

PN-AAU-280

43294

EPM 27

**SCOPE OF WORK FOR A NATIONAL  
RANGELAND AND RAINFED WATERSHED  
PROGRAM IN THE KINGDOM OF JORDAN**

R. Dennis Child  
Richard Saunier  
Waled Abed Rabbah  
Ahmed Al Rimawi  
William Furtick

July, 1984

This document was produced for the Environmental  
Planning and Management Project of the  
International Institute for Environment and  
Development under the  
Advisory Services Contract No. AS-37

The Environmental Planning and Management Project is a cooperative agreement between the International Institute for Environment and Development and the U.S. Agency for International Development to respond to requests for assistance from developing countries in a variety of environmental and natural resource management problems.

Single copies of this document are available free from:

International Institute for Environment and Development  
1717 Massachusetts Ave. N.W.  
Washington, D.C. 20036  
(202) 462-0900

## TABLE OF CONTENTS

	<u>Page</u>
Preface . . . . .	i
Executive Summary . . . . .	ii
Introduction . . . . .	1
Background to the Rangeland Problem . . . . .	3
Condition of Jordan's Rangelands . . . . .	3
Thirty Years of Studies and Recommendations . . . . .	6
Identification of the Problem . . . . .	8
Methods: A Framework for Developing a National Range Program for Jordan . . . . .	9
Long-term Development Plan for the Rangelands of Jordan . . . . .	13
Proposed Projects . . . . .	13
Related Projects . . . . .	18
Support Services . . . . .	18
First-priority Activities Required for Effective Project Implementation . . . . .	21
Development Plan . . . . .	24
Scope-of-Work Summary . . . . .	26
Appendixes	
1. Scope of Work . . . . .	31
2. Current Mission Scope of Work . . . . .	98
3. List of People Met . . . . .	106
4. Helpful References . . . . .	108
5. Related Project Activities Currently Underway . . . . .	117

## PREFACE

After reviewing Jordan's rangeland and livestock resources, a 1980 FAO review mission concluded:

"...it is plainly obvious that there is a need for an action programme to deal with the impending disaster. The methods to be adopted to tackle the problem, have been repeatedly stated over the past 25 years and even specific projects have been identified by KFAED (1978) and Draz (1979). The basic items identified by Park (1955) are still of high priority?

- a. Establishment of demonstration and experimental areas.
- b. Effective public educational programme.
- c. Collection of basic resource data.
- d. Preparation of management and development plans.
- e. Effective management, development, and maintenance plans."

The objectives of this 3 week mission were: 1) to examine the rain-fed and rangeland watersheds and the current programs and projects that relate to them; and 2) to provide detailed guidance for implementing a national rain-fed and rangeland watershed program.

Jordan is part of a very complex ecological system that includes human intervention across lands with different productive capabilities. At the request of the National Planning Council, the scope of the mission was narrowed during the 3-week mission to focus on the rangelands and areas receiving less than 200 mm of annual precipitation mostly to the east of Jordan's highland region. It is recognized that the rangelands and the higher potential highlands are inseparably related and, therefore, it is essential that all development activities in both of these geographical areas be coordinated to achieve long-term national goals.

This report addresses constraints to the development of Jordan's rangelands and outlines an action program for the implementation of development projects.

## EXECUTIVE SUMMARY

The objectives of this mission were: 1) to examine the rangeland and rain-fed watersheds and the current programs and projects that relate to them and 2) to provide detailed guidance for implementing a national rangeland and rain-fed watershed program. At the request of the National Planning Council, the mission focused on the rangelands and areas receiving less than 200 mm of annual precipitation.

Rehabilitation of Jordan's rangelands will require time, money, organization, and effective technology. The technology is available but implementation has lacked a sustained and organized range program to ensure increased productivity. Previous development efforts in Jordan's rangelands and watersheds have also been hampered by the difficulties in dealing with her interrelated and complex environments. Jordan must deal with the complexity of her problems so that she can meet the needs of tomorrow.

The range program designed for Jordan is both comprehensive and integrated. The social, cultural, and political sectors have all been considered. In addition, each sector's activities have been integrated with those of the other sectors so that conflict between them is minimized and cooperation is maximized.

A package of three types of projects has been proposed for the development of Jordan's rangelands: 1) regional projects that emphasize the range resources and ensure regional integration; 2) projects that develop institutional capabilities at the national level to support regional development; and 3) projects to alleviate the constraints to implementation.

The scope-of-work phase, which will follow this mission, will outline the requirements needed for completing the proposed projects and support services components. A twelve-month period is suggested: 1) to complete

the detailed scopes of work for the four integrated regional development planning projects; 2) to review other related project activities; and 3) to prepare implementation plans for support service projects.

During the scope-of-work phase the following products would be delivered:

1. Detailed scopes of work for integrated regional development for the 1) Wadi Mujib catchment, 2) Azrak-Duleil catchments, 3) Balqa Salt area, and 4) Jafr basin.
2. Completed plans to be submitted to donors for funding the following projects:
  - Range Management Improvement and Pilot Project Survey
  - Range Revegetation Survey and Pilot Project
  - Water Harvest Survey and Pilot Project
  - Range Management Training Program
  - Rangeland Research and Extension Program
  - Rangeland Documentaton Center
  - Rangeland Monitoring and Evaluation Unit
  - National Soil and Land-use Survey

The team preparing the scopes of work will be composed of a combination of expatriate and Jordanian professionals. The mission has recommended that the principal team assigned to complete the 12-month scope-of-work phase be composed of six full-time experts (2 expatriates) and an overall coordinator. Consultants will supplement this team where required.

A total of 119 person months will be needed during the 12-month scope-of-work phase. The projected budget (table 5) includes 55 person months of expatriate professional time and 64 person months of Jordanian professional time. The total budget indicates that approximately \$1 million will be required to complete this phase, not including the 64 person months of Jordanian time contracted by the GOJ.

## A NATIONAL RANGELAND AND RAIN-FED WATERSHED PROGRAM

### INTRODUCTION

The rangelands of Jordan have been in a deteriorated condition for hundreds of years. Their rehabilitation will require time, money, organization, and proper technology. This technology is available and projects for its implementation have been recommended in over thirty years of studies. However, implementation has lacked a sustained and organized range program that would guide and ensure execution.

Four steps need to be taken to mold and support a country-wide rangeland development program: 1) defined regionalization of the country into logical subdivisions; 2) institutional restructuring to provide an entity that can ensure project implementation; 3) legislative reform to establish the necessary control; and 4) training to provide the technical, administrative, and managerial expertise necessary to ensure full Jordanean involvement in a range development program. Action has been initiated to address these four steps but the final design of each remains to be completed.

Given their importance to the success of this study's implementation, a package of suggestions as they concern an integrated National Range program has been laid out. Although this package should be considered as an integral part of a National Range Program it--just as all other parts of the Program--may be easily separated for execution by any group so empowered by the Jordanean Government. However, both the "causes" and the "solutions" to the problems of range management and rehabilitation often lie outside what is normally considered as range management; only an integrated analysis will find the "cause" just as only an integrated response will serve in the "solution."

