboration strengthened.	PMU fully functional and operational by project start-up (Y/N) Training needs identified and implemented (number) M&E system implemented (Y/N)	Project supervision reports M&E reports Training reports	Ability to maintain staff, offices and GOJ support. Counterparts take on planning & management responsibilities. Administrative financial system operates effectively.
1.2. Develop crucial inter-sector links (MOA, MOH, pharmaceutical industry, producers, consumers).	Technical committee between relevant stakeholders established and improves partnership (Y/N)	Technical committee meeting minutes Follow-up activities Progress reports	Bureaucratic and legislative acceptance of regulatory changes. Government endorsement.
1.3. Intellectual property rights (IPR) policy and guidelines developed.	IPR policy & guideline drafted and adopted (Y/N)	Project reports Government records	GOJ commits to complying with international guidelines.
1.4. Establish health and safety standards.	Regulatory function improved (Y/N) Technical committee on standards & testing established (Y/N) Standards published (Y/N)	Project reports Government records	GOJ commits to complying with international guidelines.
1.5. Establish a national M/H plants database, GIS system and update gene-bank.	Floral species recorded (number) Extinct species recorded and stored (number) GIS map created (Y/N) Database website launched and updated regularly (Y/N)	Project reports Database reports GIS maps Database website	Existing lab and data available.
1.6. Technical and managerial capacity of stakeholders enhanced.	Farmers (m/f) trained in IPM, organic farming, cultivation of M/H plants(number) 18 graduate students selected for applied research grants	Training modules Final reports Reports on the adaptation in the field of applied research results.	Student interest in M/H plant field applied research. Farmers see value in training.
2. Pilot-Sites Conservation			
2.1. Two pilot conservation sites established (Mujib and Rift Valley). Rare and endangered species	Endangered species protected (number) Site management plans formulated (number)	Project reports Site management plans Training modules M&E information	Management in the 2 sites in place. Trained staff recruited. Local communities support in-

<p>recorded and protected. Local knowledge and usage of M/H plants for day-to-day health care needs recorded. Methods for propagation and cultivation established. Training program established.</p>	<p>Areas covered by site management plans recorded (hectares) Local knowledge and usage recorded Training participants recorded (number) Hot spots identified (number)</p>		<p>situ conservation.</p>
<p>2.2. <i>Ex-situ</i> cultivation trials of M/H plants established. Establish pilot prototype farms.</p>	<p><i>Ex-situ</i> trials conducted (number) Organic farming and product labels developed (Y/N) Contract farming models standardized (Y/N) Environmental training participants recorded (number)</p>	<p>Project reports M&E information Training modules</p>	<p>Farmers recognize benefits & willing to participate in the expanded output of M/H plants. GOJ willing to work with the private sector. Cultivation of M/H plants is commercially viable.</p>
<p>3. Public Awareness and Education</p>			
<p>3.1. Environmental education delivered to communities and schools.</p>	<p>Curricula for formal and informal environmental education includes information on M/H plants (number) Children knowledgeable about importance of local M/H species (Y/N) Training course established for environmental education (number)</p>	<p>Progress reports Printed education materials MOE information Surveys Consultants' reports Training modules</p>	<p>MOE a willing partner to develop or expand curricula. Funds available for simple equipment for schools. Communities actively involved in environmental protection. Educational institutions interested in including environmental education.</p>
<p>3.2. Training and Knowledge Sharing tools developed, public awareness campaigns incl. women's implemented.</p>	<p>Targeted communities-based training workshops undertaken(number/year) Beneficiaries receiving educational material (number) 1800 farmers visit 60 areas. Project website launched and updated monthly (Y/N)</p>	<p>Progress reports Publications Project website</p>	<p>Targeted audiences identified. Channels and actions defined.</p>
<p>4. Income Generation Activities: M/H quality enhancement and product development</p>			
<p>4.1 Certification of organically grown produce compiled and accepted nationally and internationally.</p>	<p>Certified farms (number)</p>	<p>List of certified farms Project reports Inspector's reports Agricultural statistics</p>	<p>International standards accepted. Organically grown produce command higher price.</p>
<p>4.2. Advice on standards suggested for harvested M/H products.</p>	<p>Committee provides advice on standards (Y/N)</p>	<p>Consultants' reports Project reports</p>	<p>Jordan Bureau of Standards plays active role in standards enforcement.</p>

<p>awareness</p> <ul style="list-style-type: none"> Formal and informal environmental education. Public awareness, including promoting replication. 		<ul style="list-style-type: none"> PMU reports M&E information Website 	<p>commitment from schools and universities for M/H plant conservation education Skilled and knowledgeable trainers to conduct training courses. Interest in mass media to promote M/H plant awareness campaign.</p>
<p>Component 4. Income Generation Activities: M/H quality enhancement and product development</p> <ul style="list-style-type: none"> Certification of organic farms and products. Standards for M/H plants for harvested products Processing standards for M/H plant manufactured products Quality control of M/H products Product development. Market identification Facilitating access to Micro-credit. 	<p>US\$ 3.5 million</p>	<ul style="list-style-type: none"> Government records PMU reports M&E information Trade reports Consultants' reports Bank reports 	<p>Continuous GOJ support for export promotion of M/H plants.</p>
<p>PDF-Block B</p>	<p>US\$ 0.35 million</p>		

Annex 2: Detailed Project Description

JORDAN: Conservation of Medicinal and Herbal Plants Project

This Annex describes the various project components. The cost breakdown of the components and sub-components is given in Annex 4.

By Component:

Project Component 1 - US\$2.54 million

Component 1: Institutional Strengthening. (US\$ 2.54 M – GEF \$ 1.95 M).

This component is composed of six (6) sub-components.

1.1 The Project Management Unit. The project will establish a Project Management Unit (PMU). The PMU will be staffed with a Project Manager, a lead local specialist in M/H plants; a Monitoring & Evaluation and Training Specialist; a Financial Management/Procurement Specialist (3 years); one Administrative Assistant and one Driver. Since this is a new area for Jordan, the positions of the project manager and the M/H specialist will be coupled with an international expert position for the first three years in order to transfer knowledge and technology. Other local and international experts will be hired as consultants with expertise in fields such as M/H plant conservation techniques, monitoring and evaluation, standardization and certification, update of beneficiary and scientific surveys, etc. Each PMU position will have EPP or NCARTT staff as counterparts. All staff will be recruited competitively. Small implementation units will be established at the two pilot conservation areas. These units will be under the supervision of the PMU. Two organizations will manage these pilot sites, namely RSCN at Mujib Nature Reserve and NCARTT in the Central Upper Slopes of the Rift Valley. The PMU will be supervising all the component and sub-component activities as outlined in Section C of the PAD.

The PMU will coordinate all the different aspects of the project and the different implementing agencies, especially under the second component. It will be responsible for all procurement, financial management and monitoring & evaluation matters. It will recruit various consultants, produce annual work and procurement plans, compile quarterly financial reports and the annual report. It will organize steering and technical committee meetings and ensure that accounting procedures and reporting are undertaken according to procedures and done in a timely fashion.

1.2 Development of Inter-Sector links. In order that the concerns of all interested parties are taken into consideration and to avoid duplication of efforts, it is important to develop links between government agencies such as MOA, MOE, MOH, MOIT, MOP, MOENV, the growers of M/H plants, the pharmaceutical industry, other producers of M/H plant products, NGOs and the consumers. A committee will be established to discuss technical and institutional matters relevant to this sector, including strengthening national policy and having an adequate regulatory capacity to advise the project and to facilitate the conservation of M/H plants, while at the same time promoting their sustainable and expanded use. The committee will meet 6 times per year for the duration of the project with an estimated 14 members. It will advise the project, the industry, government and the community.

1.3 Intellectual Property Rights (IPR). The purpose of this sub-component is to design an IPR framework, in close collaboration with AMIR and MOIT, advise on the licensing of M/H plants and establish a workable patent system. International and national consultants will be engaged to examine IPR in other countries and the patent laws in Jordan. A technical committee will be appointed

comprising of six people to advise the government about M/H IPR. This committee will meet six times per year for the first three years.

1.4 Standards Establishment. This sub-component is to establish health and safety standards for the M/H plant sector, from seeds to volatile oils. It will look into existing quality of products and the method of selling such products on the national and international markets. International and national consultants will be engaged to examine procedures in Jordan and other countries and make recommendations. A technical committee will be appointed comprising of six people to advise government about standards and testing procedures. This committee will meet six times per year for the first three years.

1.5 Database/GIS and Gene Bank for M/H Plants. This sub-component will build upon the existing facilities in NCARTT. A national M/H plants database and gene pool will be established and maintained at the NCARTT headquarter in Amman. Links will be established or expanded to databases throughout the world. An international consultant will advise the Project on establishing and maintaining links and providing training to personnel at NCARTT. There will be facilities at NCARTT to collect all species and varieties, especially rare and endangered ones. This will be a source for their multiplication. Extinct species could be obtained from surrounding countries if available, and be re-introduced. Through networking, contacts will be made worldwide on M/H plants and the flow of information and materials should be of importance to the project. The PMU and implementing entities will co-manage the database with NCARTT.

1.6 Training. The training program will include: short-term on site instruction courses for counterpart and project staff; short-term workshops, courses, educational visits both in and outside Jordan; training for local communities including on IPM; graduate applied research grants for on-the-ground transfer of knowledge. Further design and implementation of the training program will be coordinated by the PMU and delivered through Components 1.6, 2, and 3.1. Training will include:

- M.Sc. & Ph.D. Applied Research Grants. There are many technical and social aspects concerned with the growing and production of M/H plants that are still uncertain. Thus, students will be encouraged, through grants, to carry out applied research with farmers and/or the private sector. The grants will be allocated on a competitive basis according to guidelines to be developed and agreed with the Bank. It is estimated that 18 M.Sc. or Ph.D. students will benefit from these grants over a 2 year period (4 year period for Ph.D. students) to carry out applied research in the scientific and social fields. Applied Research topics will be identified in close collaboration between the PMU, NCARTT, RSCN, the private sector and the universities, etc.
- Short-Term Training Courses

The following short-term training courses are suggested to build up the capacity in the M/H sector including culinary, medicinal and aromatic herbal plants. They cover different areas. The training courses should focus not only on scientific aspects but also on the operational and practical aspects resulting in on-the-ground delivery of components. Participation in training courses will involve a wide range of beneficiaries. Participants could be farmers, women, community member, herbalists, extension agents, government staff, private business, researchers and students. Some courses may be conducted more frequently than others during the life time of the project.

In-situ Conservation

- 1) Natural reserve management

- 2) Management of plant genetic resources
- 3) Collection and survey of wild plant resources
- 4) Database management
- 5) Preparation of specimen sample for herbarium
- 6) Taxonomy

***Ex-situ* Cultivation**

- 1) Agricultural Crop Management: This will include developing skills in the areas of soil preparation, the use of proper seeds and seedlings, planting techniques, crop management, irrigation, water conservation, appropriate combination of M/H plant species for yield enhancement, proper harvesting methods, and modern farm management.
- 2) Contract Farming:
 - a. To explain the principle of contract farming, provide insights into benefits and obligations. To analyze a sample contract and explain the dynamics that are involved to protect the farmer and contractor.
 - b. To explain the process of building an effective herb association. Analyze the benefits and the constraints. To provide a road map to building an effective association.
- 3) Organic farming: to provide farmers/beneficiaries with practical knowledge and skills how to produce organically and how to cope with standards and certification procedures.
- 4) Integrated Pest Management: to provide farmers with the knowledge to identify common diseases in medicinal, aromatic and culinary herbs cultivation. To train farmers on how to control diseases and other pests using proper agricultural practices.

Post Harvest and Processing

- 1) Post harvest handling methods:
 - a. Latest methods used to extend shelf life of fresh cut herbs. Detail description of the process, and the machinery to be used to reach that purpose (example-chlorinated cool water and drying treatments).
 - b. Insight into proper packaging process, in bulk and bunches.
 - c. Principle of herb cooling, and proper temperature for storage and prepare for long air transportation. (Example, the work process in a typical modern post harvest pack and grading house, and sketch an ideal post harvest set up.)
 - d. In-depth look at the importance of the integrated cooling chain, from harvest time to the final market destination.
 - e. Proper packaging techniques, for large pallet shipments as well as individual packing.
 - f. Proper drying storage, cleaning, grading, mixing, packing techniques for different M/H commodities.
- 2) Extraction Methods of Volatiles: hydro-distillation and other methods.
- 3) Chromatographic separation of volatile oils and active ingredients.
- 4) Qualitative and quantitative analysis of active ingredients.
- 5) Formulation of M/H plant extracts in pharmacological and cosmeceutical dosage forms.

Project Component 2 - US\$6.92 million

Component 2. Pilot-Sites Conservation (US\$ 6.92 M – GEF \$ 2.71 M).

This component has two sub-components, namely the *in-situ* protection and management of M/H plants and the *ex-situ* production of rare, endangered and popular M/H plants to relieve *in-situ* pressure. The *in-situ* sub-component covers two pilot sites where M/H plants will be protected and managed by the local communities. Rare and endangered species will be planted for conservation purposes at the *in-situ*

sites. The *ex-situ* pilot cultivation of M/H plants will serve to relieve *in-situ* pressure. The *ex-situ* pilot sites will be used to demonstrate methods and techniques to plant, tend, harvest and process M/H plants.

2.1. *In-situ* conservation and sustainable use of M/H plants.

2.1.1 Mujib Nature Reserve *in-situ* Conservation

The Mujib Nature Reserve covers 21,500 ha and is adjacent to the Dead Sea. Four bio-geographical regions are present in the reserve and 396 flora and fauna species have been identified. The average rainfall in this reserve ranges from 250 to 350 mm and it is a water-stressed and eroded area. The reserve is used by local herders for grazing and some agriculture activities.

The Mujib Nature Reserve is managed by the Royal Society for the Conservation of Nature (RSCN) which has primary scientific based-knowledge of the site. While the exact number of communities to be involved in the project has yet to be determined, it is estimated that about 30 villages will be participate.

Livestock grazing poses a significant threat to bio-diversity conservation in the Mujib Nature Reserve. Baseline ecological surveys conducted by RSCN during 1998 revealed clear evidence of over grazing of the natural vegetation cover and disturbance to soil profiles and plant community structures through the casual planting of fodder crops and on-site feeding of concentrates and hay. The grazing pressure is largely confined to the eastern edge of the Reserve, where livestock owners from nearby villages have traditionally utilized the rangeland for goats and sheep. In response to the grazing problem, the local livestock owners and RSCN agreed to design and implement written agreements to zone grazing use. These agreements have been implemented for four years. They define seasonal zoning uses of these areas for grazing animals within the reserve, but there are no limitations on stocking density. The agreements cover an area of 40 square kilometers and there are no limits to grazing during spring and autumn. In order to compensate for any possible socio-economic negative effects created by the grazing agreements implemented during the summer and winter, RSCN has started a program of alternative income generation opportunities, targeted at livestock owners. These include tourism initiatives and handicrafts, as well as agricultural projects outside the reserve boundary. The M/H plants project will update this program through the *ex-situ* activity of growing M/H plants for local community benefits, and training in rangeland management.

The villagers will be involved from the onset to identify areas containing valuable and rare/endangered M/H plants and indigenous knowledge and use will be recorded. The existing knowledge of villagers will serve as a basis to address sustainably conservation concerns. Women especially will play a key role in the conservation and use of M/H plants. They are the primary source of home health care and their knowledge of wild sources of M/H plants is invaluable. They have the ability to maintain high-use species in home gardens. In many households, they are actively engaged in livestock herding and consequently must administer health care to their animals when sick. Accessing this human and livestock health care knowledge base is critical to the success of this project.

Traditional health care knowledge is held by the senior women referred to as “Hajat”. These women diagnose and treat ailments and infections, and treatment is generally free. The “Hajat” are also midwives who have acquired their knowledge through individual experience. No information is available regarding the total number of “Hajats” in the country or number of people treated. Neither is there any information regarding the number of home deliveries performed by the midwives. Starting with the project sites, an inventory of “Hajats” will be undertaken, including the documentation of their

knowledge both of plants and their uses. This would provide important information on the distribution and sustainability of supply of M/H plants, particularly of plants whose future existence might be in doubt. Regardless of the doubts by biomedical practitioners of its validity, treatment by “Hajat” still remains a viable, effective, cultural acceptable form of health care that needs to be documented and where scientifically proved, to be formally included in primary health care policy. Such information would be very useful in planning future activities by linking health and agricultural programs. Initially, it is proposed to link the government health clinics in these two project sites with the traditional healers vis-à-vis referrals, etc. for their mutual benefit.

The Project staff in the areas will give full-time support to the communities and services from the PMU and other components of the project will assist to ensure its successful implementation. The core staff for these interventions includes a Manager, a Site Team Leader, Ecologist, six Rangers/Community Support Officers, an Accountant and an Administrator coupled with vehicles and equipment. National and international consultants will undertake studies in the dynamics of M/H plants communities, their management and their propagation both *in-situ* and *ex-situ*. Other proposed studies include water harvesting trials, soil erosion interventions and community participation programs. Site community management plans will be designed and implemented by the communities. These plans will include updated grazing agreements, water-catchment and harvesting measures, enrichment planting, erosion control both of wind and water, natural measures to increase and maintain fertility and integrated pest management initiatives.

RSCN will ensure that phased management plans are compiled and implemented over a five-year period. These plans will include appropriate management tools for the sustainable use of M/H plants and their products. In order to relieve the pressure to endangered, rare or popular M/H plants, farmer based cultivation trials will be established. These trials will be undertaken in collaboration with the *ex-situ* sub-component. An important part of this initiative will be learning by doing and ensuring that results from the various interventions, whether positive or negative, are relayed to farmers and other interested parties through demonstrations and communications. In addition to this priority site, another eight sites were identified as areas in need of protection and management. Thus, the best practices from Mujib Nature Reserve should be documented and made available to communities, government and other donors, who may be interested in broadening the scope of the project to all identified priority areas of Jordan and to other countries with similar issues.

Training

The training component of the project will be used to build the capacity of local community stakeholders and RSCN staff in the conservation and sustainable use of M/H plants. An indicative training program, showing proposed topics and broad time frames is given in the table below, although the specific training needs of the target groups will be assessed as part of the initial phase of the project and the program will be adjusted accordingly. A considerable amount of capacity building will also occur as a result of the “on-the-job” experience gained throughout the development process.

Proposed topics	Indicative content	Yr 1 (Q = Quarter)	Yr2	Yr3
<i>Identification of M/H plants and their medicinal properties</i>	<i>Species identification in the field. Traditional and modern knowledge of healing properties. Active ingredients</i>	Q2		
<i>In- situ conservation of M/H plants</i>	<i>Status, distribution and threats. Conservation needs. Potential for assisted regeneration</i>	Q3		
<i>Sustainable collection methods for wild plants</i>	<i>Collecting techniques. Seasonality. Safe yields.</i>	Q4		
<i>Cultivation of M/H plants</i>	<i>Seed collection and storage. Propagation, cropping systems, pest management, collection.</i>		Q1	
<i>Processing of medicinal plant products</i>	<i>Harvesting, drying, cleaning, packaging, labeling, extraction of oils, processing for other products.</i>		Q1	
<i>Marketing of medicinal plant products</i>	<i>Identification of markets, marketing strategies, establishing sales outlets, advertising and promotion, cooperation with other agencies</i>		Q4	
<i>Small business management</i>	<i>Planning, target setting, accounting, quality control, staff management,</i>			Q1
<i>Development of local community cooperatives</i>	<i>Creation and/or institution building for local farming and tourism cooperatives</i>			Q2
<i>Outreach and education programs</i>	<i>Prepare an outreach and education program related to medicinal herbs</i>			Q1
<i>Grazing management</i>	<i>Sustainable rangeland management. Rotational grazing, dry land farming and gardening</i>	Q4		
<i>Medicinal herbs and tourism</i>	<i>Introducing M/H plants and their uses to guided tours in the Mujib Nature Reserve</i>		Q2	

By the end of the project, representatives of about 30 communities will participate in managing and protecting these sites. These sites will be used to demonstrate *in-situ* protection and management and *ex-situ* growing of rare and endangered species. Thus, other sites identified during the preparatory phase could have similar interventions initiated before the end of the 5-year project's lifetime. Through the production of M/H plants and products the sites will be self-supporting and become dynamic rural communities. The outputs of these *in-situ* activities include:

1. implementation of an overall management plan for the sustainable conservation of M/H plants in the Mujib Nature Reserve with focus on micro-catchment and erosion control;

2. results from the following applied research to improve M/H plants conservation are implemented:
 - a. updated surveys on M/H plants use
 - b. plant communities, structure and properties identified
 - c. apply propagation research
 - d. hot spots identified and managed with the local community
 - e. mitigation measures to M/H plants threats
 - f. rangeland management
 - g. conservation monitoring program for Mujib Nature Reserve
3. protection strategy implemented for the conservation of M/H plants including:
 - a. a community-based enforcement program
 - b. updated zoning plan
 - c. participatory grazing strategy for the area
4. community-based programs, including:
 - a. participatory rural assessment
 - b. demonstration trials for growing endemic and rare species
 - c. pilot nurseries for the use of the local community
 - d. community-based income generating activities
 - e. water harvesting techniques and soil erosion control measures
5. an outreach and education program for the Mujib Nature Reserve area including:
 - a. M/H plants importance and value
 - b. interpretation and educational material
 - c. field of M/H plants integrated into Nature Conservation Club (NCC) networks
 - d. seminars to the local community
 - e. interpretation tools for reserve visitors
6. capacity building program, including:
 - a. training for reserve staff and local community
 - b. study tours for relevant stakeholders
7. contributions to the M/H plant database, genebank and GIS located at NCARTT.

2.1.2. The Central Upper Slopes of the Rift Valley *in-situ* Conservation

‘Hotspots’ are defined as areas of various size where biodiversity is under increasing threat due to human activity, land degradation and environmental anomalies. In Jordan, the hot-spots of the Central Upper Slopes of the Rift Valley are threatened by human activities, especially over-harvesting of M/H plants that are a source of accessible and affordable home health care. The hotspots of the Central Upper Slopes of the Rift Valley whose species are endangered will be identified and zoned with the cooperation of the local people who have indigenous knowledge. Conservation action plans will be developed and implemented to protect these M/H plants. One option may be for the Queen Noor Al Hussein Foundation (NHF) in close cooperation with other bodies such as NCARTT, RSCN and the PMU to manage up to 20 hotspots spread over a 5-year period starting with 4 and adding four new ones each year.

This sub-component will support the following activities: (i) inventory of flora and fauna and definition of the boundaries of the hotspots in collaboration with knowledgeable parties; (ii) assessment of the supply and demand of M/H plants currently used by women for day-to-day health care needs in the home; (iii) assessment of the sustainability of the wild supply; (iv) classification of their status as to rare, endangered, or decreasing and significance to Jordan’s bio-diversity; (v) design and implementation of guidelines for the sustainable harvesting of wild plants where cultivation is not possible; and (vi) establishment of methods for propagation and cultivation of selected M/H plant species in home gardens and in degraded habitats etc. to take pressure off the hotspot and provide an additional source of income.

Achieving such objectives would give women a greater opportunity to develop their knowledge base and play a greater role in resource conservation and management and supplement present income generation activities.

The expansion of arable lands (with some degradation), overgrazing, urbanization and industrialization have resulted in serious threats to the natural habitats of M/H species. Home and field surveys would be carried out to determine pressures on wild populations and habitats at selected community sites to better understand community dependence on M/H plants for human and livestock health care and as an income source.

Table 1 gives data on M/H plants collected by women at four sites run by the NHF.

Table 1. Medicinal Plant Species Collected by Women for Home Health care Needs

Species		Um Qais	Libb	Al Amir	Frequency
<i>Matricaria aurea</i>	D	+	+	+/S	3
<i>Paronychia argentea</i>	C	+	+	+/S	3
<i>Peganum harmala</i>	C		+/S	+/S	2
<i>Malabaila secacul</i>	NI	+/S	+/S	+/S	3
<i>Gundelia tourneforti</i>	NI	+/S	+/S	+	3
<i>Retama raetam</i>	C	+	+	+	3
<i>Malva sylvestrus</i>	NI	+/S	+	+	3
<i>Urtica pilulifera</i>	C	+	+	+	3
<i>Salvia hierosolimitana</i>	NI	+		+	2
<i>Cyclamen persicum</i>	E		+	+	2
<i>Arum discorides</i>	NI		+/S	+	2
<i>Crambe orientalis</i>	NI	+/S	+	+/S	3
<i>Thymus capitata</i>	NI		+/S	+/S	2
<i>Achillea membranacea</i>	NI	+/S	+	+	3
<i>Foeniculum vulgare</i>	R		+/S	+/S	2
<i>Globuhania arabica</i>	NI	+/S	+/S	+/S	3

NI – not included in RSCN inventory; C – common; D – decreasing; E – endangered; R – rare; S - shortage

Another activity supported by the project to relieve *in-situ* pressure is the *ex-situ* conservation and cultivation of medicinal plant species by communities. NCARTT would give training to prospective people who want to start nurseries. This would be part of the *ex-situ* sub-component. Such nurseries would be a source of high-demand species as they are the first source of health care in the rural communities. The micro-environments of home gardens and selected agricultural sites contain high levels of species of a variety of end uses: medicinal, herbs, spices and varieties of health and nutritional value. Also, the nurseries would be points of experimentation, introduction of new varieties and/or species and genetic diversity as a result of plant (germplasm) exchange and supported by social-cultural diversity. In addition, they would be a source of supply for women wishing to expand M/H plants home gardens or to establish large income generating agricultural plots.

The outputs of the conservation activities for the ‘hotspots’ of the Central Upper Slopes of the Rift Valley include:

1. Hotspots, and their scientific characteristics are identified.
2. *In-situ* conservation and management programs, that reflect community needs and CBD

- objectives vis-à-vis the protection of bio diversity and indigenous knowledge, are implemented.
3. Sustainable harvesting guidelines for *in-situ* high-demand M/H plants species implemented.
 4. *Ex-situ* cultivation programs established in the kitchen gardens, degraded lands and farms, of the hotspots buffer zones, that reduce the pressure on wild sources in collaboration with communities (women), NCARTT and the private sector.
 5. New source(s) of income generation for communities, especially women.
 6. Strengthened public and private sector collaboration.
 7. Jordan's education and public awareness programs for resource management include M/H plants.

This initiative would build upon the existing knowledge of farmers, especially women by documenting species and proposing ways to address sustainability concerns within conservation, management and sustainable use component. The core staff implementing the activities include a Team Leader and his/her Deputy both with knowledge of M/H species and their *in-situ* management, a Monitoring and Evaluation specialist, a Secretary and Drivers together with vehicles and equipment. National and international consultants will be contracted for: hotspot identification and delineation; assisting communities with drawing up management plans; updating socio-economic surveys of home use and medicinal plant inventories; in collaboration with women, identifying sustainable agricultural practices, selection of M/H plants for cultivation, and training extension officers. The core team, together with the PMU will assist communities manage their hotspots. By the end of the project, at least 20 hotspots should be managed by 20 communities containing an estimated 600 families and these areas would have been used for demonstrating *in-situ* protection and management and *ex-situ* growing of rare and endangered species. Through production of M/H plants and products the sites will be self-supporting and because of the other activities in the project vibrant rural communities will be fostered.

2.2 *Ex-situ* cultivation trials.

A preliminary study on the cultivation of M/H plants was undertaken as part of the preparatory phase of this project. This focused on identifying such species that could be grown successfully under rainfed and irrigated production systems. For the most part, the survey focused on high-demand food crops and spices, but many of these plants also have medicinal value, albeit limited at times. The study detailed problems likely to be encountered in the production of threatened medicinal plant species. Also, consideration was given to *ex-situ* cultivation and use by local communities of rare species adjacent to the reserve sites as well as by farmers, commercial growers and the pharmaceutical industry.

Monographs for seventy-six species are included in the study providing a botanical description and identifying the ecology, distribution, bio-diversity status, chemical constituents, parts collected, medicinal and herb usage, cultivation, propagation and general comments. M/H plants species indigenous to Jordan that have cultivation potential may be grouped into three categories: trees; shrubs; and annual/perennial herbaceous species.

Tree species are adapted to a range of mountainous and wadi areas where rainfall is sufficient for survival. The medicinal properties of the trees have not been fully exploited, even though local people collect parts (bark, root, leaves, fruit, seed) for health care needs, or as dyes and for culinary purposes. Reintroducing them in all parts of their natural habitats will help combat land degradation processes (wind and water erosion). Trees that should be considered include *Ceratonia siliqua*, *Moringa peregrina*, *Salvadora persica*, and *Zizpuhus spina-christi*. Most of these species are tolerant to drought conditions and provide browse for animals as do the indigenous acacia species.

Shrubs are generally well adapted to the drier areas, those receiving less than 200 mm annually. These include *Lavendula officinalis*, *Myrtus communis*, *Teucrium polium*, and *Peganum harmala*. Most

provide browse for animals, improve the micro-climate and are commonly collected for their medicinal properties. *P. harmala* (a M/H plant) is not palatable to animals and is widely distributed in the desert and steppe regions. However, the most economically important M/H commercial crops cannot be grown under such conditions without irrigation. Good candidates for cultivation trials apart from the above include *Achillea fragrantissima*, *Alhaji maurorum*, *Capparis spinosa*, and *Cassia acutifolia*.

Annual and perennial herbs contain many plant species that have medicinal properties and lend themselves to cultivation. They include the following that are also identified in the M/H inventory: *Ammi visnaga*, *Anchusa strigosa*, *Capsella bursa-pastoris*, *Citrullis colocynthis*, *Ecballium elaterium*, *Gundelia tournefortii*, *Paronychia argand impoentea*, *Pergularia tomentosa*, *Ruta chalepensis*, *Teucrium polium*, *Urginea maritima*, and *Urtica pilulifera*. Most of these species could be cultivated under a range of environmental conditions. *Citrullis colocynthis* tolerates high temperatures, salinity and low soil pH and could be cultivated on marginal lands. *Capsella bursa-pastoris* could do well in poor soils – stony, shallow. *Urtica pilulifera* can be grown in high moisture soils, humid shaded areas. The cultivation potential of *Gundelia tournefortii* is presently undergoing assessment regarding management properties.

Target areas for cultivation trials with emphasis on rainfed sites include: the sub-tropical environments of the Jordan Valley slopes and the temperate highlands. High rainfall areas with land slopes less than 9% are deemed more suitable for annual species cultivation. High rainfall areas with slopes more than 9% could be used for trees and shrubs. Drier areas receiving low rainfall and where water harvesting is possible should favor trees and herbaceous species.

The number of M/H plants currently being commercially cultivated is relatively small. In 2000, seven crops were cultivated on 337 ha. with garlic occupying 50% of the land and parsley 39%. The number of plants cultivated for their M/H properties are also relatively small. Both categories rely primarily on irrigation. In low rainfall areas water harvesting offers opportunities for cultivation and added income (EU funded study). Herbal species (e.g. oregano, sage and mint) with high water requirements that cannot be met by rainfall alone and plants (e.g. medicinal) adapted to marginal, low rainfall areas would benefit from water harvesting. In addition, as gathered from anecdotal evidence, many women grow M/H plants in kitchen gardens for home consumption and for local trading.

Needs for the transfer of applied research and technology are considerable. At present it is restricted to the Ministry of Agriculture through NCARTT, the Noor Al Hussein Foundation and individual enterprising farmers (men and women) who see the potential to diversify the cropping systems and generate additional income. There is an urgent need for intensive, systematic applied research to identify sustainable cultivation practices for optimum production. Success will be enhanced by good research applications and technology transfer. Collaboration at the community, national and international levels is essential to the success of the cultivation phase of the project. Activities that need to be addressed include: crop adaptation, management, integrated pest management, tissue culture, crop improvement, hybridization, organic farming, post harvest operations, use of treated waste water, salinity toleration, drought tolerance, water use efficiency and social studies, etc.

Activities under the *ex-situ* component

To relieve pressure *in-situ*, two types of trials will be tested under this sub-component: (2.2.1) *ex-situ* farming demonstrations, and (2.2.2) pilot-prototype farm demonstrations.

2.2.1. *Ex-situ* farming demonstrations.

Based on the results of the Socio-economic Survey undertaken during the PDF-B phase, villagers/farmers

will be identified for on-farm pilot propagation and cultivation trials of M/H plants to remove pressure on wild populations. Trials will also be carried out at 5 NCARTT stations. This should include pilot cultivation trials of threatened, rare and high demand M/H plants used for human and livestock health care, culinary purposes and even species used by the cosmetic industry. The stations will also act as sources of planting materials for M/H stock. NCARTT field station personnel will assist communities and individuals in their establishment and management.

2.2.2. Pilot-Prototype Farm Demonstrations at ECOHERB Farms of Jordan (EFJ).

The transfer of NCARTT's knowledge base as further developed by EFJ, based on its own knowledge bank and continuous research at its prototype farm, will be instrumental in providing incentives to M/H plants farmers. The project will support demonstrations in this pilot-prototype farm in implementing the following strategy to develop the *ex-situ* cultivation trials in Jordan:

1. The screening process for the M/H plants to be cultivated in the *ex-situ* farms will be developed.
2. In order to encourage the adoption of sound environmental practices, Integrated Pest Management (IPM) and nitrogen fixing plants will be promoted and organic farming will be encouraged. Standards will be used for the dosage and purity of M/H plants and these will comply with international norms. Potential *ex-situ* farms will be identified for organic practices and certified as organic farms if they meet all the criteria. These farms will serve as prototypes for future expansion of organic farming practices for M/H plants. EFJ will also lobby and assist in developing quality benchmarks for various endogenous M/H plants. The objective will be to equate Jordanian *ex-situ* M/H plants with the connotation of high quality and specific standards, thereby enhancing the protection of *in-situ* plants.
3. A label will be developed for organic quality products for Jordan so as to contribute to the sustainability of the protection of *in-situ* plants by limiting harvesting and processing to *ex-situ* sites.
4. A prototype contract-farming model to standardize the relationship between the growers and EFJ will be developed. This will contribute to propagating threatened M/H plants outside the *in-situ* areas.
5. Stakeholders in the M/H plants sector will be trained on the ground in environmentally friendly techniques and procedures so as to conform to European cultivation and processing standards.
6. The level of progress of the *ex-situ* cultivation will be monitored and evaluated. Corrective measures will be taken as necessary.

NCARTT's experience in herbal (with medicinal value) cultivation which started in 1996 with the Initiative to Combat Desertification will be instrumental in implementing the *ex-situ* sub-component.. Herbal plants were identified that could contribute to the control of natural resource degradation, and where applicable, to restore productivity. This involved the identification of *in-situ* species and their *ex-situ* cultivation by farmers. Research trials and demonstrations were conducted to test and verify the suitability of cultivation and management practices for the most promising herbal species. The demonstrations were also used for training and technology transfer purposes. A *best-bet practice package* was developed for 6 herb field crops (cumin, black cumin, fenugreek, anise, caraway and fennel). Between 1997/98 to 2001/02 the land under cultivation increased from 4 ha to 243 ha, farmer participation rose from 5 to 19 and average area per crop/farmer increased from 2 to 4 ha. No production

figures are available.

NCARTT started cultivation trial under rainfed conditions with various M/H species at their research station at Madaba (Mashaqar). The objective was and is to demonstrate cost effective and profitable cultivation methods for various high-demand species that can be grown by farmers as alternative to the traditional grain and fodder crops etc. It is proposed to expand these demonstrations and trials to five NCARTT research stations, covering different agro-climatic zones. These are as follows (Table 2).

Table 2. NCARTT Field Stations for *Ex-situ* Demonstrations

Station	Zone	Growing conditions	Soil type	Comments
Mushaqar	Upland	Rainfed	Alkaline	Seed multiplication station
Maru	Upland	Rainfed	Alkaline	
Rabba	Upland	Rainfed	Alkaline	
Gohr Safi	Jordan valley	Irrigation	Saline	Relatively high heat conditions
Khaldeah	Steppe/desert	Irrigation	Saline	Heat and drought

These stations will serve as demonstration sites for farmers. Annual courses will be run each year on nursery practice and seed multiplication; establishment; tending and protection; harvesting; storage and production; and business practice. In addition farm visits will be organized. NCARTT will also advise the *in-situ* sub-component farmers and garden owners on cultivation tending and harvesting techniques, etc.

The core staff would include the following NCARTT staff: 3 agronomists, 1.5 irrigation specialists and 1.5 plant breeders along with consultants and the EFJ pilot farm manager. The five stations will be provided with vehicles, equipment and materials needed to successfully demonstrate the cultivation of M/H plants for five years; equipment will also be provided though NCARTT to the pilot farm. Over the course of five years, it is estimated that many M/H species will have been successfully grown at the stations and EFJ, and out-grown in fields and gardens. Training courses will be given to farmers and community leaders for *ex-situ* M/H production and *in-situ* management etc. and site visits will be made to the five stations and farmers who are growing M/H plants. Also, individual women are essential resource people if viable cultivation practices are to be researched and implemented. Women have considerable knowledge regarding the sources of wild species, their ecology, good harvesting practices and use and should be involved at all stages of the development and implementation process. They have already shown their abilities to utilize micro-credit to establish small household income generating activities by cultivating high-demand herbal species. Thus, their participation in all aspects of M/H plants cultivation is essential to project success and sustainability.

Project Component 3 - US\$ 1.25 million

Component 3. Public Awareness and Education. (US\$ 1.25 M – GEF \$ 0.34 M)

This component consists of two sub-components: environmental education and public awareness of M/H plants. Environmental education aims at introducing state-of the-art knowledge about M/H plants in formal and informal education. Public awareness will focus on providing knowledge on the role and importance of M/H plants in the conservation and community development agenda of Jordan.