Three types of projects are proposed within the range program: 1) regional development projects that emphasize the range resources,

organize priorities, and ensure integration 2) projects that develop institutional capabilities at the national level to support regional development; and 3) projects to alleviate the constraints to implementation.

Implementation of the proposed national range program began when the National Planning Council requested this preliminary mission to make a prediagnosis of the Jordanian situation. The mission chose an integrated, flexible approach in the conception, design, and execution of Jordan's range program. Flexibility in achieving integration is obtained through iterative planning and the generation of alternative strategies and projects to meet the objectives.

Three steps need to be taken following the completion of the mission's preliminary report: 1) undertake detailed diagnoses relating to the problems identified, 2) design a clear overall strategy for a comprehensive and integrated program for the management and rehabilitation of Jordan's rangelands, and 3) design an overall program for implementation that would allow separate portions to be funded and managed by different groups (ministries, agencies, international development assistance organizations, etc.) while still maintaining the integrated nature of the program.

## **BACKGROUND TO THE RANGELAND PROBLEM**

### Condition of Jordan's Rangelands

A few thousand years ago much of the area east of Amman was forested. Human activities, including the domestication of livestock, resulted in eventual clearing of the forest. Increased grazing pressure eventually removed the vegetation cover, exposed the soil to wind erosion, and developed the current erosion pavement seen throughout this man-made desert.

Nevertheless, Jordan's rangelands were much more productive as recently as 100 years ago. Palatable shrubs and annual grasses provided a good resource base to sustain the nomadic lifestyles of the people. Degradation of the range resource base has increased for a number of reasons: 1) the tendency for the nomadic peoples in Jordan to become more sedentary has reduced herd movement and concentrated animals in smaller areas for longer periods of time; 2) the population of Jordan has grown from 400,000 in 1930 to 2,490,000 in 1984 and although most of this growth has occurred around the city of Amman, increased demand on the rangeland resources resulted because of increased demand for red meat. This trend is illustrated in figure 1. Even though the number of animals has increased, the number of units per 1,000 persons has decreased (figure 2). Figure 3 shows Jordan's population from 1968 to 1981 and the total livestock forage units during the same period. The increasing difference between these lines is related to the increasing importation of red meat. Jordan now imports about 35% of its red meat products. With good management, much of this could be produced internally.

The need for increasing returns from rangeland and the desire to own land have resulted in high stocking rates. Plowing rangeland for cereal crops, overuse of commonly held lands, and the movement of animals across national boundaries during dry years may have obtained a "short-

## LIVESTOCK FORAGE UNITS IN JORDAN

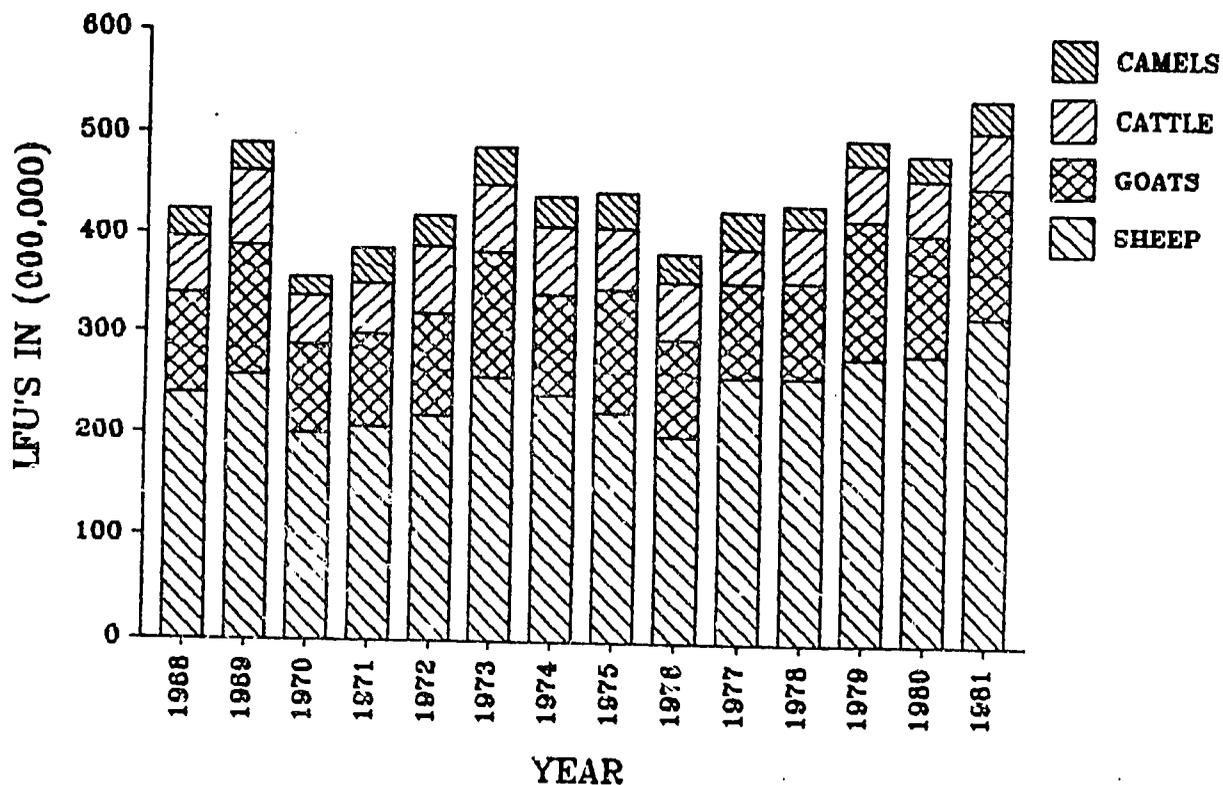


FIGURE 1. Number of livestock for age units in Jordan from 1968 to 1981 seperated into species.

## LIVESTOCK FORAGE UNITS IN JORDAN LIVESTOCK FEED UNITS PER 1,000 HUMANS

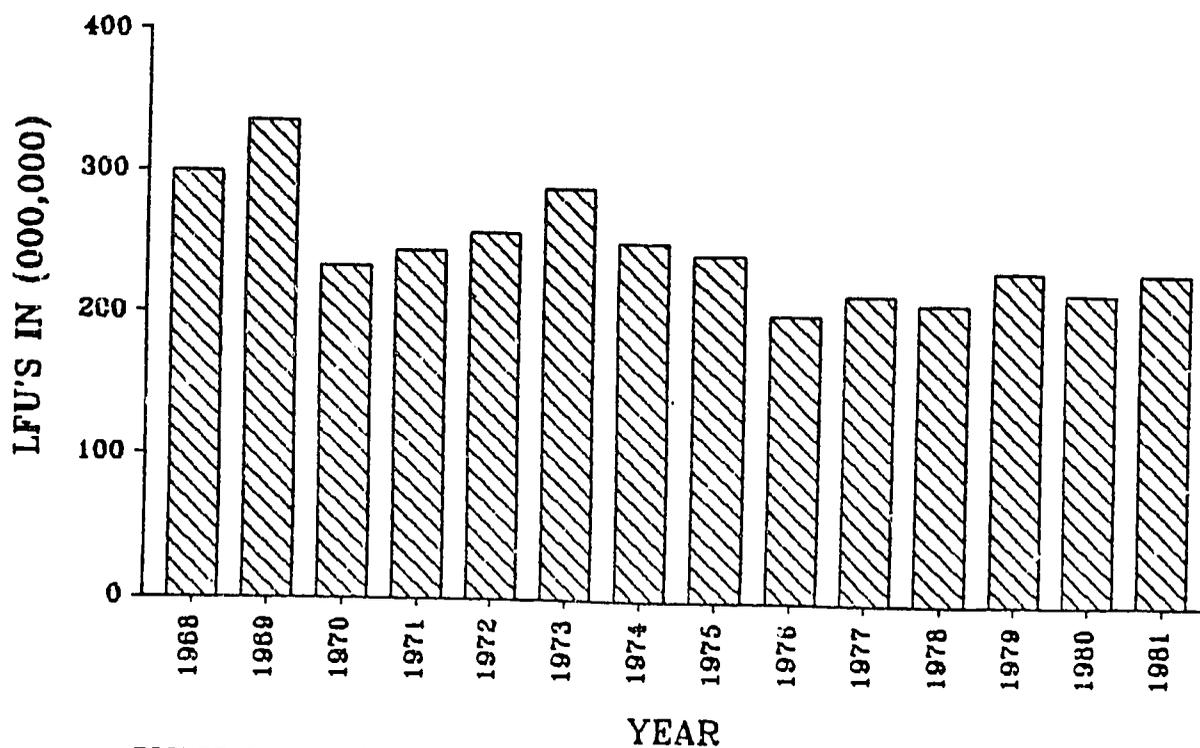


FIGURE 2. Number of livestock forage units in Jordan per 1,000 humans from 1968 to 1981.

# HUMAN POPULATION IN JORDAN WITH ANIMAL FORAGE UNIT DAYS

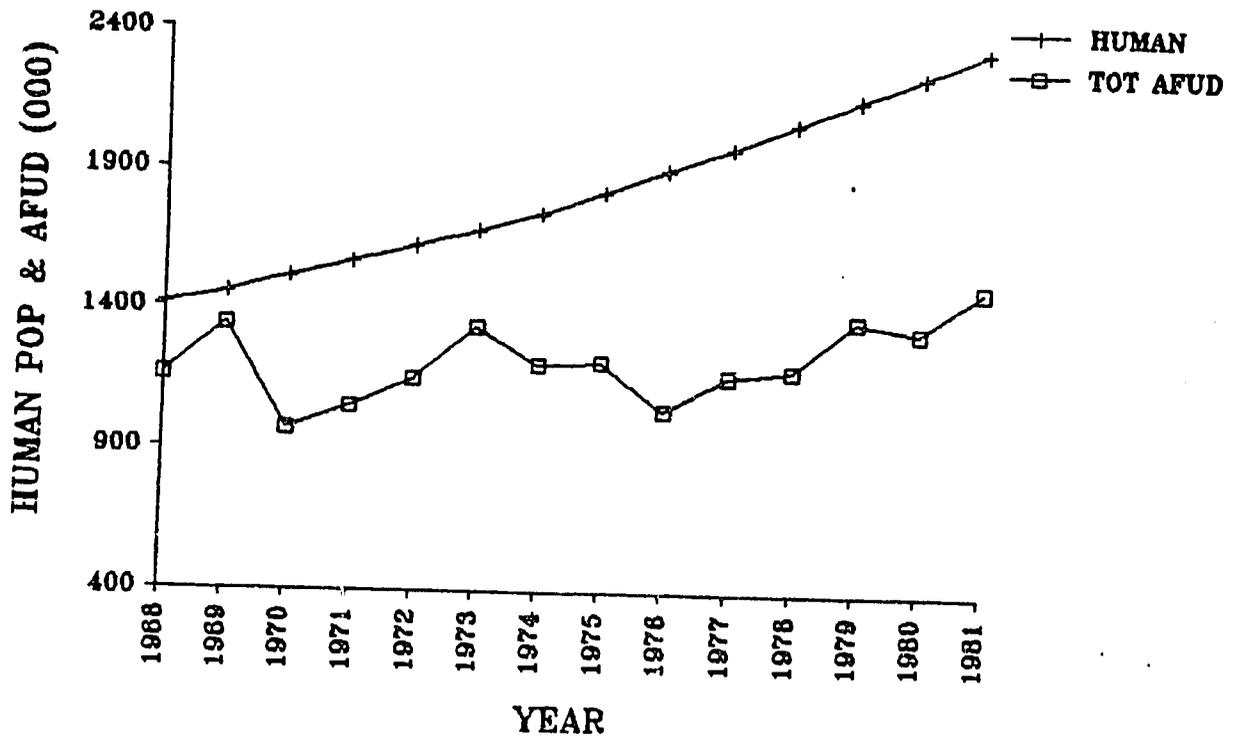


FIGURE 3. Animal forage days and human population in Jordan from 1968 to 1981.

term" economic advantage, but the results are long-term degradation of the resource base and even lower levels of future productivity.

Most experts agree that reconstituting the forests of the past is not feasible. However, research activities, beginning in the early 1950s, indicate that it is technically possible to return the desert rangelands that receive more than 150 mm of annual precipitation to a more productive state by reintroducing palatable shrubs and perennial grasses.

Rangeland rehabilitation will be a slow and costly process because of the arid nature of these lands and the general absence of sufficient sources of natural seed. A large-scale improvement will require a sustained commitment and effort over a 20- to 30-year period. Control of the area being rehabilitated is critical to the success of the program and the cooperation of the traditional users of the resource is essential throughout all phases of rehabilitation projects.

#### Thirty Years of Studies and Recommendations

Over the last three decades, many competent people at both national and international levels have discussed and made recommendations concerning range deterioration, soil erosion, and water scarcity in the highlands and desert areas of Jordan.

Although there are a few significant exceptions, the numerous studies, reports, work plans, and project designs to tackle the problems of range and watershed deterioration have made little difference. A quick review of these studies shows that they have observed the same conditions and identified similar, if not identical, solutions. Some studies died before implementation; some have stagnated; and some, though implemented, have been ineffective because of restrictions placed on them by administrative red tape.

Implementation of these numerous and repetitious recommendations has been blocked by a series of constraints.

- o Sociopolitical constraints. In any area of the world, constraints of a sociopolitical nature exist that affect the implementation of development projects at a technical level. Such constraints also appear to exist in Jordan but were not specifically identified by the mission.
- o Institutional constraints. The major constraint to the successful implementation of projects seems to be institutional in nature. The low priority given to range and watershed management since the 1950s has led to 1) the lack of an organization having the financial, technical, and managerial capability to deal with comprehensive rural development and management of rangeland areas; 2) inadequate research and extension services and facilities to provide farmers and herdsman adequate technical advice adapted to local environmental/economical conditions; and 3) adequate legislation to regulate development-oriented activities that affect the use of Jordan's rangelands.
- o Personnel constraints. Jordan has prepared for future needs by providing education to many candidates in most disciplines, but those same well-trained people have become a major export. Fortunately, a number of very competent people are active in rural development in Jordan, but they are spread much too thinly to meet the challenges the country faces. There are essentially no people trained in range and watershed management who are still working in that discipline in Jordan.