3.1 Environmental Education

This sub-component will examine how information about M/H plants and their environment can be included in the formal education curricula of schools and universities and the informal education programs for communities, etc. Consultants will be engaged to look into curricula development and work closely with the Departments of Education and Higher Education under MOE. Once the curricula is approved there will be training courses for trainers, who in turn will train teachers. Publications and some equipment will be prepared for schools, universities and communities and M/H planting materials will be distributed to schools and communities so that they can raise them in the school garden or at village centers, etc.

3.2 Public Awareness

Training. As mentioned above under the *ex-situ* sub-component, training courses will be provided to farmers, and community leaders on the growing, harvesting and processing of M/H plants and their CDD products; training will include management of *in-situ* M/H sites. The role of NGOs, especially women's NGOs, is critical if M/H plants protection and cultivation is to be implemented, thus NGOs will be included in the training program. Also farm visits will be arranged throughout the lifetime of the project so that potential and actual growers of M/H plants can see at first hand these plants being grown and processed. Over the lifetime of the project, at least 1,200 farmers (including women) will have benefited from training courses at the five NCARTT stations; 340 trainers will have been given intensive training courses; 1,800 farmer will have visited 60 areas. In addition, information and materials, especially seeds and planting stock, will be made available to farmers throughout the country.

Knowledge Sharing. To keep farmers, communities, NGOs, the media and other interested parties informed about the project, information pamphlets, posters, press releases and articles, etc. will be produced. Video documentaries will be made on all aspects of the project for showing in community centers and at schools. Information on the project will be made available over the website of the project which will be updated frequently.

Project Component 4 - US\$3.50 million

Component 4. Income Generation Activities: M/H Quality Enhancement and Product Development (US\$ 3.5 M – GEF \$ 0)

This component focuses on income generation and will mainly provide local and national benefits. But without it, it is doubtful if the protection of globally important M/H plants would be effective, especially in the long run. This component has three sub-components: Standardization of M/H plants raw materials and processing, income generation through product development and promotion, and facilitating credit for income generating activities. These sub-components will include the following activities:

- i. Organic Farming Certification.** All collected M/H plants from the wild are grown under natural conditions without the addition of herbicides, pesticides or chemical fertilizers. Indeed, the only nutrients that are added come from those dissolved in the rainfall or are from animal droppings. Again, most if not all *ex-situ* production of M/H plants has no application of pesticides or herbicides, but some chemical fertilizers may have been added, although the application of organic fertilizers is more likely, if fertilizers are added at all. Thus, products made from M/H plants such as essential oils, spices, herbs and medicines can be said to be from organically grown products. Such products should command a higher price, both within Jordan and on the export market. Therefore, one thrust of this component is to examine how Jordan can certify M/H products that are organically grown in line with the standards established by GOJ under Component 1. International consultants will be

engaged to study the certification requirements of the European Union (especially Germany) and the USA, the two principal markets for organically grown products. A technical committee will first advise the consultants and then determine the steps to take to undertake the certification process, if feasible. It is envisaged that the technical committee of about 12 people from all interested parties will hold bi-monthly meeting over a period of 3 years, starting in 2003.

ii. Standards for M/H Plants for Harvested Products. In order to enhance the harvested products and semi-processing, there should be uniform standards concerning collection, cleaning, permissible foreign bodies, grading, packaging and trading. If such standards are adopted by the growers and the packers, then Jordanian grown M/H plants could be traded on the national and international markets with a guarantee of quality. National and international consultants will be appointed to examine this aspect and make recommendations to a technical committee. This technical committee will comprise of about 12 people with representatives from all interested parties and meet bi-monthly over a 3-year period.

iii. Processing Standards for M/H Plant Manufactured Products. As with the proposed standards for harvested products, there should be standards for manufactured products from M/H plants. A similar technical committee of about 12 members will be established to advise on product standards. There will be national and international consultants to examine standards in Jordan and abroad who will make recommendations to the committee. It is envisaged that this committee will meet bi-monthly for a period of 3 years starting in 2003.

iv. Quality Control of M/H Plant Products. In order to maintain the quality of M/H products, especially for essential oils and ingredients for medicines etc. it is necessary to have an independent laboratory to monitor products and ingredients so that they conform to the established standards. A national consultant will investigate standards and recommendations will be made to a technical committee, again composed of about 12 people, meeting bi-monthly for a 3-year period, starting in 2004. An independent laboratory, (may be one belonging to a university) will be furnished with the necessary equipment and consumables so that it will be able to test products. People submitting samples for testing will have to pay for the service, but the initial capital cost of equipment plus consumables for 4-years will be provided by a donor or donors. This quality control laboratory will meet international standards and be in a position to issue certificates for chemical and products that are in conformity with the set standards.

v. Product Development. Product development should be an essential part of expanding the market for M/H plants and their products. Thus, it is proposed to engage national and international consultants to look into all aspects of product development and to advise a technical committee on the possibilities for developing new products or enhancing existing ones. The technical committee will comprise of about 12 people and meet bi-monthly for the duration of the project. It will work closely with the other committees especially the one on marketing, described later.

vi. Market Identification. An essential part of promoting M/H plants and their products is to have up-to-date market information and to investigate new markets for M/H products both nationally and internationally. National consultants will be employed throughout the lifetime of the project to undertake market identification and collect market information. International consultants will be engaged for the first two years to provide reports on international opportunities. Also as mentioned above under Product Development, it is hoped to forge links with the M/H plant sector in China, Europe, South Africa and the USA (and other countries) in order to promote M/H plant products from Jordan. A technical committee of 12 people will meet bi-monthly over the lifetime of the

project to advise on all aspects of marketing and market intelligence.

vii. Facilitating Access to Micro-credit. Obtaining credit for income generating activities is vital, especially for the disadvantaged who have little, if any, collateral as a loan security. Cooperative arrangements with on-going initiatives that provide micro-credit to the poor, including the Enhanced Productivity Program of the Socio-Economic Development Programme, King Abdullah II Foundation, and USAID's Jordanian-US Business Partnerships, will be explored.

Annex 3: Estimated Project Costs
JORDAN: Conservation of Medicinal and Herbal Plants Project

Project Cost By Component	Local US \$million	Foreign US \$million	Total US \$million
Institutional Strengthening	1.67	0.73	2.40
Pilot-Sites Conservation	5.35	1.16	6.51
Public Awareness and Education	1.06	0.02	1.08
Income Generation Activities	3.50	0.00	3.50
Total Baseline Cost	11.58	1.91	13.49
Physical Contingencies	0.21	0.03	0.24
Price Contingencies	0.42	0.06	0.48
Total Project Costs¹	12.21	2.00	14.21
Total Financing Required	12.21	2.00	14.21

Project Cost By Category	Local US \$million	Foreign US \$million	Total US \$million
Land Acquisition	0.06	0.00	0.06
Works	0.18	0.06	0.24
Goods	0.42	0.95	1.37
Consultants/Studies/Training	4.06	0.95	5.01
Recurrent Costs (incremental)	0.12	0.04	0.16
Recurrent Costs (other)	3.87	0.00	3.87
Income Generation Activities	3.50	0.00	3.50
Total Project Costs¹	12.21	2.00	14.21
Total Financing Required	12.21	2.00	14.21

¹ Identifiable taxes and duties are 0 (US\$m) and the total project cost, net of taxes, is 14.21 (US\$m). Therefore, the project cost sharing ratio is 35.19% of total project cost net of taxes.

Annex 4: Incremental Cost Analysis

JORDAN: Conservation of Medicinal and Herbal Plants Project

A. Introduction

An incremental cost analysis of the activities for which incremental funding is requested from GEF has been carried out. The overall context and broad development goals is described below under section B, while the baseline is described in section C. Section D illustrates the alternative course of action for which funding from GEF and other donors is requested. In section E, the comparison of baseline and alternative activities is carried out broken down according to the project sub-components. An incremental costs matrix is presented in section F.

B. Context and Broad Development Goals

The potential in terms of conservation and sustainable use of globally significant M/H plants in Jordan is significant. Jordan's flora is considered rich and diverse, being at the junction of three continents, Europe, Asia and Africa. Al-Eisawi (1985) indicated the presence of four bio-geographical regions and thirteen vegetation types. The flora of Jordan is rich in M/H plants, mainly the *Umbelliferae*, *Labiatae* and *Compositae*. Many of them grow in sub-series or successional communities in various states of development or degradation, and are adapted to arid or semi-arid conditions. M/H plants in Jordan are distributed throughout the country from the eastern desert to the western highlands and from the semiarid north to the extremely arid south. Local people have recognized the importance of these plants as a source of M/H products since time immemorial. A few studies related to the identification of endemic, rare and endangered species have been carried out in Jordan on all flora. An estimated 100 species of endemic plants comprising about 2.5 percent of the total flora are recognized. A total of 485 species of M/H plants, which belong to 330 genera and 99 families, is reported from Jordan (Oran and Al-Eisawi, 1994). The identified plants are herbs, shrubs or trees. Under the PDF – Block B Grant an inventory of M/H plants in five sites representative of most of the vegetation types in Jordan revealed 94 species of medicinal value. Three species were found to be endangered (*Cyclamen persicum*, *Moringa peregrina*, *Salvadora persica*), five rare (*Ankyropetalum gypsophiloides*, *Foeniculum vulgare*, *Gomphocarpus sinaicus*, *Pergularia tomentosa*, *Rheum palaestinum*), eight decreasing in abundance (*Arum dioscorides*, *A. hygrophyllum*, *Ceratonia siliqua*, *Crataegus aronia*, *Majorana syriaca*, *Matricaria aurea*, *Mentha longifolia*, *Nasturtium officinalis*), one endemic (*Rheum palaestinum*) and one extinct (*Salvia triloba*). The remaining sixty-four species were considered common, although an increasing number are coming under threat. An earlier survey by the Royal Society of Conservation of Nature in one proposed project area (Mujib Nature Reserve) indicated the presence of rare species like *Adiantum capillus-veneris*, *Sternbergia clusiana*, *Pistacia atlantica*, *Caralluma aaronis*, *Pergularia tomentosa*, *Equisetum ramosissimum*, *Crocus moabiticus*, *Micromeria sinaica* (endemic; also on IUCN list), *Teucrium leucocladum*, *Ajuga chamaeopytis*, *A. iva*, *Lavandula pubescens*, *Withania somnifera* (new to the area). Endemic species in the Mujib Nature Reserve include *Withania obtusifolia*, *Micromeria sinaica*, and *Crocus moabiticus*.

One of the major difficulties of assessing the importance of M/H plants and developing a strategy for their conservation and sustainable use is the lack of hard facts about which species have medicinal value, their detailed distribution, how they are collected or harvested, which species are cultivated and where, what are the quantities involved in collection, consumption, and trade, etc. Trade statistics are unreliable as is the identity of the material traded under such names as oregano, covering plants belonging to more than one genus and several species. Some countries such as Spain have produced reasonable detailed assessments of the uses and trade in medicinal and aromatic plants. A review of surveys for other

Mediterranean countries, prepared under the auspices of the MEDUSA organization, as part of data gathering on wild regional species of potential value for sustainable use may provide examples of good practices.

The sector is undergoing major changes. On one hand the demand for M/H plants and their extracts for domestic use in Jordan is increasing and is satisfied either through over-harvesting of wild plants, a little cultivation or by imports. The latter amounts to about US\$ 6 million per year with exports about \$ 0.4 million annually.

C. Baseline scenario

Under the baseline course of action, very few activities in Jordan exist that focus specifically on the conservation and sustainable use of M/H plants. While the legislative framework for biodiversity conservation has been defined in the context of the Environmental Law No. 12 of 1995 and of the Jordan Country Biodiversity Study, prior to the proposed project, there is no capacity at the national level to address needed institutional strengthening, capacity building, improving awareness and fostering private sector, NGOs and research institutes to promote and implement the conservation of M/H plants. Therefore, the baseline scenario will result in extremely limited conservation of M/H plants or strengthening of national capacity to address conservation and sustainable use issues in a coordinated and systematic approach.

A few small-scale related activities are worth mentioning in terms of contribution to the baseline scenario, namely the Germplasm for Arid Lands Program (GALP), on-going research on germplasm and ex-site conservation by NCARTT, RSCN nature conservation program and the micro Medicinal Herbs Agri-Enterprise Project (MHAEP) of the Noor Al Hussein Foundation.

Germplasm for Arid Lands Program (GALP)

This program is supported by the Regional Desertification Initiative of which the objective is to identify and evaluate indigenous and exotic species of plants for arid areas, evaluate their economic and environmental potential and promote the establishment of a more biologically diversified and productive plant resource base for farming systems in the region. Activities under the program have, however, been limited to carrying out very small experimental field trials for all plant species on yield improvement, cultivation under plastic house conditions, impact of mulching on *arak*, *mellisa* and *roselle*, and financing scholarships. Extension work in cultivation of M/H plants is non-existent. Under Phase II of the Desertification Initiative the focus will be on regional knowledge sharing, while the GALP program will focus on the formulation of national strategies through planning workshops to control desertification as the basis for identifying a regional strategy. Hence, there will be virtually no attention paid to sustainable use of M/H plants in Jordan.

NCARTT Germplasm and Ex-situ cultivation research

NCARTT has implemented very small ex-situ cultivation trials and related research in 6 M/H plant species, and it is expected that this will continue, albeit with limited funding. Given the budget constraints, it is not expected that NCARTT will expand the scope of its activities in sustainable use of M/H plants.

RSCN nature conservation program

RSCN will continue to implement its mandate to manage the nature reserves and protected areas.

This will have positive, if limited, impacts on the status and conservation of endangered flora, including M/H plants in the selected project sites. However, RSCN has no independent resources to carry out the much needed baseline surveys, market assessments, socio-economic surveys and targeted in-situ conservation activities related to M/H plants.

NHF Medicinal Herbs Agri-Enterprise Project (MHAEP)

This micro program was established in 1989 to integrate women in rural development, create employment, turn home gardens into small-scale enterprises, preserve medicinal and aromatic plants and support women as decision makers. One initial target site, Bani Kenanah, is managed in cooperation with local community and several Jordanian universities. Good experience has been gained in engaging women as entrepreneurs in production and marketing of M/H plants and supporting their role in traditional health care, with 440 women having received technical training, and another 1800 obtained indirect benefit. The MHAEP will continue to have a positive, if limited, impact, in terms of establishing sustainable use mechanisms within local communities. It has the potential, through the project, of being scaled up.

D. Alternative scenario

With the introduction of the GEF alternative, a set of complementary as well as substitutional activities would be implemented to ensure that global environmental benefits are attained. The GEF alternative will build on the baseline scenario to (i) establish a framework for M/H plant biodiversity conservation and management, (ii) strengthening institutions and implementing a coordination program between relevant agencies and stakeholders, (iii) promoting in-situ conservation and sustainable use of M/H plant species in 2 pilot sites, and (iv) designing and implementing a public awareness and conservation of M/H plants education strategy.

The support of GEF will also ensure that lessons learned in this project can be replicated in other areas in similar agro-climatic zones within Jordan and in the region. In particular, the demonstration of successful partnerships between Government, private sector and local communities in the conservation and management of M/H plant resources for economic benefits can be of value for other natural resources and economic sectors in the country. At the local level and in the pilot sites, the communities will build on traditional knowledge to benefit from education/ awareness and training programs that link the value of sustainable resource management to improved income opportunities. This will hopefully lead to project initiatives being extended beyond the pilot areas into other potential sites in Jordan. At the national and regional level, the development of appropriate legislation, particularly with regard to intellectual property rights (IPR) policy and guidelines for indigenous knowledge will provide the foundation for further efforts in M/H plant conservation programs in Jordan and could be replicated in other countries in the region where IPR issues of traditional knowledge are yet to be addressed. The initiatives of the project will be documented through videos, articles, newsletters, by the GEF and the World Bank and other communication channels, thus it is anticipated that the project will have a large replicability potential.

E. Incremental costs

The baseline and GEF alternative are described below according to the four project sub-components in order to estimate the incremental costs for which funding from GEF and other donors will be requested.

1. Institutional Strengthening (Baseline Cost: US\$ 0.05 M, Alternative Cost by GEF: US\$ 1.95M, Non-GEF Incremental Cost: US\$ 0.54M)

The main thrust of this component in the baseline scenario would be to continue with on-going micro-fragmented programs with no dissemination of results. Under the baseline, lack of institutional capacity, information and incentive structures will provide a barrier to the efficient management of M/H plant resources.

The GEF alternative will provide the nucleus for institutional coordination through establishing crucial inter-sectoral links and regulatory instruments. Through the development of proper policies and guidelines, the establishment of standards, safety and efficacy testing, and the provision of formal and informal training to various stakeholder groups, an environment of improved access to information and knowledge will be created; thereby promoting partnerships and enhancing the capacity within the Government, private sector and local communities for the establishment of sustainable management set-ups for M/H plant conservation. The main global environmental benefits include increased knowledge on the status of key globally significant species and potential for propagation through the establishment of the M/H plant database and gene bank.

2. Pilot Sites Conservation (Baseline Cost: US\$ 0.15 M, Alternative Cost by GEF: US\$ 2.71M, Non-GEF Incremental Cost: US\$ 4.06M)

In situ conservation and sustainable use of M/H plants

No baseline activities are envisaged under this component, since conservation of M/H plants would not have been considered a priority in the current on-going nature conservation programs in view of limited funding capacity.

In the GEF alternative, substantial global benefits are anticipated from implementing the different activities aimed at improved site management for conservation purposes. These activities include: improving scientific understanding of M/H plants, the design and enforcement of a protection strategy, development of community based support programs, development and implementation of outreach & educational programs, implementation of capacity building programs and identifying hotspots. Grazing arrangements with local communities, water catchment and harvesting measures, shrub planting to reduce erosion will all contribute to improved soil fertility, and increased species occurrence and density. A monitoring program will be developed for each of the two in-situ pilot sites to track the changes in status of key indicative species and the results will be disseminated and potentially replicated in other possible sites in the country.

Ex-situ cultivation trials

The objectives of this sub-component is to demonstrate cost-effective and profitable cultivation methods for various high demand M/H plant species that can be reproduced by the farmers in order to protect the in-situ M/H plants from over-harvesting. The baseline activities of demonstration are limited to a maximum of 1 hectare and the extent of dissemination of research and trial results confined to the few demonstration plots and involved farmers through NCARTT.

Through the GEF alternative, ex-situ plots will be extended and expanded to enable farmers from all over Jordan and beyond to see the sites and appreciate the various techniques. Pilot prototype demonstration farms will also be established in partnership with the private sector. Mass media initiatives will be promoted to ensure that information dissemination is maximized, and will be linked to the activities under Component 3 – Public Awareness below. Promotion of organic cultivation techniques to increase quality standards and competitiveness will also be included under GEF support of selected ex-situ farms. These activities will assist in propagating threatened M/H plants outside the in-situ areas and providing alternative livelihood sources and sustainable use

mechanisms that alleviate the pressure off the wild varieties.