Most of the planning, project formulation, and technical and leadership inputs for development projects involving rangeland ecosystems in Jordan have come from expatriates. Projects developed and executed by expatriates often fail to meet long-term goals and needs because 1) the project

may never be initiated; 2) if initiated, the project either collapses after external support is withdrawn or fails because the design was inappropriate for the situation. Such failures occur because the affected populations were not adequately involved in the design or implementation of the project.

### Identification of the Problem

The condition of Jordan's rangelands and watersheds is the visible result of a problem that hampers any development effort -- the extreme difficulty to understand and work within tremendously interrelated and complex environments. The interrelatedness and complexity of Jordan's production systems are the real problems. Long-term management and production problems cannot be resolved by isolated, sectorial responses. This universal problem applies to Jordan as it does with all countries in today's world. We can no longer manage things or individual products as was done in the past. We must deal with the complexity of today's world to begin to meet the needs of tomorrow.

## **METHODS: A FRAMEWORK USED FOR DEVELOPING A NATIONAL RANGE PROGRAM FOR JORDAN**

Rangelands can be seen in a number of ways: as units of landscape where human activities take place, as units of production, and as ecosystems connected to many other ecosystems.

In a sense, any effort to distinguish between rangeland and watersheds is somewhat fruitless. Jordanean watersheds, more often than not, include landscapes that are rangeland, just as they may also include rain-fed lands, forest, agriculture, and urban lands. Rangeland provides forage for livestock and wildlife; woody vegetation for posts, fuelwood and, eventually, lumber; land for urban construction and agriculture; and water to meet the needs of agriculture, livestock, industry, urbanization, recreation, and health.

Rangeland fits any modern conceptualization of an ecosystem: a more or less arbitrarily delineated area having interacting physical and biological components to which social, cultural, economic, institutional and political components and processes must be added. Rangeland as units of landscape and production have often been discussed in Jordan and numerous proposals to improve their condition or correct any perceived problems have been made.

Within the ecosystems, urbanization and industry conflict with crop production and grazing for the use of rangeland watersheds and all four of these uses increase erosion and sedimentation. However, it is the lack of understanding of the interrelated nature of rangelands on the part of those who use them that causes their deterioration and decreased capability to provide what man deems necessary for improving the quality of life in a sustainable production system.

Consider, for example, the production of water in quantity and quality needed and the service of erosion and sediment control. These natural resources have deteriorated because of overgrazing, removal of permanent

vegetation for the cultivation of annual crops, (which denudes the landscape for varying periods) and use of impervious concrete and asphalt infrastructures. Both overgrazing and changes in land use have been influenced by land tenure customs and regulations that encourage inappropriate technologies. However, these adverse technologies have been encouraged by population pressures and social, cultural, and political factors that must be understood if development projects are to be successful. Using a comprehensive and integrated approach to improving rangeland use is emphasized in the following analyses, discussion, and project design.

The approach chosen for conceiving, designing, and executing a Range Program in Jordan is one of integration and flexibility. Here, a distinction needs to be made between the words "comprehensive" and "integration." Comprehensive in the context of development planning means that the social, cultural, and political sectors, have all been considered. Integration means that not only have all sectors been considered but that the execution of each sector's activities has been integrated with that of others so that conflict between them has been minimized and cooperation has been maximized.

Flexibility is a necessary prerequisite for integration and is obtained through iterative planning and the generation of alternative strategies and projects to meet the development objectives.

Figure 4 is a diagram of the process leading to implementation of the specific projects that make up the proposed Range Program. Under this model, this preliminary mission undertakes a quick prediagnosis of the range and watershed situations and geographical areas included in the request from the Government of Jordan, and together with representatives of the Government defines the expected final product, and outlines the work plan. The work plan 1) identifies development actions that are imminent or already taking place, and gives them consideration early in the project; 2) defines the technical content of the study, determines the principal problems and potentials and establishes priorities for

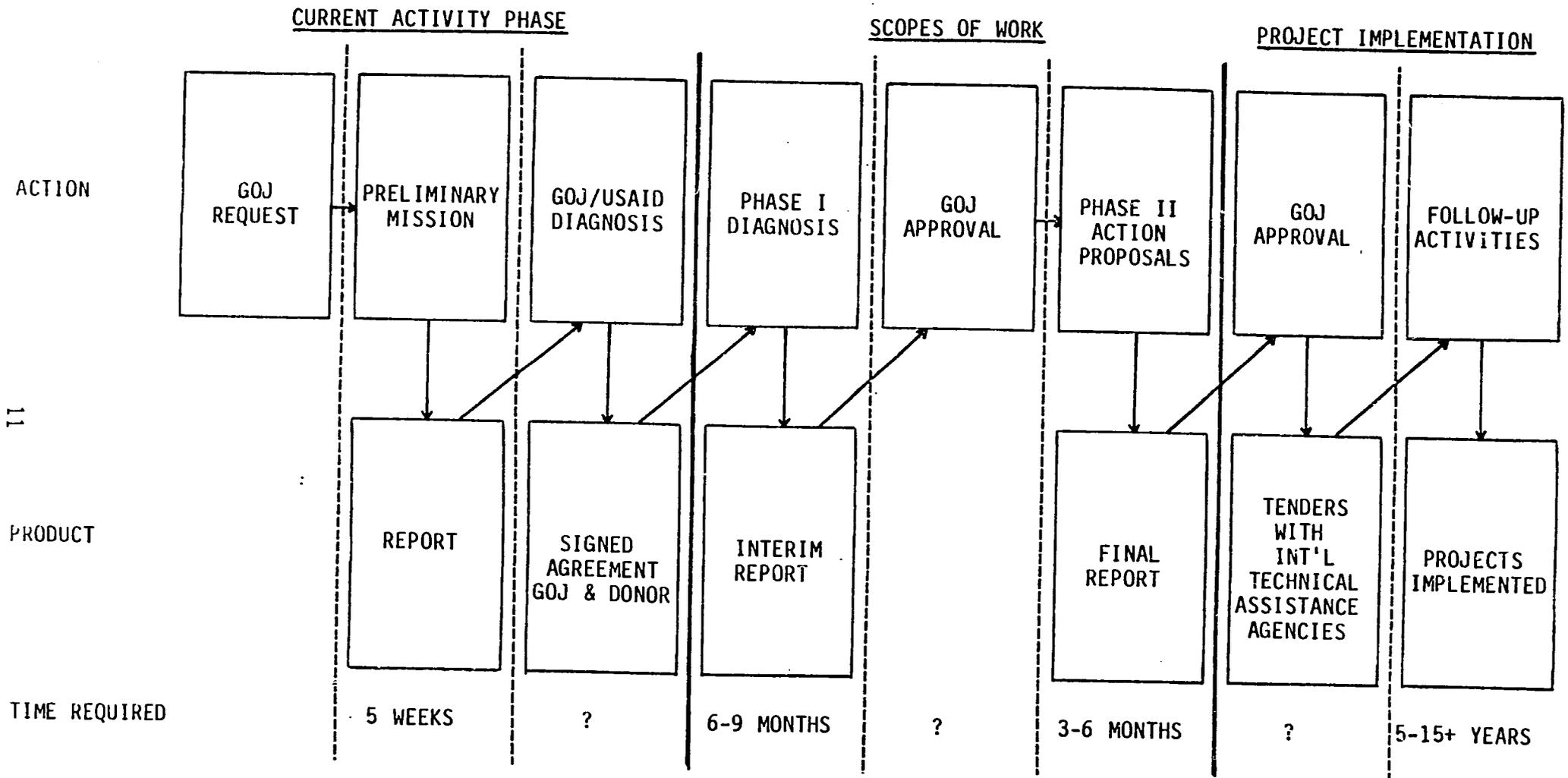


FIGURE 4. PROCESS LEADING TO THE DESIGN AND IMPLEMENTATION OF A NATIONAL RANGE AND WATERSHED PROGRAM

action; and 3) outlines a very general strategy for implementation. The preliminary report of this mission follows this model.

The next step toward implementation of a rangeland watershed program provides a) a detailed diagnosis relating to the problems identified by the preliminary mission and b) the design of a detailed overall strategy including specific projects and activities that will make up a comprehensive and integrated program of range management and rehabilitation in Jordan. Although portions of the program will be implemented very early, 9 to 15 months are envisioned to complete this step.

Design of the overall program should determine distinct portions that can be funded and managed by different groups (ministries, agencies, international development assistance organizations, etc.) while maintaining the integrated nature of the Program.

## LONG-TERM DEVELOPMENT PLAN FOR THE RANGELANDS OF JORDAN

The rain-fed and rangeland watersheds in Jordan are extremely complex. Problems on these lands cannot be solved by using an isolated sectorial solution. For example, removing livestock from rain-fed areas suffering from severe erosion may not be the long-term answer since the real problem may be the legislative measures that deal with land tenure. The long-term solutions needed will increase the sustained productivity of these lands by using an integrated systems approach to resource planning, development, and management.

Components of the proposed National Rangeland and Rain-fed Watershed Program can be divided into four broad categories: 1) proposed projects; 2) related projects; 3) support services; and 4) immediate needs. The components within each of these are shown in table 1.

The scope-of-work phase which will follow this mission will outline the requirements needed to undertake and complete a detailed diagnosis for the proposed projects and support services components. The NPC can review the activities of related project activities being developed by other institutions to determine priorities for implementation and(or) detailed diagnosis.

### Proposed Projects

The development process for Jordan's natural resource base in the rangeland ecosystems cannot occur on all areas at the same time. Neither the pool of trained citizens nor the physical and financial resources required for such an effort are currently available to turn the trend of gradual degradation of the natural resource base while increasing the long-term productivity of this base to meet the needs of the people of Jordan.

TABLE 1. COMPONENTS OF A NATIONAL RANGELAND AND RAIN-FED WATERSHED PROGRAM

ID#	Component Title	Region
<u>Proposed Projects</u>		
P-1	Wadi Mujib	Plateau/Desert
P-2	Azrak-Duleil	Desert
P-3	Balqa-Salt	Plateau
P-4	Jafr Basin	Desert
P-5	Range Management Improvement	All Rangelands
P-6	Range Revegetation Survey	All Rangelands
P-7	Water Harvest Survey	All Rangelands
<u>Related Projects</u>		
P-8	Al-Hamad	Desert
P-9	Wadi Arab	Plateau
P-10	Wadi Araba	Rift Valley
P-11	Zarqa	Plateau
P-12	Aqaba	Desert
P-13	Highland Agriculture	Plateau
P-14	USAID Rural Development	Plateau
P-15	Australian Land Use	Plateau
P-16	UNEP Lajjun	Desert
<u>Support Services</u>		
T-1	Training	National
T-2	Research and Extension	National
T-3	Documentation Center	National
T-4	Monitoring Evaluation	National
T-5	National Soil and Land-Use Survey	National
<u>Immediate Needs</u>		
O-1	Institutional Restructuring	National
O-2	Regionalization	National
O-3	Regional Planning	National
O-4	Legislation	National

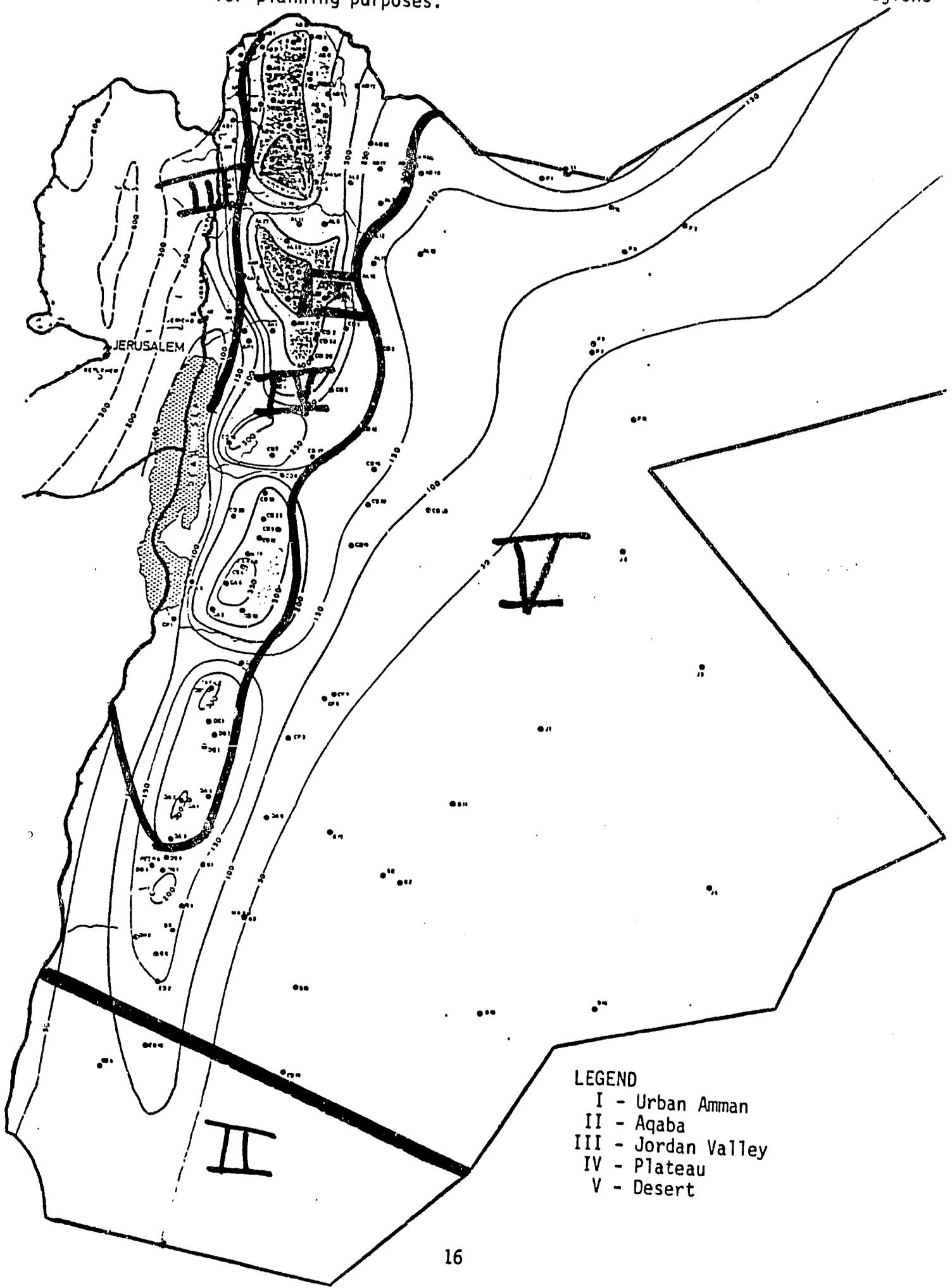
Priorities for beginning the rehabilitation of the regions or subregions depend on many factors. To ensure that national objectives are met, a preliminary ranking should be determined through a process of regionalization. Jordan's National Planning Council is currently in the process of regionalization and a draft map indicating one possible scheme is presented as figure 5. In this scheme, Jordan is divided into 5 regions: 1) Urban Amman, 2) Aqaba, 3) Jordan Valley, 4) Plateau, and 5) Desert. Some of these regions may eventually be divided into subregions and even sub-subregions. Much of the proposed development activities will be focused on the sub subregions because of the greater input of manpower and financial resources required for larger areas.