3. *Public Awareness and Education* (Baseline Cost: US\$ 0.02 , Alternative Cost by GEF: US\$ 0.34M, Non-GEF Incremental Cost: US\$ 0.89M)

The objectives of public awareness and education programs under the baseline scenario will focus on the provision of general messages to the public regarding conservation issues, natural resources management and the value of nature reserves.

Under the GEF alternative, it will be possible to develop and deliver targeted messages and materials on M/H plants as a significant resource for the country. Activities under this component will provide the necessary support and dissemination channel through extension work, training courses for farmers and teachers, demonstrations, farm visits and environmental education in schools for the in- and ex-situ cultivation activities under Component 2 above. These activities will ensure that on the long run sufficient public support is generated for the sustainable conservation of these resources.

4. *Income Generating Activities: M/H Quality Enhancement, Product Development* (Baseline Cost: US\$ 0.00 M, Alternative Cost by GEF: US\$ 0.00M, Non-GEF Cost: US\$ 3.50M)

While the activities under this component will also accrue potential global benefits by providing incentive mechanisms for the conservation and sustainable use of M/H plants, it is envisaged that funding for the component activities will not be provided by GEF but from GOJ, other donors and/or the private sector.

F. Incremental cost matrix

As explained above, the incremental costs of the alternative scenario were derived according to each of the project components. These costs and the domestic and global environmental benefits are displayed in the following matrix.

Component Sector	Cost Category	US\$ mill.	Domestic Benefits	Global Benefits
Institutional strengthening and collaboration	Baseline	0.05	Ongoing traditional agricultural initiatives.	Some protection of germ plasm. Minimal improvement to sustainable use of M/H plants.
	GEF Incremental	1.95	Demand driven (vis-à-vis current supply driven) applied research and technical capacity of relevant government and nongovernmental institutions. Training for beneficiaries NGOs to identify and conserve M/H plants.	Enhanced information sharing and increased public sector capacity to manage biodiversity and sustainable management of M/H plants.
	<i>Additional non-GEF incremental costs</i>	0.54		
Pilot Sites Conservation	Baseline	0.15	M/H plants are over-harvested.	Limited conservation of M/H plants as part of more general on-going nature reserve programs.
	GEF Incremental	2.71	Two <i>in-situ</i> sites protected and managed sustainably. Used as models for other sites. Increased collection and analysis of information vital for conserving endemic/rare fauna. <i>Ex-situ</i> production of M/H plants and products. Increased opportunities for income generation in rural communities. Management plans for sustainable land use, decreased erosion and improved water harvesting.	Pressure relieved from vulnerable global M/H species over the long term, gene pools of global M/H plants maintained and sustained, agro-biodiversity preserved, long-term capacity and awareness for biodiversity established at the community level. Sustainable production of M/H plants increased. Improved quality and quantity of water into Jordan Valley, some increase in carbon sequestration.
	<i>Additional non-GEF incremental costs</i>	4.06		
Public Awareness and Education	Baseline	0.02	Some environmental training, but lacking focus on M/H concerns. Minor public awareness through existing conservation.	Increased public knowledge of general environmental concerns
	GEF Incremental	0.34	Increased information sharing and public awareness concerning the importance of biodiversity, specifically M/H plant education.	Increased public and private awareness of globally significant biodiversity and the importance of M/H plants.
	<i>Additional non-GEF incremental costs</i>	0.89		
M/H income generation etc.	Baseline	0.00	Some private activities and farm trials with limited production capacity and competitiveness	Negative benefit due to over-harvesting.
	GEF Incremental	0.00	Improved quality and quantity of products from sustainable supply and resulting increased income opportunities	Sustainable production leads to increased management and sustainable use of M/H plants and increased conservation of in-situ M/H plants of global importance.
	<i>Additional non-GEF costs</i>	3.5		
Total	GEF incremental	5.35	Total GEF input \$5.35 million including \$0.350 million for PDF-B	
Total		14.56		

Annex 5: Financial Summary
JORDAN: Conservation of Medicinal and Herbal Plants Project
Years Ending

	IMPLEMENTATION PERIOD						
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Total Financing Required							
Project Costs							
Investment Costs	2.6	2.4	1.9	1.6	1.5	0.0	0.0
Recurrent Costs	0.7	0.8	0.8	0.9	1.0	0.0	0.0
Total Project Costs	3.3	3.2	2.7	2.5	2.5	0.0	0.0
Total Financing	3.3	3.2	2.7	2.5	2.5	0.0	0.0
Financing							
IBRD/IDA	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Government	0.7	0.6	0.7	0.7	0.8	0.0	0.0
Central	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Provincial	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Co-financiersMOP/EPP	0.7	0.7	0.7	0.7	0.7	0.0	0.0
User Fees/Beneficiaries	0.0	0.1	0.0	0.1	0.0	0.0	0.0
GEF	1.3	1.5	1.0	0.6	0.6	0.0	0.0
RSCN	0.2	0.2	0.2	0.3	0.3	0.0	0.0
EFJ	0.4	0.1	0.1	0.1	0.1	0.0	0.0
Total Project Financing	3.3	3.2	2.7	2.5	2.5	0.0	0.0

Main assumptions:

Annex 6(A): Procurement Arrangements
JORDAN: Conservation of Medicinal and Herbal Plants Project

Procurement

Procurement arrangements:

Organization: Procurement activities will be undertaken by the Project Management Unit (PMU), which will be based in the EPP Directorate in the Ministry of Planning. The PMU would comprise an experienced Procurement Specialist (PS) who will also be a qualified FMS, combining these functions. He/she will be recruited into the project under terms of reference acceptable to the Bank. The PS/FMS will be familiar with procurement under Bank-financed projects and will constitute adequate capacity to carry out procurement activities foreseen under the GEF project. The PS/FMS will be responsible for preparing the procurement plans for the project, with annual plans proposed each year by March 31 and starting from 2003, as well as for carrying out procurement action.

Consulting services and training:

(i) A number of consulting services contracts will be awarded under the project, following IBRD *Guidelines for Selection and Employment of Consultants* dated January 1997 and revised May 2002. Contracts with individual consultants above US\$ 50,000 and consulting firms above US\$100,000 will be subject to prior review by the Bank. Short lists of consulting firms may comprise entirely national consultants for estimated contract values below \$100,000 equivalent :

- a) Project Management Unit (PMU); staff of the PMU (Manager, Procurement/Financial Specialist, M&E/Training, Local M/H Specialist and International M/H Specialist) will be recruited as individual consultants
- b) Foreign Training: Using the Consultant Qualification (CQ) method, 3 small contracts will be awarded for training outside Jordan with foreign consulting firms or technical institutions.
- c) National Training: using selection under fixed budget (SFB) method, 10 small contracts will be awarded using this method. In addition, several individual consultant will selected to carry out special training activities. Under this training will be also some applied research grants for graduate students which will be selected though competition.
- d) The selection process for consulting firms will be based on the Selection under a fixed Budget (SFB) or Consultant Qualification (CQ) methods.
- e) Certain studies be carried out by consulting firms using the Selection under Fixed Budget method.

(ii) Individual Consultants: (short term): The project provides US\$749,600 for short-term consultants, which are expected to be selected competitively on an international basis.

(iii) Individual Consultants (long term): The project provides US\$2.04 million for long-term consultants, which are expected to be selected competitively on a national basis.

All selections of individual consultants will follow the provision of Section V of the Bank's Consultant Guidelines.

Goods and Equipment: Vehicles will all be procured from UN IAPSO (14 vehicles at an aggregate value of US\$280,000). Services such as telephone and e-mail charges will have a threshold of US\$15,000 annually and US\$75,000 in aggregate procured through a sole source local provider.

Agricultural equipment will be packaged together to the extent possible and procured under International Competitive Bidding (ICB) procedures for all contract values above US\$100,000 up to an aggregate amount of US\$459,100. Small quantities of agricultural equipment, estimated to cost less than US\$50,000 per contract and up to an aggregate amount of US\$150,000 will be procured through National/International Shopping (NS/IS) according to paras. 3.5 and 3.6 of the guidelines. Procurement of office and lab equipment (approximately US\$79,000) will be procured through the National Shopping (NS) method.

Small Works: This small item includes mainly construction of small buildings for packing and grading, outlets for local products and water harvesting works for the RSCN component and will be procured through the National Competitive Bidding (NCB) method. Contract values will be in the range of \$30,000 - \$50,000 with an aggregate amount of \$156,000.

Incremental Operating Costs: This item (estimated at \$150,000) includes expenditures incurred by the PMU, NCARTT and RSCN in connection with the carrying out of the Project, on account of office furniture and supplies, audit costs and local transportation, excluding salaries of officials of the Recipient's civil service.

Prior Review: All contracts for goods above US\$100,000 and the first three contracts for works, goods and services, irrespective of the contract amount shall be subject to prior review by the Bank. Contracts with consulting firms above US\$100,000 and with individuals above US\$50,000 shall be subject to prior review. All other contracts shall be subject to post review during World Bank supervision missions.

Reserved Procurement with GOJ: Reserved procurement under the project estimated at \$1,000,000 will be carried out according to section 1.12 of the Procurement Guidelines under IBRD Loans and IDA Credit dated January 1995 and revised January 1999 and to section 1.17 of Guidelines Selection and Employment of Consultants by World Bank Borrowers dated January 1997 and revised May 2002. The PIP would provide details for this Reserved Procurement which would be finalized and agreed upon during negotiations.

Procurement Plan

Pkg No.	Component/Description of Services/Goods	Estimated Cost (US\$ 1000)	Procurement Method	Date of Advert.	Date of Award	Indicative Completion/Delivery Date
A. Equipment						
A.1	14 Vehicles (PMU, NCARTT, & RSCN)	235.1	UNDP IAPSO	May 2003	Aug. 2003	Oct. 2003
A.2	Office Equipment (PMU, NCARTT, & RSCN)	68.7	NCB	May 2003	July 2003	Aug. 2003
A.3	Lab equipment (NCARTT)	16.8	NCB	May 2003	Aug. 2003	Oct. 2003
A.4	Field equipment (NCARTT & RSCN)	407.6	ICB/IS/NS	June 2003	Nov. 2003	Feb. 2004
A.5	Office Furniture (RSCN)	4.9	NS	June 2003	Aug. 2003	Sept. 2003
B. Consultant Services						
B.1	Individual Consultant					

B.1.1.	PMU	1,521.8	Individual Consultant	Feb 2003	June 2003	May 2008
B.1.2.	Mujib Nature Reserve	490.1	Individual Consultant	June 2003	Oct.2003	May 2008
B.1.3.	Central Upper Slopes of the Rift Valley	334.4	Individual Consultant	June 2003	Oct. 2003	May 2008
B.1.4.	Ex-situ	321.4	Individual Consultant	July 2003	Nov. 2003	May 2008
B.1.5.	Ex-situ: Pilot prototype farm	155.4	Individual Consultant	Aug 2003	Dec. 2003	Dec. 2005
B.1.6.	Public Awareness & Education	10.6	Individual Consultant	Jan 2004	March 2004	March 2005
B.2. Consultant firms/ Studies						
B.2.1.	Central Upper Slopes of the Rift Valley	106.7	SFB	Aug 2003	Nov. 2003	May 2008
B.2.2.	Mujib Nature Reserve	177.3	SFB	July 2003	Oct. 2003	May 2008
B.3. National Training						
B.3.1.	PMU	153.0	SFB/Individual Consultant	Oct. 2003	Feb. 2004	May 2008
B.3.2.	PMU –Applied Research Grants	111.7	Other	Sept. 2003		May 2008
B.3.3.	Mujib Nature Reserve	92.2	SFB/Individual Consultant	Oct. 2003		May 2008
B.3.4.	Public Awareness & Education	224.8	SFB/Individual Consultant	Nov. 2003		May 2008
B.4. Foreign Training						
B.4.1.	PMU	49.9	Consultant Qualification (CQ)	Sept. 2003		May 2008
C. Civil Works						
C1	RSCN	155.7	NCB	Aug. 2003	Nov. 2003	June 2004
D. Operational Cost	PMU	150	Others	June 2003	June 2003	May 2008

Procurement methods (Table A)

Table A: Project Costs by Procurement Arrangements
(US\$ million equivalent)

Expenditure Category	Procurement Method ¹			N.B.F.	Total Cost
	ICB	NCB	Other ²		
1. Works	0.00 (0.00)	0.16 (0.16)	0.00 (0.00)	0.08 (0.00)	0.24 (0.16)
2. Goods	0.40 (0.40)	0.17 (0.17)	0.28 (0.28)	0.46 (0.00)	1.31 (0.85)
3. Services	0.00	0.00	3.92	1.15	5.07
Consultant/Studies/Training	(0.00)	(0.00)	(3.92)	(0.00)	(3.92)
4. Miscellaneous	0.00 (0.00)	0.00 (0.00)	0.07 (0.07)	7.52 (0.00)	7.59 (0.07)
Total	0.40 (0.40)	0.33 (0.33)	4.27 (4.27)	9.21 (0.00)	14.21 (5.00)

^{1/} Figures in parenthesis are the amounts to be financed by the Bank Grant. All costs include contingencies.

^{2/} Includes civil works and goods to be procured through national shopping, consulting services, services of contracted staff of the project management office, training, technical assistance services, applied research grants and incremental operating costs related to (i) managing the project, and (ii) re-lending project funds to local government units.

Table A1: Consultant Selection Arrangements (optional)
(US\$ million equivalent)

Consultant Services Expenditure Category	Selection Method							Total Cost ¹
	QCBS	QBS	SFB	LCS	CQ	Other	N.B.F.	
A. Firms	0.00 (0.00)	0.00 (0.00)	0.50 (0.50)	0.00 (0.00)	0.04 (0.04)	0.05 (0.05)	0.00 (0.00)	0.59 (0.59)
B. Individuals	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	3.33 (3.33)	1.15 (0.00)	4.48 (3.33)
Total	0.00 (0.00)	0.00 (0.00)	0.50 (0.50)	0.00 (0.00)	0.04 (0.04)	3.38 (3.38)	1.15 (0.00)	5.07 (3.92)

^{1/} Including contingencies

Note: QCBS = Quality- and Cost-Based Selection

QBS = Quality-based Selection

SFB = Selection under a Fixed Budget

LCS = Least-Cost Selection

CQ = Selection Based on Consultants' Qualifications

Other = Selection of individual consultants (per Section V of Consultants Guidelines), Commercial Practices, etc.

N.B.F. = Not Bank-financed

Figures in parenthesis are the amounts to be financed by the Bank Grant.

Prior review thresholds (Table B)

Table B: Thresholds for Procurement Methods and Prior Review¹

Expenditure Category	Contract Value Threshold (US\$ thousands)	Procurement Method	Contracts Subject to Prior Review (US\$ millions)
1. Works	<300	NCB	First three contracts
2. Goods	>200	ICB	All First three contracts and all subsequent contracts larger than \$0.2 m
	>100 and <= 200	NCB	First three contracts
	<= 100	IS/NS	None
-Vehicles	<= 300	UN IAPSO	
3. Services - Individual Consultant	>=50	Section V of Consultants Guidelines	Report, TOR and Contract (All)
	> 100	SFB	Report, TOR and Contract
- Firms	<= 100	CQ	All
4. Miscellaneous			

Total value of contracts subject to prior review: US\$ 3.5 million

Overall Procurement Risk Assessment: Average

Frequency of procurement supervision missions proposed: One every 6 months
(includes special procurement supervision for post-review/audits)

¹ Thresholds generally differ by country and project. Consult "Assessment of Agency's Capacity to Implement Procurement" and contact the Regional Procurement Adviser for guidance.

Annex 6(B) Financial Management and Disbursement Arrangements JORDAN: Conservation of Medicinal and Herbal Plants Project

Financial Management

1. Summary of the Financial Management Assessment

The Project will be implemented by a PMU to be housed in the EPP in the MOP. The PMU is responsible for financial management of the project within the overall payment authority of the Finance Department of the MOP. The PMU is responsible for maintaining all financial and accounting records, preparing accounting entries, reviewing, posting and preparing monthly bank reconciliations, as well as recording all disbursements from GEF funds. It will also prepare quarterly project financial monitoring reports (FMRs) and the annual project financial statements and arrange for their auditing by a qualified auditor acceptable to the Bank. The PMU will be staffed with a qualified FMS prior to Board presentation, to undertake these activities according to the prepared terms of reference which are acceptable to the Bank (see Annex 13). In the meantime, the EPP has appointed a qualified consultant to prepare a financial management manual and design a computerized accounting system in order to have an adequate financial management system acceptable to the Bank in operation by September 30, 2003.

Country Issues: the Country Financial Accountability Assessment dated October 2001 considered the public sector control environment to be adequate, although the number of separate controls, while ensuring financial accountability, could detract from efficiency and effectiveness. The budget system is being modernised.

Risks: The overall financial management risk related to the Project is considered moderate. This consideration is made with the recognition that accounting staff have yet to be appointed and the financial management system for the project has to be established. These risks will be mitigated through (i) allocation of funds for the financial management consultant; (ii) appointment of a qualified accountant by Board presentation; (iii) having an adequate financial management system in place by September 30, 2003; and (iv) close project supervision by the Bank team. These mitigating actions will allow the building of capacity within the PMU for proper implementation. There remains the risk, which is rated as high, that MOP's control of the PMU and the flow of funds will result in delays in payment to contractors and hinder timely implementation of the project. The Steering Committee and Bank supervision missions will closely monitor this issue. MOP's Finance Directorate is committed to issuing payments for requests submitted by the PMU within three days and has entrusted responsibility for this commitment to a finance officer hired specifically for the project.

Flow of Funds: A Special Account in US Dollars will be established in the Central Bank of Jordan to be solely managed by the MOP/PMU (see "Disbursement" for details on the Special Account). Replenishment will be made using traditional disbursement methods including direct payment, replenishment to the Special Account on the basis of Statement of Expenditures (SOEs) and full documentation as required. Payments to contractors and third parties from the Special Account will follow the internal control procedures stipulated in the financial manual. Project financing provided by the government (through budget allocation arranged by MOP) will be paid directly to the contractor based on request from the PMU. A flow of funds chart is shown below.

Implementing Entity: In view of the overall payment authority of the MOP, a review of its financial management system was carried out to assess its financial management capacity to implement the project. The main characteristics of MOP's financial management systems are as follows:

- The accounting system is governed by the provisions of the Public Accounting Law. The books are maintained manually, outlining budget components and using the single-entry bookkeeping method or cash basis principals.
- An annual budget is prepared and agreed with the Ministry of Finance.
- After the approval of the annual budget, special delegations are issued for its execution, which enables MOP to proceed directly to pay for expenditures.
- Expenditures and payments are subject to three levels of control: an internal auditor, a representative of the Ministry of Finance, and a representative of the Audit Bureau are involved during the approval process and before issuing payments.
- While there is delegation of implementation, as in the case of the PMU, all payments are centralized.
- Computerization and implementation of integrated management information systems are underway.

Accounting System: The project accounting practices will follow international accounting standards, which will be reflected in the accounting policies and procedures in the PMU financial manual. Locally available accounting software will be installed for the project and will assist in generating quarterly Financial Monitoring Reports (FMRs). All accounts and supporting documents will be maintained at the PMU. The consultant is developing a chart of accounts reflecting project activities, and preparing the FMR reporting formats for inclusion in the PIP. Also, RSCN and EFJ will prepare quarterly summary reports on their project related activities showing all project expenditures incurred from their own resources and a summary of physical progress achieved. RSCN and EFJ will send these quarterly reports to the PMU within 10 calendar days after the end of each quarter so as to enable the PMU to submit the quarterly FMR to the Bank within 45 days from the end of the related quarter. The consultant is preparing reporting formats for use by the RSCN and EFJ for inclusion in the PIP.

Internal Control Procedures: The financial management manual will define adequate internal control procedure and proper segregation of duties among incompatible functions, including dual check signatories, preparation of monthly general ledger closure, and preparing monthly bank reconciliation for all project bank accounts. All financial transactions incurred directly by any participating agency (e.g. RSCN) from its own resources should be pre-approved by the PMU and supporting documents should be sent to the PMU for verification and recording in the project's accounting records. Reimbursement of such expenditures from the Special Account to the participating agency should be channeled by the PMU after approval of expenditures by the PMU. Before the start of each year, every participating agency will prepare and agree on an annual procurement plan with the PMU.

Financial Monitoring Reports: Quarterly FMRs will be produced and sent to the Bank unaudited within 45 days of each quarter end. The reports will show (i) summary progress report on project implementation; (ii) sources and uses of funds; (iii) cost per component for the quarter and cumulative; (iv) costs incurred per expenditures type; and (v) procurements incurred on contracts below the stated threshold. The chart of accounts for the project will be set up to facilitate the automatic generation of the FMR. These contents and format will be agreed upon during negotiations.

2. Audit Arrangements

Auditing: The project financial statements (project balance sheet, statement of sources and uses of funds, and Special Account statement) for each fiscal year ending December 31 will be subject to annual audit under International Standards by an independent auditor acceptable to the Bank, and under terms of reference acceptable to the Bank. The audit will cover all sources of funds related to the project including the GEF grant. Also, it will cover all expenditures incurred including those under SOEs and their compliance with the Grant agreement. The auditor will issue an opinion on the fairness of the

project financial statements and a separate opinion on the eligibility of all expenditures incurred and claimed under SOEs. The audit report will be sent to the Bank as soon as possible and in any event no later than six months after year-end. The auditor will also provide a memorandum on internal controls, including suggestions for improvement, and will submit that memorandum to the PMU for follow-up and implementation.

3. Disbursement Arrangements

Allocation of grant proceeds (Table C)

Table C: Allocation of Grant Proceeds

Expenditure Category	Amount in US\$million	Financing Percentage
1. Civil Works	0.15	75 %
2. Vehicles and Equipment	0.70	100% of foreign expenditures, 100% of local expenditures (ex-factory cost) and 85% of expenditures for other items procured locally
3. Consultants and Training	3.63	90 % of foreign firms or individuals, 90 % of local firms, 95 % of local individuals, 100 % of training
4. Research Grants	0.20	100 %
5. Incremental Operating Costs	0.15	100 %
Unallocated	0.17	
Total Project Costs	5.00	
Total	5.00	

Note: Allocation amount for "3. Consultants and Training" is US\$3.635 million, "Unallocated" is US\$0.165, but has been rounded up/down in the table due to system requirements.

Use of statements of expenditures (SOEs):

The Bank may require withdrawals from the Loan Account to be made on the basis of statements of expenditure, using the Special Account, for: (i) services under contracts costing less than (a) US\$100,000 equivalent each for consulting firms, and (b) US\$50,000 equivalent each for individual consultants; (ii) equipment and vehicles under contracts costing less than US\$100,000 equivalent each; and (iii) works, grants, and study tours, under such terms and conditions as the Bank shall specify by notice to the Borrower.

Special account:

To facilitate project implementation and disbursement against eligible expenditures, *assurances would be sought that a Special Account would be established* in the Central Bank of Jordan, which would be operated under terms and conditions satisfactory to the World Bank. The Special Account would have an authorized allocation of US\$500,000 and maintained in US dollars. The initial advance to the Special Account will be limited to US\$250,000 until the combined total withdrawals and the amounts in special commitments exceed US\$750,000. Thereafter, it will be increased to US\$500,000. The Special Account will be used to finance only eligible expenditures and documentation would need to be maintained to support all expenditures from the Special Account for purposes of post review and audit. The Special

Account will be periodically replenished on the basis of withdrawal applications, which would be supported by appropriate documentation.

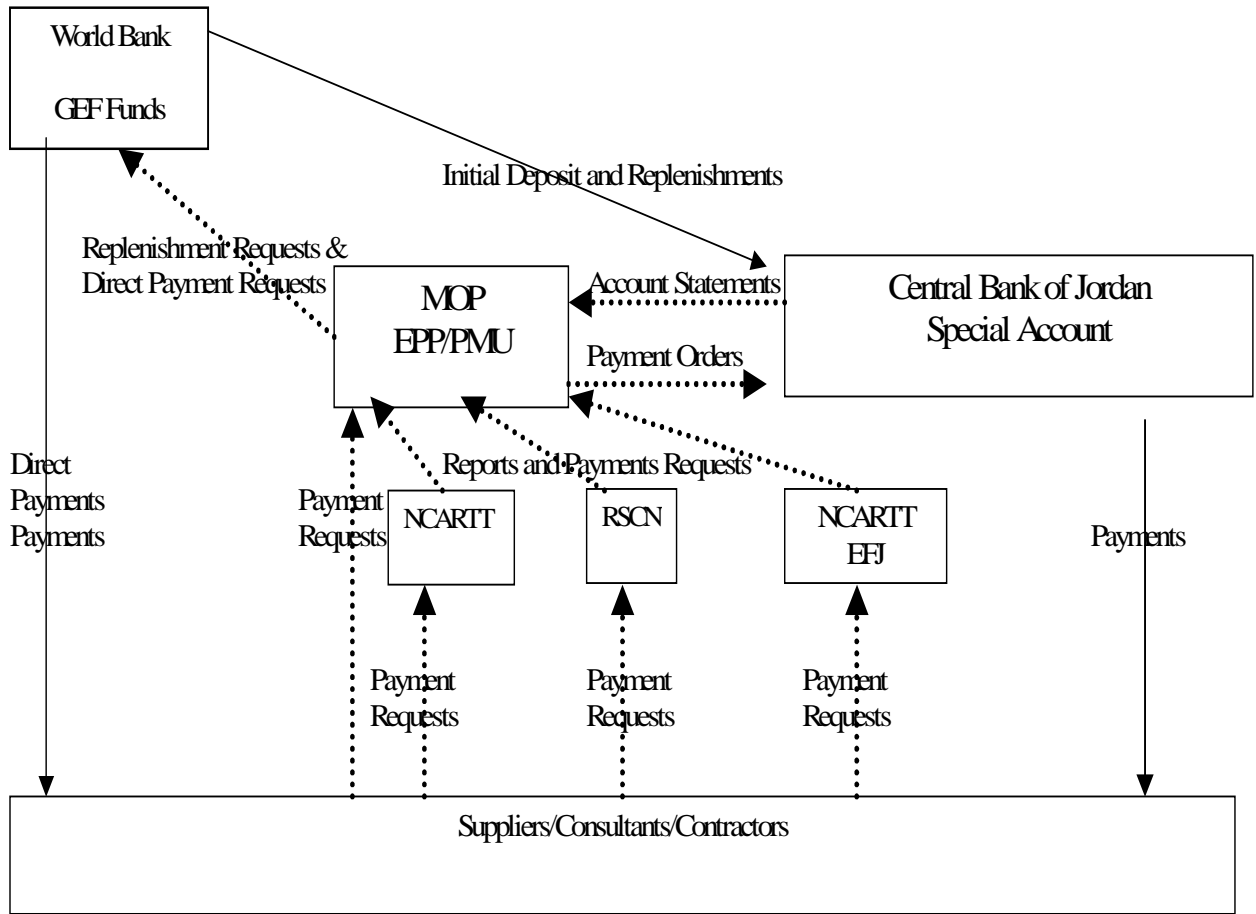
Actions

The PMU will install a financial management system (FMS) capable of recording all project related transactions and generating Financial Monitoring Reports (FMRs). The format of the FMRs is in the PIP, which is to be agreed at negotiations. The timetable for implementing the FMS, which is to be agreed at negotiations, is described below:

<u>Action</u>	<u>Planned Completion Date</u>	<u>By Whom</u>
1. Agree FMR formats	March 5, 2003	at negotiations
2. Complete FM manual	March 31, 2003	GOJ
3. Select/appoint Financial/Procurement Specialist	April 30, 2003	EPP/PMU
4. Select and procure software system	June 30, 2003	PMU
5. Complete installation and training	September 30, 2003	PMU
6. Submit first FMR	November 15, 2003	PMU

The financial management manual and specifications of the FM system are to be completed by March 31, 2003 to be available for the PMU's Financial/Disbursement Specialist on appointment.

FLOW OF FUNDS CHART



Flow of Funds (GEF) →
 Reports, Supervision, Statements →

Annex 7: Project Processing Schedule
JORDAN: Conservation of Medicinal and Herbal Plants Project

Project Schedule	Planned	Actual
Time taken to prepare the project (months)	14	24
First Bank mission (identification)	11/11/2000	11/11/2000
Appraisal mission departure	01/03/2003	01/03/2003
Negotiations	02/17/2020	03/04/2003
Planned Date of Effectiveness	06/01/2003	

Prepared by:

Enhanced Productivity Program (EPP) of the Ministry of Planning, National Center for Agricultural Research and Technology Transfer (NCARTT) of the Ministry of Agriculture, Royal Society of the Conservation of Nature (RSCN), and ECOHERB Farms of Jordan (EFJ) with input from the World Bank.

Preparation assistance:

GEF Preparation Grant (PDF-Block B): \$350,000

Bank staff who worked on the project included:

Name	Speciality
Petros Aklilu, MNSRE	Sector Manager Rural and Social Development
Salah Darghouth, MNSRE	Sector Manager Water and Environment
Ayman Abu-Haija, MNACS	Financial Management
Osman S. Ahmed, MNCO2	Jordan Country Officer
Nawaf Al-Mahamel, LEGMS	Legal
Christine Allan, MNSRE	Operations Analyst
Andrina Ambrose, LOAG1	Disbursement
Frederic Avanessoff, LOAG1	Disbursement
Ferid Belhaj, LEGMS	Legal
Stefanie Brackmann, MNSRE	Natural Resources Management
Concepcion Del Castillo, MNSRE	Social Reviewer
Antonio Citatti, MNSRE	Procurement
Hocine Chalal, MNSRE	Environmental Reviewer
Nicole Glineur, MNSRE	Natural Resources Management
Nadia Gouhier, MNSRE	Procurement
Usaid El-Hanbali, MNSRE	Procurement and Implementation Arrangements
Hovsep Melkonian, LOAG	Disbursement
Samia Msadek, MNSRE	Financial Management
Laurent Msellati, MNSRE	GEF Coordinator
Aloysius Uche Ordu, MNACS	MNA Quality Advisor
Idah Pswarayi-Riddihough, MNSRE	Environmental Reviewer
Nicola Renison, MNACS	Trust Fund Administrator

Josephine Salang, MNSRE
Tijan Sallah, MNSRE
Shobha Shetty, MNSRE
Ayat Soliman, MNSRE
Yurie Tanimichi, MNSRE

Team Assistant
Cluster Team Leader
Economist
Operations Officer
Environmental Economist

Peer Reviewers

Richard Kennedy, HSDHS
Colin Rees, Consultant

GEF-STAP Reviewer

Mark Plotkin

GEF STAP Medicinal and Herbal Plants Lead Specialist

QER Review

Jocelyne Albert
Shawki Barghouti
David Freestone
Gunars Platais
Ethel Sennhauser

Annex 8: Documents in the Project File*
JORDAN: Conservation of Medicinal and Herbal Plants Project

A. Project Implementation Plan

Project Implementation Plan, February 2003

B. Bank Staff Assessments

PCD

Pre-appraisal mission Aide-Memoire, January 2003

COSTAB Cost Tables

Integrated Safeguard Data Sheet

C. Other

Prepared for the Conservation of Medicinal and Herbal Plants Project:

GOJ: Environmental Assessment

GOJ: Environmental Management Plan (EMP), Oct. 2002, updated January 2003

GOJ: Global Importance of M/H Plants, May 2002

GOJ: Role of Women in the Management and Sustainable Use of M/H Plants in Jordan, May 2002

GOJ: "Hot Spots" and M/H Plants Sustainable Use at the Home Level, May 2002

GOJ: Essential Oils – Their potential importance to Jordan, May 2002

GOJ: List of M/H Plants in the Wadi Mujib, May 2002

GOJ: Proposed Ethno-Veterinary Project in the Jordan Badia and Wadi Musa Region, May 2002

GOJ: Summary of work undertaken under the PDF-B Grant, May 2002

GOJ: Profile of NCARTT Research Stations envisaged for Ex-situ Cultivation

GOJ: Documentation of the Proceedings and Findings of the National Stakeholder Workshop, 24-25 April 2002

GOJ: Medicinal Plants Socio-Economic Survey by Karim Corporation for Agrobusiness Development, April 2002

GOJ: Institutional Assessment by Agricultural Research Service of USDA, August 2001

GOJ: Cultivation Study by Dr. Nasri Haddad, March 2002

GOJ: National Database Study by Dr. Qutaishat, Feb. 2002

GOJ: Inventory of Medicinal and Herbal Plants by RSCN, April 2002

Documents with Background Information:

Abu-R. Maylah, B.; Afifi, F.: Treatment with Medicinal Plants in Jordan, Jan.2000

GOJ: Enhancing Community-Based Livelihood Systems: Sustainable Use, Management and Conservation of Medicinal Plants in Sub-Saharan Africa, Sept. 2000

Lambert, J.; Baah-Dwomoh, J.: Medicinal Plants and Traditional Health Systems, March 2000

Lambert, J., Srivastava, J.; Niemeyer, N.: Medicinal Plants, Rescuing a Global Heritage, March 1997

Nabeh, K.: Proposal for Training and Income Generating. Growing Medicinal and Herbal Plants, 1994

Nabeh, K.: Growing Aromatic and Medicinal Herbs as Income Generating activity for grass root. Jan. 2001

NCARTT: Agricultural Resource Database in Jordan, 1997

NCARTT: Promotion, Preservation and Utilization of Medicinal and Herbal Plants of Jordan As Means to Combat Desertification, 1997/1998

Nefatti, M; Bounejmate, M.; Christiansen, S.: Biological diversity, cultural and economic value of medicinal, herbal and aromatic plants in southern Tunisia, August 2001

Khairallah, K.: Medicinal and Herbal Plants of Jordan. Proceedings of a National Workshop, June 1998
Srivastava, J.; Lambert, J.; Vietmeyer, N.: Medicinal Plants – An Expanding Role in Development,
April 1996
Tehabsen Z.: Plant Genetic Resources Unit (PGRU) at NCARTT, 2001

*Including electronic files

Annex 9: Statement of Loans and Credits
JORDAN: Conservation of Medicinal and Herbal Plants Project
02-Jan-2003

Project ID	FY	Purpose	Original Amount in US\$ Millions		Cancel.	Undisb.	Difference between expected and actual disbursements ^a	
			IBRD	IDA			Orig	Frm Rev'd
P076961	2002	Hort. Exports Promotion & Tech. Transfer	5.00	0.00	0.00	5.00	0.00	0.00
P069326	2000	JO-HIGHER EDUCATION DEVELOPMENT	34.70	0.00	0.00	27.33	8.63	0.00
P048521	1999	JO-AMMAN WATER & SANITATION	55.00	0.00	0.00	20.02	16.02	0.00
P039749	1999	HEALTH SECTOR REFORM	35.00	0.00	0.00	19.88	4.93	0.00
P049581	1998	COMMUNITY INFRA.DEV.	30.00	0.00	0.00	6.59	6.59	6.59
P035997	1998	JO-SECOND TOURISM DEV.	32.00	0.00	0.00	15.94	15.94	0.00
Total:			191.70	0.00	0.00	94.75	52.10	6.59

JORDAN
STATEMENT OF IFC's
Held and Disbursed Portfolio
Jun 30 - 2002
In Millions US Dollars

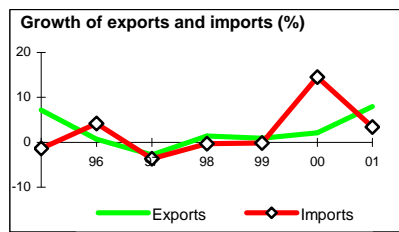
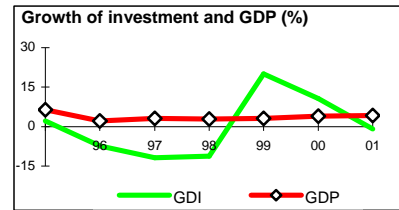
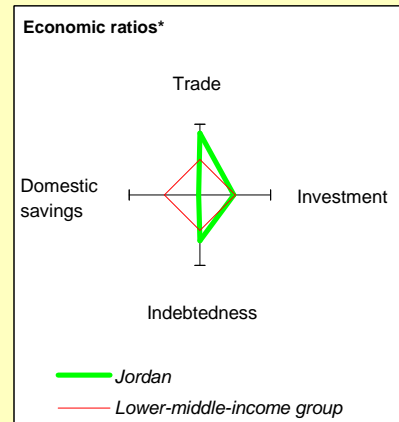
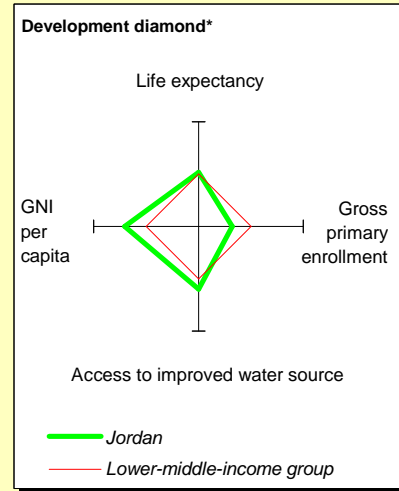
FY Approval	Company	Committed				Disbursed			
		IFC				IFC			
		Loan	Equity	Quasi	Partic	Loan	Equity	Quasi	Partic
1998	AIHC	0.00	3.60	0.00	0.00	0.00	3.60	0.00	0.00
1987/90/93/95	Al-Hikma	0.00	0.34	0.00	0.00	0.00	0.34	0.00	0.00
1997	BTC	3.33	0.00	0.00	0.00	3.33	0.00	0.00	0.00
2001	Boscan Jordan	7.20	0.00	0.00	0.00	7.20	0.00	0.00	0.00
1997	El-Zay	2.86	0.00	0.00	0.00	2.86	0.00	0.00	0.00
2002	IITPDC	12.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1995	Indo-Jordan	16.00	0.00	0.00	0.00	16.00	0.00	0.00	0.00
1998	JHTC	8.57	0.00	0.00	0.00	8.57	0.00	0.00	0.00
2001	Jordan Gateway	10.00	0.00	0.00	0.00	3.00	0.00	0.00	0.00
1998	Jordinvest	0.00	1.41	0.00	0.00	0.00	1.41	0.00	0.00
1999	MAICO	0.00	1.00	0.00	0.00	0.00	0.75	0.00	0.00
2000	MEIB	0.00	2.20	2.15	0.00	0.00	0.00	2.15	0.00
2002	MEREN	4.40	0.60	0.00	0.00	0.00	0.00	0.00	0.00
2002	SIC	8.00	0.00	0.00	0.00	4.00	0.00	0.00	0.00
1996	Zara	13.76	2.97	0.00	0.00	13.76	2.97	0.00	0.00
Total Portfolio:		86.62	12.12	2.15	0.00	58.72	9.07	2.15	0.00