The capability to undertake regional planning to determine priority areas for development is not sufficiently mature in Jordan. Since some urgency exists, it is proposed that the preliminary work to assess the feasibility for integrated development projects in some major subregions begin immediately, while at the same time encouraging the development of a regional planning capability within Jordan. The most promising projects, according to this assessment, could then be evaluated for funding and implementation. The process would involve training a Jordanian team to continue a regional planning effort that could extend the process throughout the rain-fed and rangeland watersheds in Jordan.

Two ways to begin developing a program for the rain-fed and rangeland watersheds are: 1) to concentrate on one region/subregion and cluster many projects within that region/subregion and 2) to develop one or two projects in each of the regions/subregions.

Both options have some advantages. Concentrating on one region/subregion tends to maximize the short-term return while developing one or two projects in each region/subregion extends information to the private sector by having model projects in a wide range of ecosystems for easier observation. The second option was selected and a list of the seven project areas selected for this initial evaluation along with some of the important characteristics is shown in table 2.

FIGURE 5. Map of the Hashimite Kingdom of Jordan showing five potential regions for planning purposes.



- LEGEND
- I - Urban Amman
  - II - Aqaba
  - III - Jordan Valley
  - IV - Plateau
  - V - Desert

TABLE 2. PROPOSED REGIONAL PROJECTS TO BE IN THE NATIONAL RANGELAND PROGRAM

ID#	Component title	Region	Area of impact (sq. km)	Human pop. (000)	Future invest. (\$mil)	Key characteristics for inclusion
P-1	Wadi-Mujib	PLATEAU/DESERT	2563	73.6	100 plus	Opportunity for mixed crop and livestock production in submarginal areas.
P-2	Azraq-Duleil	DESERT	225	5	50	Wildlife reintroduction research is underway; increase in irrigation; competition for ground water; and depletion of underground aquifers.
P-3	Balqa/salt	PLATEAU	231	15.4	50	An area of relatively steep slopes going down to the Jordan valley. One area has a high population and infra-structural development, the other does not.
P-4	Jafr Basin	DESERT	11985	23	50	Migration to the area due to mineral extraction and associated activities. Limited rainfed agriculture exists, but some range development possible.
P-8	Al-Hamad	DESERT	166000	11	-	A four nation team is developing plans for this area. Al-Hamad is very arid but supports some livestock. Irrigation may be developed.
P-9	Wadi Arab	PLATEAU	267	170.1	100 plus	The Arab League is developing a Regional Development plan for this area; soon available for review.
P-10	Wadi Araba	RIFT VALLEY	1390	8.7	100 plus	Several groups have surveyed this area to determine the feasibility of further development. Regionalization will allow priority comparisons.
P-11	Zarqa	PLATEAU	830	140	100 plus	This project is currently ending the preliminary phase and beginning implementation. Pilot studies carried out have been very successful.
P-12	Aqaba	AQABA	12800	12.8	-	The Aqaba Authority is relatively new and will be developing its own projects as planning continues.

### Related Projects

Activities and plans are underway for several related projects. A brief summary of these activities is found in appendix 5. The important characteristics of these project areas are also shown in table 2. The reports and sites of these projects should be reviewed so that all development projects can be evaluated with common terms of reference. Other projects could be added or could replace those proposed for early implementation as the regionalization and regional planning process continues.

### Support Services

One of the most important factors that limits the implementation of projects already planned and those in the planning stage is inadequate Jordanian capacity to provide sufficient staff support for sustained and effective implementation. This is caused by inadequate numbers of sufficiently experienced and skilled staff in planning, administration, technical oversight and evaluation and monitoring during project implementation. This is further influenced by noncompetitive salary levels, which make it difficult to retain those staff with the greatest competence and desired skills.

It is desirable that assistance be given the GOJ in developing an inventory of the staff resources that will be needed over the short, medium, and longer term to implement the projects planned. This will include an inventory of staff resources currently available, the requirements of a staff development program and the specific in-service and longer term training requirements. In addition, action is needed for strengthening the essential support services such as research, extension, documentation, etc. Some of this is being included within the design of the Jordan Highland Development Project and in those of other donors. These need to be designed to fill priority needs in a coordinated manner. It is important that these support services include adequate range improvement and management research and extension to form

a livestock/range/cropland system component. A research and extension conservation farming component is needed that includes the watershed protection and management needs.

An essential requirement for successful implementation of a National Range Program is an adequate national capacity to provide essential support services. These include research, extension, documentation, and data management, monitoring and evaluation, and a national soil for land use study. Implementation needs for these essential support services should be detailed by specific studies in the next phase proposed in this report.

### Training

A development plan is needed for each of the support-service components. This should include an inventory of current staff resources, in-service training needs for existing staff, and long-term training needs. Because of the large number of Jordanean students in the university system (and perhaps an even larger number overseas), an inventory of these potential staff resources should also be considered. In addition a study of Jordan's future needs should indicate how the university system can be strengthened to fill identified gaps, such as in natural resource and range management curricula.