		Approvals Pending Commitment			
FY Approval	Company	Loan	Equity	Quasi	Partic
2001	Boscan Jordan	6.00	0.00	1.00	0.00
Total Pending Commitment:		6.00	0.00	1.00	0.00

Annex 10: Country at a Glance

JORDAN: Conservation of Medicinal and Herbal Plants Project

POVERTY and SOCIAL	Jordan	M. East & North Africa	Lower-middle-income	
2001				
Population, mid-year (millions)	5.0	301	2,164	
GNI per capita (Atlas method, US\$)	1,750	2,000	1,240	
GNI (Atlas method, US\$ billions)	8.8	601	2,677	
Average annual growth, 1995-01				
Population (%)	3.0	2.0	1.0	
Labor force (%)	4.0	2.9	1.2	
Most recent estimate (latest year available, 1995-01)				
Poverty (% of population below national poverty line)	12	..	..
Urban population (% of total population)	79	58	46	
Life expectancy at birth (years)	72	68	69	
Infant mortality (per 1,000 live births)	25	43	33	
Child malnutrition (% of children under 5)	5	15	11	
Access to an improved water source (% of population)	96	89	80	
Illiteracy (% of population age 15+)	10	34	15	
Gross primary enrollment (% of school-age population)	69	97	107	
Male	68	103	107	
Female	69	90	107	
KEY ECONOMIC RATIOS and LONG-TERM TRENDS				
	1981	1991	2000	2001
GDP (US\$ billions)	4.4	4.2	8.5	8.8
Gross domestic investment/GDP	45.4	25.9	27.2	25.9
Exports of goods and services/GDP	43.0	59.5	41.8	44.2
Gross domestic savings/GDP	-8.7	2.6	0.5	1.0
Gross national savings/GDP	42.2	15.0	27.9	26.3
Current account balance/GDP	-0.9	-10.1	0.7	0.4
Interest payments/GDP	2.1	6.7	3.5	3.5
Total debt/GDP	51.5	227.7	94.4	89.0
Total debt service/exports	10.1	24.2	12.3	12.1
Present value of debt/GDP	..	..	90.2	85.0
Present value of debt/exports	..	..	129.9	118.1
	1981-91	1991-01	2000	2001
<i>(average annual growth)</i>				
GDP	1.5	4.5	4.0	4.2
GDP per capita	-2.5	1.0	0.9	1.2
Exports of goods and services	4.5	2.5	2.1	7.9
STRUCTURE of the ECONOMY				
	1981	1991	2000	2001
<i>(% of GDP)</i>				
Agriculture	6.1	8.5	2.2	2.1
Industry	29.8	26.2	24.8	24.7
Manufacturing	14.5	13.7	15.6	15.3
Services	64.1	65.3	73.0	73.2
Private consumption	77.7	71.4	74.5	76.0
General government consumption	31.1	26.0	25.1	23.0
Imports of goods and services	97.2	82.8	68.6	69.0
	1981-91	1991-01	2000	2001
<i>(average annual growth)</i>				
Agriculture	8.5	-3.2	7.1	..
Industry	-0.5	4.3	3.8	..
Manufacturing	0.7	5.4	5.6	..
Services	1.6	5.0	4.9	..
Private consumption	-0.1	4.8	10.9	6.1
General government consumption	0.6	5.0	6.8	-4.6
Gross domestic investment	-2.4	1.7	10.6	-0.9
Imports of goods and services	-0.3	2.5	14.5	3.4

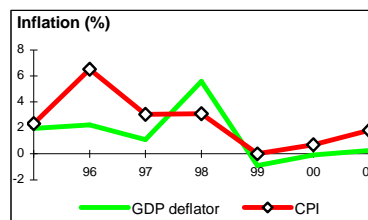


Note: 2001 data are preliminary estimates.

* The diamonds show four key indicators in the country (in bold) compared with its income-group average. If data are missing, the diamond will be incomplete.

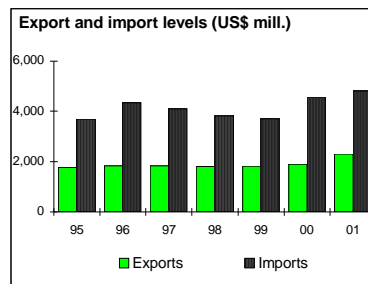
PRICES and GOVERNMENT FINANCE

	1981	1991	2000	2001
Domestic prices (% change)				
Consumer prices	7.7	8.2	0.7	1.8
Implicit GDP deflator	18.9	5.1	-0.1	0.3
Government finance (% of GDP, includes current grants)				
Current revenue	49.1	44.8	29.8	30.4
Current budget balance	22.5	13.1	1.0	2.0
Overall surplus/deficit	7.2	8.3	-4.7	-3.7



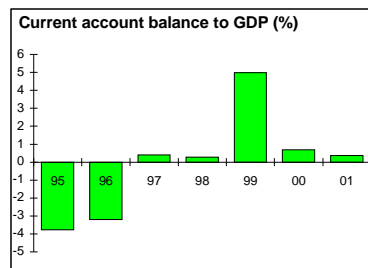
TRADE

	1981	1991	2000	2001
(US\$ millions)				
Total exports (fob)	734	1,132	1,899	2,293
Food	100	126	164	191
Phosphates	166	181	128	130
Manufactures	215	403	933	1,269
Total imports (cif)	3,170	2,512	4,577	4,812
Food	508	613	747	733
Fuel and energy	533	355	718	702
Capital goods	1,256	369	1,313	1,311
Export price index (1995=100)	88	87	91	92
Import price index (1995=100)	124	97	106	108
Terms of trade (1995=100)	71	89	86	85



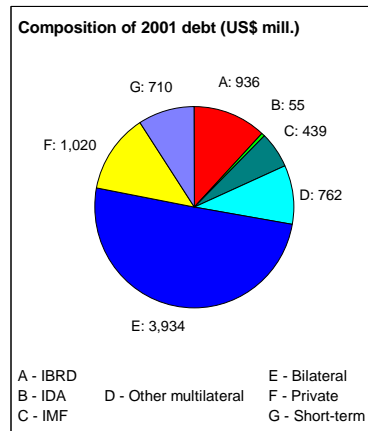
BALANCE of PAYMENTS

	1981	1991	2000	2001
(US\$ millions)				
Exports of goods and services	1,909	2,484	3,536	3,899
Imports of goods and services	4,215	3,429	5,796	6,094
Resource balance	-2,306	-945	-2,260	-2,195
Net income	87	-362	-27	9
Net current transfers	2,178	884	2,345	2,218
Current account balance	-41	-423	58	32
Financing items (net)	-5	397	623	-270
Changes in net reserves	47	26	-681	237
Memo:				
Reserves including gold (US\$ millions)	1,300	1,112	3,430	3,192
Conversion rate (DEC, local/US\$)	0.3	0.7	0.7	0.7



EXTERNAL DEBT and RESOURCE FLOWS

	1981	1991	2000	2001
(US\$ millions)				
Total debt outstanding and disbursed	2,291	9,550	7,978	7,856
IBRD	45	511	856	936
IDA	78	76	57	55
Total debt service	316	739	723	770
IBRD	3	97	105	104
IDA	1	2	3	3
Composition of net resource flows				
Official grants	891	383	286	313
Official creditors	305	417	-18	61
Private creditors	29	-96	-115	-115
Foreign direct investment	..	-26	751	140
Portfolio equity	0	0	104	-25
World Bank program				
Commitments	25	25	35	120
Disbursements	22	40	38	161
Principal repayments	0	56	56	58
Net flows	22	-16	-17	103
Interest payments	3	43	52	49
Net transfers	19	-59	-70	55



Additional GEF Annex 3: STAP Roster Technical Review
JORDAN: Conservation of Medicinal and Herbal Plants Project

Dr. Mark Plotkin, STAP Roster Member

I have reviewed the project and found it to be impressive. It seems well thought out and well designed.

I would suggest - if the project is funded - to bring in a few outsiders with expertise like to complement that of the Jordanians themselves. In particular, I am thinking of Dr. Jim Duke (jimduke@cpcug.org) of Maryland, USA who is an expert in both Neotropical medicinal plants and medicinal plants of the Holy Land, and Dr. Gary Martin of Morocco who is an expert in medicinal plants of arid environments.

I would also recommend a bit more attention to Intellectual Property Rights issues, so as not to share Medicinal secrets across to wide a spectrum.

Finally, I fully recommend funding of this project.

The Medicinal and Herbal Plant Conservation Project (MHPCP) seems to be a well-thought out and well-designed effort. The development objectives – improving both the livelihood and the health of rural communities – are praiseworthy goals. And the focus on both human and livestock needs are particularly important in arid areas like Jordan.

The medicinal and other useful plants of the Middle East have long been overlooked by much of the conservation community which has often focused more attention on the tropical regions. Yet the Mediterranean region as a whole has been as important – some would argue more important – as a source of economic plants for the world. And Jordan, especially in light of its size and because of its location at the juncture of Asia, Africa, and Europe, has a rich and diverse flora.

Though I haven't worked in Jordan, I assume the situation in terms of plant use, knowledge and marketing is similar to most other industrializing countries: traditional cultures are facing severe disruption, and not transmitting ethnobiological data onto the next generation. Meanwhile, the urban educated elite are becoming more interested in traditional medicine. And information on trade in medicinal plants (this is cited in the proposal) is, at best, unreliable.

What this means is that there needs to be some form of recording traditional knowledge about medicinal and forage plants so this information does not disappear. The need to develop a framework for the protection of intellectual property rights is explicitly mentioned in the proposal, but recording the information should be considered a priority and perhaps incorporated in the database being assembled.

The key performance indicators – enhanced management capacity, diminished threats to plants, involvement of local communities, and enhanced public awareness – are well chosen.

The one aspect of the project that seems least well-developed is the commercialization of useful

plants. Passing mention is made of pharmaceuticals, but this is a complicated, time-consuming, and expensive process. Probably the best way to approach commercialization of local species is to do so specifically for local, national, or regional markets. This approach negates the need to try to crack the international marketplace, which is best avoided in a project of this scale. Another recommendation is to focus on non-medicinal species: spices or aromatic plants that do not require the same degree of testing as do medicinal species. An obvious approach is to develop products to sell to tourists (aromatic candles, etc.) that can generate even greater income.

The other issue that comes to mind reading this proposal is the seeming lack of interaction with other countries of the region. Surely, many of the challenges facing Jordan are shared by neighboring countries like Syria. Furthermore, the Israelis are quite advanced in medicinal plant technologies: cell tissue culture, hydroponics, etc. Political realities might complicate any close Jordanian-Israeli cooperation at this point in time, but any effort to draw on regional expertise or share results with neighboring countries would serve to augment the positive impact of the project.

Let me say that the issues I've raised are meant as helpful suggestions, not serious criticisms. In fact, I find this to be one of the best-designed plant conservation strategies I have ever seen. If implemented, the successes that are likely to result should be applicable in many other countries. I recommend full funding.

Response to STAP Review

The project team agrees with the recommendations provided by the STAP reviewer. During appraisal, special attention will be given to:

- Further ensure that project components will improve information, knowledge, and recording of M/H plants.

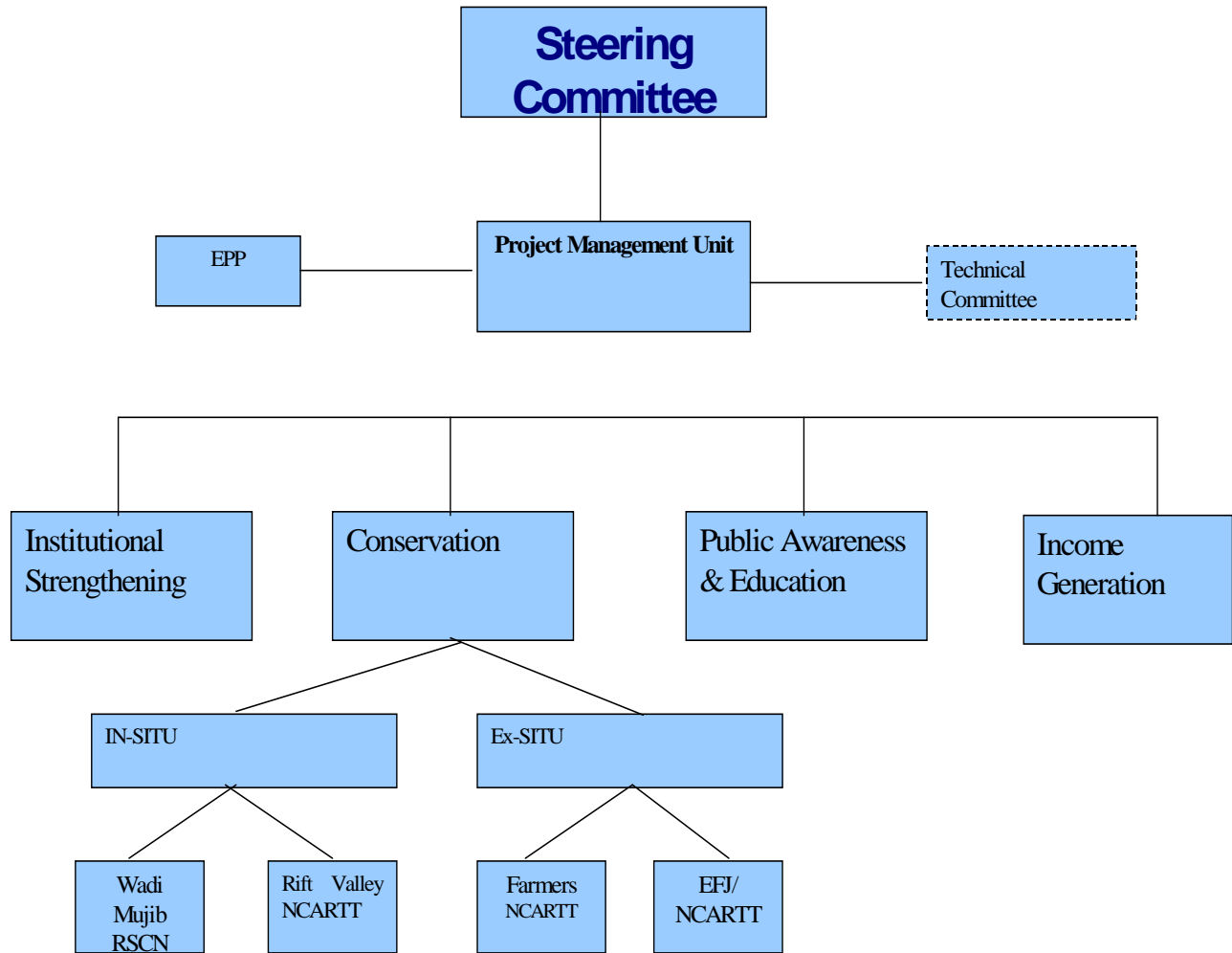
- Further inclusion of outside expertise. Since this is the first time that the conservation of M/H plants is addressed in Jordan, GOJ, local communities, private sector, NGOs and the project team are well aware that there is a crucial need for external expertise to allow for knowledge transfer.

- Focus on IPP will be increased.

- More attention will be afforded to product development

- Interaction with other countries of the region will be explored

**Additional GEF Annex 4: Project Organigramme
JORDAN: Conservation of Medicinal and Herbal Plants Project**



Additional GEF Annex 13: Terms of Reference

JORDAN: Conservation of Medicinal and Herbal Plants Project

The Project Implementation Team shall be composed of two categories of personnel: (i) consultants to be financed by the GEF funds and seconded to positions at relevant GOJ entities; and (ii) personnel to be financed directly by the GOJ. It is expected that a core M/H plants team will be maintained by GOJ, RSCN, and the private sector following project completion. Since M/H plants are a new theme in Jordan, it will be essential to draw on international expertise for certain short term consultancies in order to ensure transfer of knowledge and techniques to Jordan.

Project Manager

A Project Manager will head the PMU. He/she will be responsible for the overall management, technical leadership and coordination of project activities to successfully achieve its goals. The Project Manager will ensure the timely and effective implementation of all components of the project in relation to the conservation and development objectives. He/she will be liaising and coordinating with the Project National Steering Committee, the Project Technical Committee, concerned ministries, private sector beneficiaries, relevant implementing and donor agencies, NGOs, farmers, etc. The Project Manager is accountable to the chair of the Project Steering Committee.

The Project Manager shall perform the following functions:

1. Develop and implement a management plan for all project components;
2. manage the implementation of activities (see Annex 2) to ensure full and timely achievement of stated tasks in accordance with defined objectives;
3. lead the preparation of: budgets and annual work plans, Steering Committee's meetings, and progress reports on project implementation activities, in accordance with World Bank/GEF requirements (see below);
4. refine relevant job profiles, participate in the screening and selection of personnel hired under the project, and enforce best practices in all hiring activities;
5. collaborate with the Project Financial and Procurement / Disbursement Specialist to oversee project financing and procurement activities;
6. oversee planning and implementation of training efforts with the Monitoring & Evaluation and Training Specialist to train the local community (with special focus on women), GOJ officials, technicians, and project staff in the skills and knowledge needed to perform their assigned duties under the project;
7. facilitate contacts and communication: within GOJ, with all implementing entities, the private sector, the local community, NGOs, academia, and the donor community;
8. collaborate with MOP, MOA, the private sector, RSCN, MOE, MOH, MOIT, the local community and other relevant parties to ensure effective project coordination with relevant activities; and
9. ensure relevant communication and knowledge sharing of significant achievements through appropriate media.

Reporting. The format of the reports will be agreed with the Bank.