### Research and Extension

Adequate research and extension backup has been repeatedly demonstrated throughout the world as absolutely essential to the success of development projects. Major voids in range and watershed research and extension are apparent in Jordan. Because agriculture in Jordan is almost entirely based on a livestock/range/cropland farming system, watershed management is an important component. Therefore, the research and extension program should be a team approach to the development and implementation of improvements in this system that will be acceptable to the agricultural producers and improve range and livestock management

methods. The next phase should examine the research and extension needs, determine current capabilities, identify gaps, and establish development plans that will provide the essential level of support services required.

#### Documentation Center

It is important that the planners, implementation staff, and those dealing with the essential support services have ready access to the current knowledge base or data management systems in Jordan and abroad. In order to provide information services, assist in data management needs, and provide training assistance in use of these systems, an adequate information center is an essential ingredient.

In the next phase recommended in this report, these needs should be detailed and recommendations made on the organizational locus for such a center.

#### Monitoring and Evaluation

With the multiplicity of Jordanean agencies, international organizations, and donors involved in development activities in Jordan, it is extremely important to be able to track progress, determine shortfalls, identify bottlenecks, and determine corrective measures needed. It is necessary to monitor the effects of all pending plans and relate current and future operations to resource requirements and allocations on the short, medium, and longer term. During the next phase, these monitoring and evaluation needs should be examined along with the best means to fill them.

#### National Soil and Land-use Study

Development of detailed land-use plans, based on an accurate knowledge of the soil resources, is basic to development of range needs. The basic requirements for developing a national soil and land use study

have been detailed in the June 1984 report of AID consultant William Johnson. This should be used as the basis for developing this support requirement during the next phase.

### First-priority Activities Required for Effective Project Implementation

#### Institutional Restructuring

There is a general awareness that broadly based natural resource development in Jordan requires institutional restructuring to be successful. For development of the Jordan Valley clear lines of authority, responsibility, and accountability were assigned for implementing this type of large interagency project.

The seat of authority has overall responsibility for planning and implementation of development and direct control over financial resources. It is able to establish wage scales much the same as a private sector company. Because the Government of Jordan realizes the need for institutional restructuring for other regional and sectorial development projects, and because donors are insistent on restructuring, an overall restructuring plan for implementing projects having a spatial orientation is in an advanced state of development.

Implementation of this institutional restructuring will require a careful analysis of the specific implementation requirements, establishment of priorities, assessment of available staff resources and supplemental training needed for some staff, and identification of additional staff needed. Nevertheless, its implementation is necessary if parts or all of a National Range Plan is to be implemented. It is not recommended that the "National Range Plan" be raised to the level of "Authority." Indeed, such a sectorial authority would probably fail. The "Plan," however, must be integrated and form a part of any organization established for spatial planning.

With the division of Jordan into a series of development zones as the basis for project planning and implementation, a central project-planning capability is needed for making detailed regional development plans as the basis for project implementation, including rangeland development and management. Figure 6 shows one way the components of a national range program could be integrated within the administrative structure.

The scope of work phase proposes to assist the GOJ develop work plans for four regional projects that have a large component of rangeland development. In this phase plans should be made for soliciting donor financing and developing Jordanean staff who can plan the future project needs with a minimum of short-term "emergency" assistance from international consultants. To train Jordanean staff, the organizational, staffing, and short- and long-term training needs of a regional planning institution must be determined.

#### Regionalization

Currently the GOJ is in the process of establishing regional boundaries for subdividing the land mass into regional development units. After the initial division has been established, a preliminary assessment should be made of the most urgent needs considering the range and resources available and then set the priorities for the projects planned in the four regions. As projects are implemented, there may be a need for boundary changes or subdivision through either aggregation or redistribution of the areas involved.

Consideration of donor interests and donor financial capabilities is of first priority during initial regionalization assessments so as to attract maximum donor support.