1. On a **Quarterly** basis - the Project manager will submit a report covering implementation

progress, the use of funds, and project impacts. The report will include:

- (i) A description (status and impacts) of all activities undertaken, under each component, during the previous 3 month period;
 - (ii) a budgeted work plan for activities under each component, covering (at least) the next 3 month period;
 - (iii) a financial statement of expenses of GEF expenditures undertaken during the preceding 3 month period;
 - (iv) as warranted, comments and/or recommendations relating to any conditions that may affect the progress or quality of work.
2. On an **Annual** basis - These reports will be consolidated by the PMU into yearly progress reports to be submitted through the MOP to the Bank within two months of December 31. These progress reports will also include an implementation plan and a work program for the next year.
 3. **Implementation Completion Report** – On completion of the project , the Project Manager will submit a report containing:
 - (i) a description and assessment related to performance indicators and the attainment of objectives of activities and development outcomes;
 - (ii) a financial statement of expenses covering all components activities throughout the life of the project; and
 - (iii) detailed recommendations for subsequent follow up to be undertaken by all stakeholders to sustain the objectives of the project.

Qualification and Experience Required

- M.S. or Ph.D. in management, environmental conservation and management, agriculture, natural resources management or other relevant professional skills;
- strong top executive and managerial skills as demonstrated by 10 years' prior work experience in top management in the public or private sector;
- managerial level work experience with international agencies and demonstrated ability to work effectively with top management and technical staff in the public and private sector and with local community leaders;
- fluency in Arabic and English, including strong demonstrated oral presentation and writing skills.
- knowledge of the entities comprising the relevant sections of the Jordanian government, private sector and NGOs is helpful.

Monitoring & Evaluation and Training Specialist

The Monitoring & Evaluation and Training Specialist will assist the Project Manager in the management of daily operations. He/she shall perform the following functions:

Assistance in the Management of Operations

1. Assist in the management of daily operations;
2. act as a coordinator for prompt resolution of operational issues;
3. assist in the preparation of work plans and reports
4. act as Project Manager in his/her absence;

5. assist the Project manager with the preparation of all reporting documents; and
6. assist in establishing performance standards and development for project personnel.

Monitoring and Evaluation

1. Formulate and implement a Monitoring & Evaluation System using agreed performance indicators;
2. assist the different implementing agencies in updating and implementing baseline studies and scientific surveys designed to obtain results to implement on the ground;
3. evaluate the progress of project activities and prepare M&E reports as required;
4. participate in planning and supervision of project M&E activities;
5. coordinate the design and organization of workshops, training sessions, and study visits; and
6. train project staff and beneficiaries in M&E methods.

Training and Awareness Building

1. Design and implement a training and awareness-building program targeted at training the local community (with special focus on women), GOJ officials, technicians, and project staff with the skills and knowledge needed to perform their assigned duties under the project in cooperation with implementing entities and local communities;
2. design and lead decisive workshops; and
3. lead the preparation of training modules and TORs for consultancies.

Qualification and Experience Required

- B.S. in natural resource management, agriculture, business or other relevant professional skills;
- a minimum experience of 5 years in overall project implementation as well as design and implementation of: (a) M&E systems, (b) logframes, and (c) training and awareness building activities;
- demonstrated ability to produce financial reports complying with World Bank guidelines;
- excellent computer skills with relevant Windows applications including Word and Excel; and
- fluency in Arabic and English, including strong demonstrated communication, oral presentation, and writing skills.

Financial Management/Procurement/Disbursement Specialist

The Project Financial Management/Procurement/Disbursement Specialist will be responsible for organizing and fulfilling all financial management requirements and all procurements of services and goods during the first 3 years of the project in close coordination with the implementing entities, and shall carry out the following duties:

Financial Management

1. Prepare budgeted annual work plans together with executing and implementing agencies; seek their approval for inclusion into GOJ budget by the Project National Steering Committee;
2. implement a financial management system and supervise its operation;
3. prepare all financial reports and statements requested by the GOJ and World Bank;
4. assist the Project Manager to supervise all project expenditures and ensure that these expenditures are eligible to be financed by the Project funds;

5. maintain accounts in accordance with the project's budget lines;
6. manage the project budget to meet the day-to-day operating expenses of project components;
7. ensure that project funds flow on a timely basis and all project accounts are replenished on time;
8. arrange for the release and availability of government budget funds annually; and
9. provide training in management and finance to micro-and small enterprises and community members.

Procurement

1. Act as a focal point for procurement matters, including obtaining the required clearances from the Ministry of Planning and the World Bank;
2. participate in the preparation of working plans;
3. prepare , implement and update as necessary, a detailed procurement plan in agreement with the Project Manager, implementing entities and the World Bank;
4. establish a simplified procurement tracking system for monitoring procurement activities under the project;
5. develop and collect tender documentation for works, goods, services and other procurements in accordance with World Bank procurement guidelines, including: qualification of consultants, suppliers and contractors, preparation of short lists for bidding, review and evaluation of bidding documents for adherence to procurement procedures;
6. ensuring timely disbursement of project funds for consultants, equipment purchases, and other project-related expenditures in accordance with procurement and disbursement guidelines;
7. ensure timely preparation of financial accounting reports and replenishment applications to World Bank/GEF;
8. commission the annual audit of project accounts;
9. inspect goods together with implementing entities to ensure compliance with specifications, and ensure prompt delivery of goods to beneficiaries;
10. contribute to the procurement section of the relevant project reports and prepare procurement monitoring reports; and
11. train relevant personnel in the management of project funds, including procurement procedures, payment of consultants, and World Bank/GEF financial accounting and reporting requirements.

Qualification and Experience Required

- Certified Public Accountant or equivalent degree in administration, accounting and procurement skills;
- a minimum of 5 years' work experience in procurement, accounting, and financial management using World Bank guidelines and local procedures;
- relevant computer skills including Excel; and
- fluency in written and spoken Arabic and proficiency in written and spoken English.

Lead Medicinal and Herbal Plant Specialist

The Lead M/H Plant Specialist will be responsible for the coordination of the technical activities of the project. This includes organizing the *ex-situ* cultivation activities of M/H plants and providing technical assistance to *in-situ* conservation activities. He/she will be the Executive Secretary of the Technical Committee. The M/H Plant Specialist will work with the staff of NCARTT stations, the private sector, community members and farmers with input from agronomists and plant breeders in full coordination with the *ex-situ* Cultivation officer and *in-situ* Conservation Officer at NCARTT.

The Lead M/H Plant Specialist shall perform the following functions:

1. Prepare technical work plans with the implementing entities;
2. assist in the implementation of technical work plans with a problem solving approach;
3. prepare TORs and draft contracts for relevant technical consultancies for the *in-situ* and *ex-situ* sub-components;
4. prepare inputs to relevant reports;
5. coordinate with relevant national and international technical initiatives;
6. develop and transfer to local farmers, guidelines for the production of the six M/H species cultivated at the stations;
7. ensure provision of quality seed varieties to local farmers and conduct an applied breeding program;
8. ensure training of farmers and communities on cultivation and harvesting of tested M/H plants;
9. promote an appropriate IPM system for *ex-situ* cultivation of M/H plants;
10. prepare and implement detailed work plans for growing tested M/H species in different production areas and systems to develop best agricultural practices.
11. prepare and implement work plans to demonstrate appropriate technologies for growing and harvesting M/H plants;
12. assist the M&E Specialist to develop a Monitoring & Evaluation Plan for *ex-situ* activities;
13. promote a state-of- the art M/H Plant Genebank, Database and GIS at NCARTT;
14. contribute to and follow up on production and dissemination of relevant documents, mass media, information leaflets, extension brochures and scientific publications; and
15. contributes to networking with relevant projects.

Qualification and Experience Required

- Ph.D. in natural resources management, agriculture (agronomy/plant genetics and production) or other relevant professional skills;
- Minimum of 5 years in managing the cultivation of M/H plants in Jordan or similar climatic zones;
- managerial level work experience with development projects and a demonstrated ability to work effectively with management, technical staff, the private sector and the local community ;
- excellent computer skills including Word and Excel; and
- fluency in Arabic and English, including strong demonstrated oral presentation and writing skills.

Lead International M/H Specialist

The Lead International M/H Specialist will have two main roles to assist in the attainment of the project's development and global objectives over a period of 3 years. He/she will transfer state-of- the art knowledge on the conservation management and sustainable use of M/H plants to GOJ, the local community, NGOs, and the private sector. He/she will also assist the Project Manager in the management of the overall project with the major role of introducing appropriate new skills and management systems both *in-situ* and *ex-situ*.

The Lead International M/H Plant Specialist shall perform the following assignment:

1. Ensure the transfer of new skills, facilities, and systems to ensure the conservation of M/H plants;
2. assist implementing entities in the development of essential skills and in the coordination and

- implementation of conservation management strategies and action plans;
3. supervise, coordinate and, where necessary, assist with the initiation and implementation of all consultancies for all project components;
 4. supervise and, where necessary, assist with the appraisal of the technical feasibility and social acceptability of selected small-scale income generation projects and with the initiation of any such projects which are likely to support the overall objectives of the project;
 5. supervise and, where necessary, assist in the initiation and coordination of transfer of NCARTT results to the field;
 6. assist in the design and implementation of Monitoring and Evaluation Plans and scientific surveys;
 7. guide IPR and organic certification developments;
 8. identify and commission relevant consultancies and short international courses or educational visits for relevant stakeholders which will expose them to the experiences of organizations and individuals involved in more advanced stages of implementing similar programs;
 9. promote capacity building in the field of M/H plants. This will include an institutional assessment of the needs of GOJ, RSCN, Private Sector and other relevant entities, and, based on the results of this assessment, the design and implementation of an organizational plan to ensure the sustainability of the project after its conclusion; and
 10. organize at the onset the substance of the reporting requirements and ensure their timely delivery.

Qualification and Experience Required

- Ph.D. or M.S. in Natural Resources Management, Agriculture or related areas;
- strong managerial experience and M/H plants background as demonstrated by 10 years prior work experience in the field of M/H plants.
- managerial level work experience with international agencies, NGOs, private sector or relevant entities and demonstrated ability to work effectively with top management and technical staff in the public and private sector and with the local community; and
- fluency in English and strong written and oral communication skills, working knowledge of Arabic is an advantage.

Administrative Assistant

The Administrative Assistant will assist the PMU with administration of project activities.

1. Provide support to the Project Manager and PMU staff;
2. develop and implement a filing system for all project documents;
3. coordinate the visits of international consultants and ensure logistical support;
4. prepare project-related documents;
5. organize logistics for conferences, meetings and workshops;
6. ensure maintenance of office communication tools and equipment; and
7. contribute to the maintenance of the project webpage.

Qualification and Experience Required

- B.S. degree in administration and at least 5 years experience in secretarial / administration of international projects;
- a high level of proficiency in computer skills including Word, Excel, and Power Point (mastering of other applications is an advantage);

- proficiency in the management of databases;
- strong written and oral communication skills in Arabic and English.

Mujib Nature Reserve Site Team Leader - RSCN

The Mujib Nature Reserve Site Team Leader will coordinate the *in-situ* conservation activities of M/H plants in the Mujib Nature Reserve. He/she will be assisted by a team from RSCN and national and international consultants. He/she will work with RSCN staff, applied researchers, farmers, community members and consultants to implement *in-situ* conservation activities with a special focus on gender issues. He/she will prepare work plans and supervise the day-to-day operations of the team. He/she will work in close cooperation with the NCARTT Site Team Leader. The Mujib Nature Reserve Site Team Leader is a member of the Technical Committee.

The RSCN Site Team Leader shall perform the following functions:

1. Prepare and implement an overall management plan for the sustainable conservation of M/H plants in the Mujib Nature Reserve with a focus on micro-catchment and erosion control;
2. prepare TORs and draft contracts for all required consultancies, to include: anthropologist, M/H plants agronomist, ethno pharmacist, rangeland management, plant ecology, community-based project development, and soil erosion and water harvesting;
3. implement applied research to improve the conservation of M/H plants including:
 - a. updating of baseline survey on M/H use
 - b. identifying plant communities, structure and properties
 - c. apply propagation research
 - d. identifying hot spots with the local community
 - e. identifying threats to M/H plants, and design and implement mitigation measures
 - f. carry out a range land survey and implement recommendations
 - g. design and implement a conservation monitoring program for Mujib Nature Reserve
4. design and implement a protection strategy for the conservation of M/H plants including:
 - a. develop and implementing a community-based enforcement program
 - b. updating the zoning plan
 - c. developing a participatory grazing strategy for the area
5. design and implement community-based programs, including:
 - a. conducting a preliminary rural assessment (PRA)
 - b. implementing demonstration trials for growing endemic and rare species
 - c. initiating pilot nurseries for the use of the local community
 - d. developing community-based income generating activities
 - e. implementing water harvesting techniques to control soil erosion
6. design and implement an outreach and education program for the Mujib Nature Reserve area including:
 - a. assessing the level of understanding of M/H plants importance and value
 - b. developing and distributing interpretation and educational material
 - c. integrating the field of M/H plants into the Nature Conservation Club (NCC) networks
 - d. delivering seminars to the local community
 - e. developing interpretation tools for reserve visitors
7. design and implement a capacity building program, including:
 - a. assessing training needs for reserve staff and local community
 - b. developing and implementing a training program
 - c. organizing study tours for relevant stakeholders

8. contribute to the M/H plant database, genebank and GIS located at NCARTT; and
9. prepare monthly financial and technical progress reports to the PMU and RSCN.

Qualification and Experience Required

- relevant tertiary qualifications – in conservation management, biology, ecology or other relevant discipline;
- extensive experience in the management of protected areas and/or multi-disciplinary rural development projects involving the integration of sustainable natural resource management with rural economic development and the objectives of conservation of biodiversity;
- strong interpersonal skills – ability to effectively communicate and empathize with all social groups involved in the project (including women, subsistence farmers, nomadic pastoralists, government and private sector);
- proficiency in training and working effectively with counterpart staff at all levels
- proficiency in the writing of reports and management plans in English

Central Upper Slopes of the Rift Valley Site Team Leader - NCARTT

The NCARTT Site Team Leader will coordinate the *in-situ* conservation activities of M/H plants in the Central Upper Slopes of the Jordan Rift Valley. He/she will be assisted by a team from NCARTT and national and international consultants. The Site Team Leader will work with NCARTT staff, researchers, farmers, community members and various consultants to implement *in-situ* conservation activities with a special focus on gender issues. He/she will prepare work plans and supervise day-to-day operations. He/she will work in close cooperation with the Mujib Nature Reserve Site Team Leader and will be member of the Technical Committee.

The NCARTT Site Team Leader shall perform following functions:

1. Prepare and conduct detailed work plans with communities for identifying hotspots hosting wild M/H resources;
2. carry out relevant botanical surveys for M/H plants and implement the findings;
3. prepare and implement monitoring programs for the *in-situ* conservation activities;
4. assist the community in the preparation and implementation of site community management plans;
5. assess the properties and potential of wild M/H plants;
6. conduct test trials to propagate wild M/H resources *ex-situ*;
7. develop and implement income generating activities;
8. contribute to the M/H plant database, genebank and GIS located at NCARTT;
9. prepare monthly financial and technical progress reports to the PMU and NCARTT;
10. prepare and implement a training and awareness program focusing on the cultivation, management and use of M/H plants, community development, gender, participatory approaches, etc. targeting communities (esp. women), extension workers, NGOs, etc.

Qualification and Experience Required

- Ph.D. or M.S. in Natural Resources Management, Agriculture or related areas;
- 5-7 years working experience in agricultural, natural resources management, or community development projects and sound knowledge of Botany and Taxonomy;
- strong experience in the implementation of survey results on the ground

- demonstrated ability to work effectively with women, farmers and community members at large, and technical staff in the public and private sector;
- excellent computer skills; and
- fluency in English and strong technical report writing skills

Ex-situ Cultivation Coordination Officer – funded by NCARTT

Scope of work:

NCARTT will be implementing activities related to the *ex-situ* sub-component. The activities will cover the following:

1. Test and verify feasible M/H crops and crop management for different cropping systems and areas in Jordan (development of best agricultural crop management package).
2. Provide proper varieties for approved feasible crops, which needs verification of variety trails and an applied breeding program.
3. Multiplication of seeds and plant material for feasible crops to provide farmers and communities with good plant material.
4. Train farmers and communities on *ex-situ* cultivation of M/H plants, which requires demonstrations, field days and seminars.
5. Test and verify an appropriate IPM system for *ex-situ* cultivation of M/H.

Such activities will be conducted at 5 NCARTT research stations and in farmer fields in different agro-ecosystems of the country, mainly in the Madaba/Mushaqar area.

NCARTT will deploy or hire on a full time basis a Coordination Officer for *ex-situ* Cultivation assisted by a team from NCARTT and national and international consultants when needed. The main responsibility of the *ex-situ* Cultivation Officer is to work with the agronomists, plant breeders, the staff of the stations, the extension officers of the agricultural directorates and community members and farmers to successfully implement activities in full coordination with the Project Management Unit. He/she will prepare relevant work plans for the stations and in cooperation and agreement with the PMU will supervise daily operations. He/she will be stationed at NCARTT and will report both to the Director General of NCARTT and the Project Manager. The *ex-situ* Cultivation Officer will be member of the Technical Committee of the project.

Job profile

1. Prepare and conduct detailed work plans for growing different crops in different production areas and systems to develop best agricultural practices.
2. Prepare and conduct work plans to demonstrate appropriate technologies to grow and harvest feasible crops
3. Conduct field days and seminars to train farmers, women and other growers.
4. Prepare and conduct breeding programs to verify proper varieties for each crop and area.
5. Organize and conduct applied breeding programs and nurseries to produce and multiply seed materials
6. Prepare and conduct applied research to test and verify appropriate IPM systems for *ex-situ* cultivation of M/H.
7. Work closely with national and international consultants of the *ex-situ* sub-component.
8. Prepare monthly financial and technical progress reports to PMU and NCARTT

Qualification and Experience Required

- M.S. or B.S. with specific emphasis on agronomy/plant breeding/production.
- Work experience of 5-7 years with farming projects including the provision of advice, and cultivation of various crops. Good experience in cultivation of medicinal and herbal plants is preferable.
- Working experience with international development or/and applied research projects.
- Demonstrated ability to work with researchers, farmers, extension agents and community members.
- Proficiency in writing technical reports.
- Good command of English.
- Proficiency in computer skills.

In-situ Conservation Coordination Officer – funded by NCARTT

Scope of work:

NCARTT will be implementing conservation activities related to the pilot-site of the Central Upper Slopes of the Rift Valley for the *in-situ* sub-component. The activities will cover the following:

1. Identification of hotspots hosting wild resources of M/H plants (including surveys and botanical studies).
2. Develop and implement community based *in-situ* management plans.
3. Develop and implement *in-situ* management plans for areas hosting wild resources of M/H plants (including monitoring programs).
4. Conduct and coordinate applied research for better understanding of wild medicinal and herbal plants potentials (including analysis of active ingredients and properties and use of biotechnology).
5. Conduct and coordinate applied research to promote wild M/H plant resources in cooperation with *ex-situ* cultivation component.
6. Run a database on M/H plants located at NCARTT.

Such activities will be conducted through NCARTT staff at the Central Upper Slopes of the Rift Valley, mainly in the Madaba region. NCARTT will deploy or hire a full-time Coordination Officer for *in-situ* conservation of M/H plants assisted by a team from NCARTT and national and international consultants when needed. The main responsibility of the *in-situ* Conservation Officer is to work with the researchers, NCARTT staff, farmers, community members and various consultants to successfully implement activities in full coordination with the Project Management Unit. He/she will prepare relevant work plans in cooperation and agreement with the PMU and supervise daily operations. He will be stationed at NCARTT and report to both the Director General of NCARTT and the Project Manager. The *In-situ* Conservation Officer will be a member of the Technical Committee.

Job profile

1. Prepare and conduct detailed work plans for identifying hotspots hosting wild M/H resources.
2. Prepare and conduct surveys and botanical studies for M/H plants.
3. Prepare and conduct monitoring programs for *in-situ* conservation measures.
4. Prepare and conduct detailed community-based *in-situ* management work plans.
5. Prepare and conduct detailed work plans and measures to manage identified hot spot areas.

6. Organize and conduct applied breeding programs and nurseries to produce and multiply seed materials.
7. Organize and conduct applied research to study potentials and properties of wild M/H including the use of biotechnology methods.
8. Conduct and coordinate applied research to utilize wild M/H resources in cooperation with *ex-situ* cultivation component.
9. Supervise the database on M/H located at NCARTT.
10. Prepare monthly financial and technical progress reports to PMU and NCARTT.

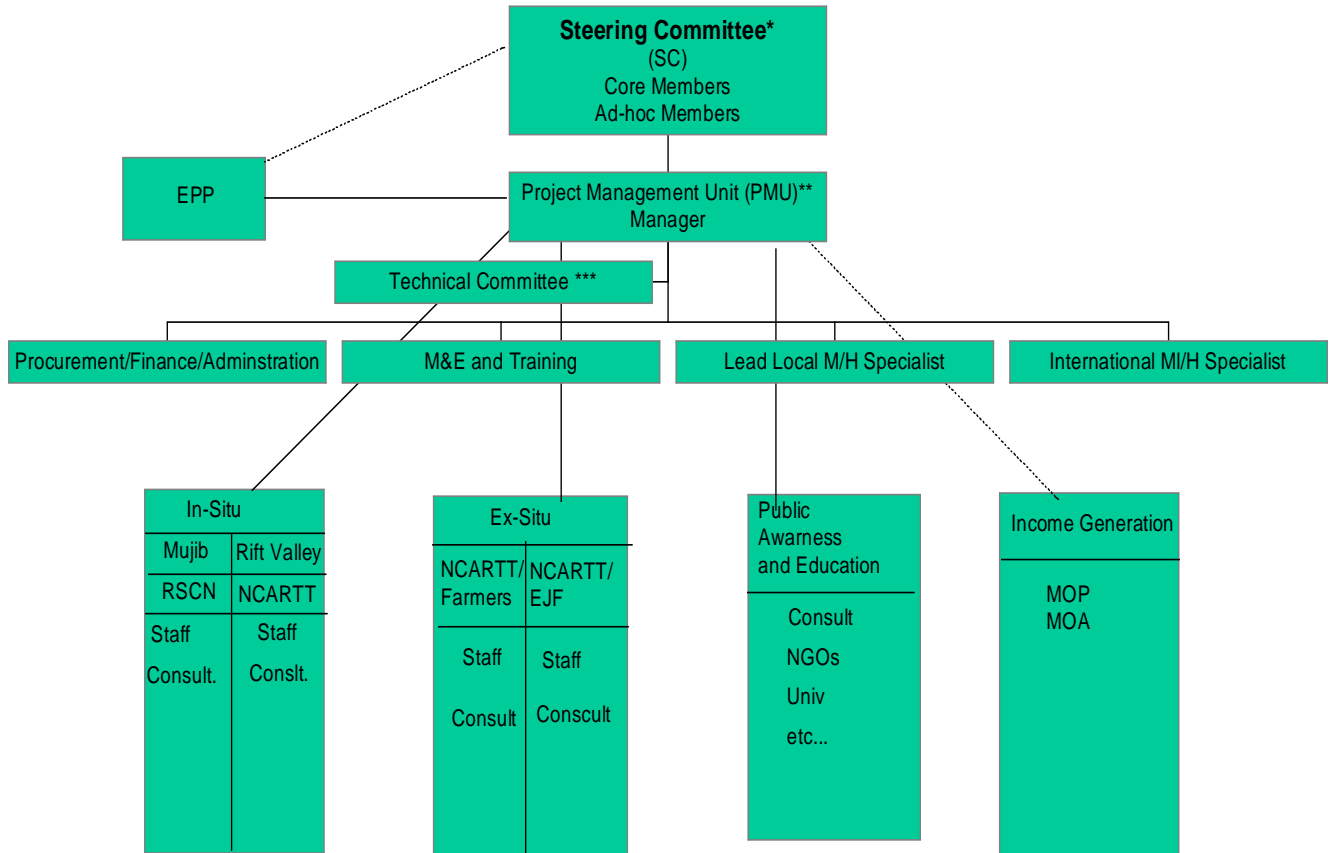
Qualification and Experience Required

- M.S. or B.S. degree in agriculture with specific emphasis on plant breeding/plant genetic resources or natural resource management and botany and taxonomy.
- Work experience of 5-7 years with the management of natural environment projects including plant genetic resources. Experience in conducting surveys and studies of natural resources, especially medicinal and herbal plants is preferable.
- farming projects including provision of advice and the cultivation of various crops. Good experience in cultivation of medicinal and herbal plants is preferable.
- Working experience with international development or/and applied research projects.
- Demonstrated ability to work with researchers, farmers, extension agents and community members.
- Proficiency in writing technical reports.
- Good command of English.
- Proficiency in computer skills.

Additional GEF Annex 14: Implementation Agencies Organigramme

JORDAN: Conservation of Medicinal and Herbal Plants Project

IMPLEMENTATION ORGANIGRAMME



Additional GEF Annex 15: Composition of Steering, Technical and EPP Special Tendering Committees
JORDAN: Conservation of Medicinal and Herbal Plants Project

Steering (Core)	Steering (Ad Hoc)	Technical
Sec. Gen., MOP (Chair)	Minister of Health	Project Manager (Chair)
Director, NCARTT	Minister of Education	PMU Specialist (local)
Director, RSCN	MOP Dir, Environment	PMU Specialist (intl.)
Chairman, EFJ	MOP Dir, EPP	PMU Fin/Proc. Specialist
PMU Project Manager	MOP EPP Project Coord.	PMU Tng, M&E Officer
	Dir, GCEP	Site TL Mujib Nature Reserve
	Dir, Standards & Measurement, MOIT	Site TL Central Upper Slopes of the Rift Valley
	Fruits & Vegetables Association	Representative, University of Jordan
	Representative, Local Community	Representative, University of Science & Technology
	Representative, Farming Community	Dir, Jordan River Foundation
		Dir, Noor Al Hussein Foundation
		Dir, Hashemite Fund
		Dir, RSCN
		Reps, Private Sector
		An Architect
		Rep, USAID
		Rep, EU
		Rep, GTZ

EPP SPECIAL TENDERING COMMITTEE

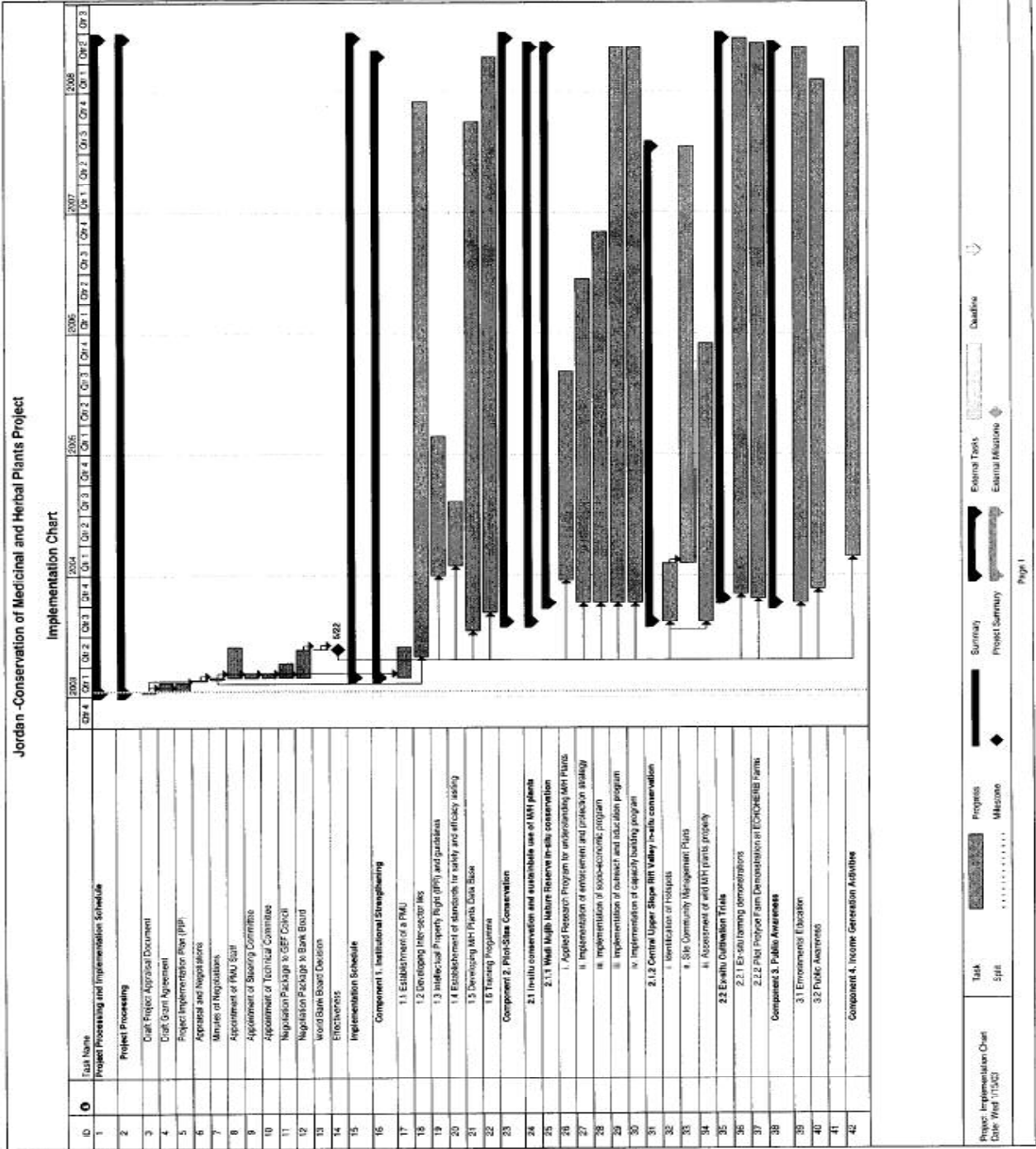
MOP Secretary General (Chair)
MOP Director of Finance
MOP Director, SPP
MOP Director, Regional Planning
MOP Director, Infrastructure
Representative, Ministry of Finance
Representative, Central Tendering Department.

(Special Tendering Committee Technical Committee)

PMU Project Manager
PMU Financial Specialist
EPP Contracting Officer
EPP Project Coordinator

Additional GEF Annex 16: Implementation Chart

JORDAN: Conservation of Medicinal and Herbal Plants Project



**Additional GEF Annex 17: Preliminary Financial Analysis of M/H Plants
JORDAN: Conservation of Medicinal and Herbal Plants Project**

The experience of NCARTT in M/H plants cultivation started in 1999 with the implementation of a regional project on Desertification Control under the umbrella of the Multi-Lateral Working Group on Environment of the Middle East peace process.

Research trials and demonstrations were conducted to test and verify the suitable agricultural and management practices for some promising M/H crops. These demonstrations were also used for training and technology transfer purposes.

Twelve promising crops were evaluated; 6 for dryland farming system, 3 for dryland with supplemental irrigation and 3 for irrigated system. Main activities conducted are summarized in table (1) below:

Table (1): Agricultural and management practices that have been tested and verified for selected promising M/H plant crops

Crops	Farming system	Agricultural and management practices tested
<i>Pimpinella anisum</i> (Anise)	Dry land	1. Planting date
<i>Cuminum cyminum</i> (Cumin)		2. Seeding rate
<i>Trigonella Foenum-graecum</i> (Fenugreek)		3. Harvest method
<i>Nigella sativa</i> (Black cumin)		4. Seed processing and cleaning
<i>Carum carvi</i> (Caraway)		5. Weed and pest control
<i>Foeniculum vulgare</i> (Fennel)		6. Economical assessment
<i>Origanum syriacum</i> (oregano)	Dry land	1. Plant spacing
<i>Salvia triloba</i> (Sage)	with	2. Cutting time, height and frequency
<i>Matricaria Chamomilla</i> (Chamomile)	Suppl. Irrigation	3. Requirement for water and fertilizers
		4. Effect of environment and agricultural practices on yield and volatile oil / active ingredient content
		5. Weed and pest control
<i>Hibiscus sabdariffa</i> (Roselle)	Irrigated	1. Plant spacing
<i>Salvadora persica</i> (Arak)		2. Harvest and yield processing
<i>Lipia verbena</i> (Millisa)		3. Requirement for water and fertilizers.
		4. Tolerance to salinity and heat stresses
		5. Effect of environment and agricultural practices on yield and volatile oil / active ingredient content

Preliminary Results:

Results obtained are preliminary and still incomplete but will be refined through the implementation of the proposed project.

Rainfed crops

A best-practice package has been developed for 6 M/H field crops. These crops are cumin, fenugreek, black cumin, anise, caraway and fennel. All field operations were successfully mechanized. Planting was conducted by seed drill, and harvesting by direct combining using wheat combine. Weeds were controlled using proper herbicides. This shows that these crops could be fully mechanized by using the equipment used for cereal production. Therefore, large scale cultivation is deemed possible. An intensive demonstration program was implemented in the different governorates to disseminate the best-practice to farmers.

Results in Table (2) show the development in the areas planted with M/H crops under rainfed conditions during the last five growing seasons. It shows a steady increase in the cultivated area during the five seasons. The area was increased from 4 ha in 1997/98 season to 243 ha in 2001/2002 season. The number of demonstrations conducted increased ten times within 4 years. This is due to the public awareness activities that were conducted by NCARTT. The number of adoptive farmers increased from 5 to 19 and the average area per crop / farmer increased from 2 to 4 ha compared to 2001/2002 season. This indicates the willingness of farmers to expand M/H plant cultivation.

Table (2): Development of Cultivated Areas with M/H Plant Crops in Rainfed since the Project started 1997 – 2002

Activity	Total Area Planted (ha)	For Research & Seed-multiplication	Demonstrations on farmer fields		Production by farmers	
Season		Area in Res. Stations	Area (ha)	No. farmers	Area (ha)	No. farmers
1997 / 1998	4.0	4.0	--	--	--	--
1998 / 1999*	20.0	6.0	14.0	12	--	--
1999 / 2000*	37.0	8.0	29.0	27	--	--
2000 / 2001*	170.0	12.0	158.0	114	12.0	5
2001 / 2002	243.0	18.5	144.0	118	80.5	19

* Dry season

Feasibility studies of some M/H crops, grown under rainfed conditions were conducted using the results obtained during the previous seasons. Production costs and import substitutability potential were estimated for these crops as compared to that of wheat and lentils, which are the common traditional crops grown in the area. Results are presented in Table (3).

Table (3): Calculated production costs for promising M/H plant crops compared to traditional field crops grown under rainfed conditions.

Cost Items In JD	Common crops		Promising medicinal and herbal plant crops				
	Wheat	Lentil	Cumin	Anise	Fennel	Black Cumin	Fenugreek
Summer plowing	0.65	0.65	0.65	0.65	0.65	0.65	0.65
Seed bed preparation	0.65	0.65	0.65	0.65	0.65	0.65	0.65
Seeds	2.30	4.00	5.00	3.50	3.00	3.00	4.00
Seed drill	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fertilizers	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Weed control: Chemically	1.00	5.00	2.60	2.60	2.60	2.50	4.60
Manually	0.00	0.00	0.00	0.00	0.00	5.00	0.00
Harvest: By Combine	1.50	0.00	0.00	1.50	1.50	1.50	1.50
Manually	0.00	10.00	10.00	0.00	0.00	0.00	0.00
Bags	0.50	0.85	0.65	0.60	1.00	1.00	1.25
Seed cleaning	0.00	2.00	2.00	2.00	2.00	2.00	3.00
Land leasing cost	10.00	10.00	10.00	10.00	10.00	10.00	10.00
A)Production cost /ha	196.0	371.5	345.0	245.0	244.0	293.0	286.5
B)Avg. yield (Kg/ha)	1000	800	500	500	1000	500	1000
C)Production cost/Kg [A/B]	0.196	0.464	0.690	0.490	0.244	0.586	0.286
D)Straw income JD/Kg	0.07	0.050	0.100	0.050	0.030	0.010	0.030
E)Net production cost [C-D]	0.126	0.414	0.590	0.440	0.215	0.215	0.256
F)Import price per Kg	0.15	0.350	1.500	1.070	0.560	0.850	0.350
Net production cost versus import price JD/Kg [F-E]	0.024	-0.064	0.91	0.630	0.345	0.635	0.094
Cheaper to import	Yes	Yes	No	No	No	No	No

Source for import prices [F]: Department of Statistics, Annual report of Foreign Trade, Data averaged over 1991-1996.

The results indicated that M/H plant crops showed a substantial advantage over wheat and lentil. However import prices need to be evaluated periodically because it will be seriously affected by the market demand and quantity produced.

Rainfed with Supplementary Irrigation

Farmers in Jordan are growing oregano, sage and chamomile. Research conducted aimed at improving crop management. Oregano and sage were cultivated in plastic houses to find out the optimum row spacing and cutting frequency and cutting height. Major findings are summarized as follows:

Growing oregano under plastic house resulted in 70% yield increase over yield under open fields. Sage was not adaptable to plastic house condition, because of powdery mildew infection. The results showed that cutting frequency for the three crops will be around 5-6 cuttings per year.

Irrigated Crops

Three crops were grown under irrigation, namely, Arak (*Salvadora perisca*), Roselle (*Hibiscus subdariffa*) and Melissa (*Lipia verbena*). They were planted at two research stations: Khaldeah and Ghor safi. The crops were grown in saline soils and irrigated exclusively with saline water. Preliminary observations show their ability to tolerate heat and salinity. Roselle suffered when temperature was below 15°C.

A demonstration program was initiated to promote cultivation of both Roselle and Melissa. Attempts were made to train farmers on how to market the fresh product, and to train women on how to make Roselle-Jam. As for Ark, an orchard of around 100 trees has been established at Ghor safi station in Wadi Araba to test appropriate agricultural practices, especially harvesting techniques.