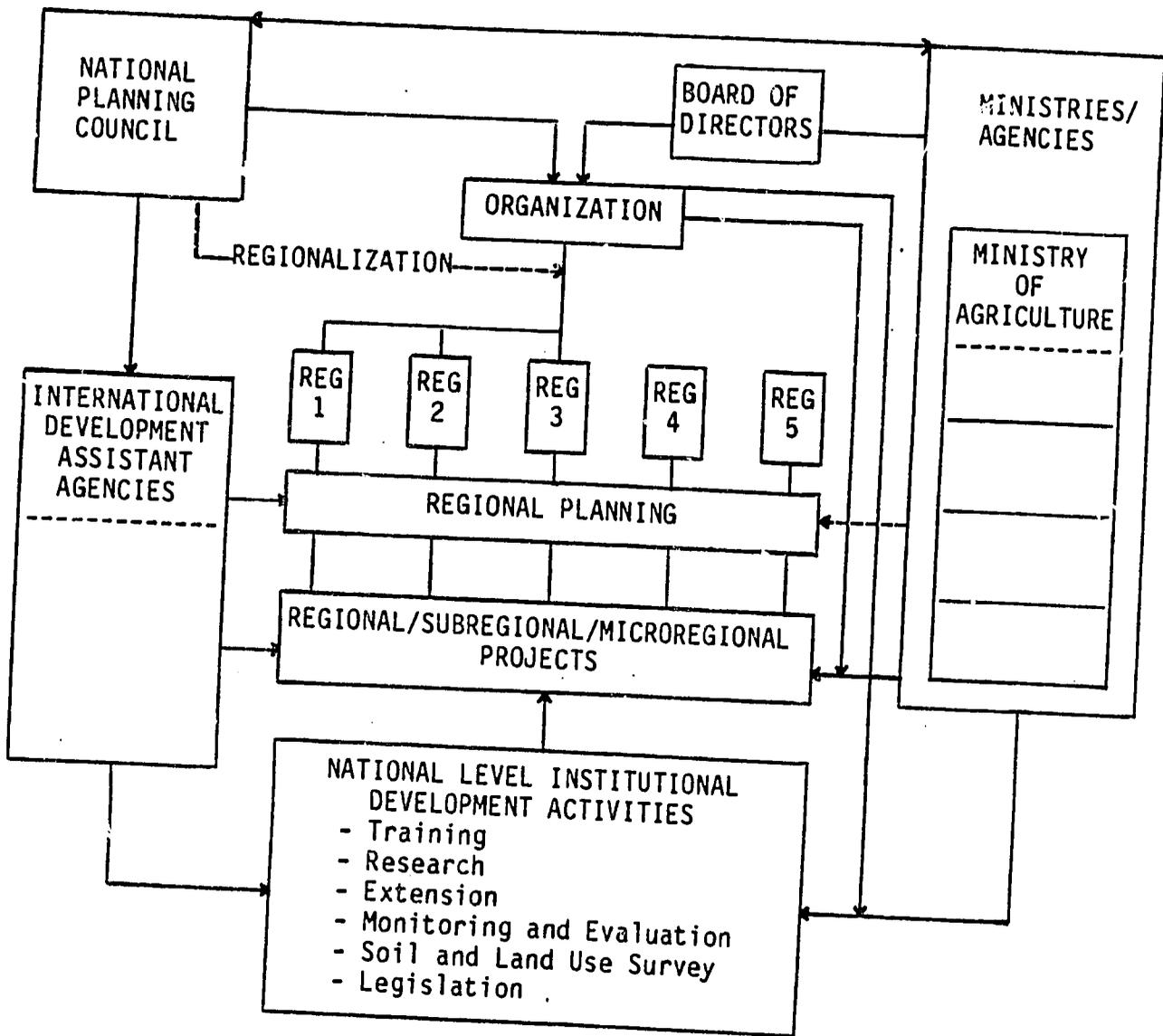


FIGURE 6. RELATIONSHIP BETWEEN THE COMPONENTS OF THE PROPOSED NATIONAL RANGE PROGRAM

## Legislation

The current legal basis for the use of rangelands, water, and grazing rights stems from Ottoman and Islamic law, which has been modified by specific legislative acts by the GOJ. In order to implement improvements in and proper management of rangelands, various modifications in legislation will be required to permit the needed enforcement. In addition, inheritance traditions have prevented the sound management of the land resources by accelerating the fragmentation of land ownership. New legislation is needed to discourage further fragmentation and to encourage reaggregation of land so that equity to present land owners is ensured.

## Development Plan

A package of three types of projects has been proposed that forms a program for the development of the rangelands of Jordan. A twelve-month period is suggested to complete detailed scopes of work for the four integrated regional development planning projects, to review the related project activities, and to prepare implementation plans for the support service projects. Figure 7 outlines the costs, timing, and products expected from this overall development program. Figure 7 also diagrammatically shows how the integrated regional development plan leads to project implementation using the Wadi-Mujib project as an example.

Using this approach, the detailed scope of work for the Wadi-Mujib project would be available for submission to a donor 2 months after project initiation. The other projects and scopes of work, including the support services projects, would be ready within the first twelve-month period for submission to a donor for implementation or ready for the integrated regional development planning phase.

To prepare for the implementation of projects, the integrated regional planning phase for each of the four regional development areas should 1) involve donors likely to be involved in the project implementation

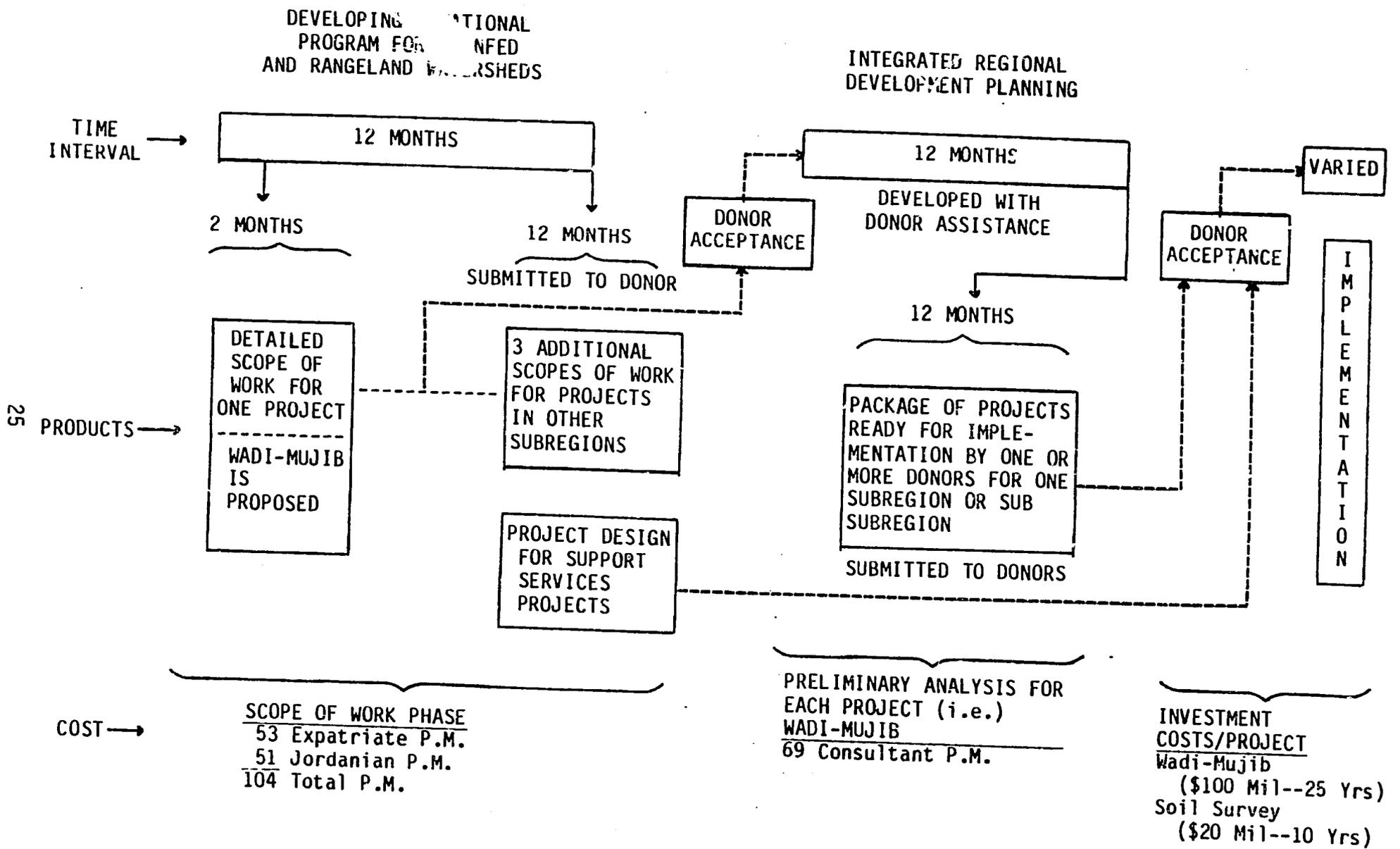


FIGURE 7. TIME INTERVAL, PRODUCTS, AND COSTS

phase; 2) last about 12 months; and 3) require approximately \$1 million to prepare.

This paper outlines the anticipated budget and manpower requirements for only one of the four regional projects -- the Wadi-Mujib. These items have been included to illustrate the level of effort required to prepare the total plan for integrating these rangeland areas. Detailed staffing and budget requirements for each of the development projects will be prepared during the scope of work phase.

The team that completed the first twelve-month work phase could feasibly complete this second IRDP phase with input from selected consultants. The expected output from the second phase would be a set of project plans ready for implementation within the specified geographical area. The projects together form a rangeland integrated regional development program for that area. These projects should be divided according to donor interests and level of funding needed. It is estimated that a typical project funding cycle will require at least 28 months from the beginning of the scope of work phase until project implementation can begin.

#### Scope of Work Summary

An interdisciplinary team will be needed to design the integrated project desired by the GOJ for implementation. Tables 3 and 4 show the projected staffing analysis for each project component and the person months required (by specialty) for the scope of work phase using the integrated regional development plan for the Wadi Mujib as an example. The four-month interim period between these two phases was inserted to allow adequate time for obtaining donor support and involvement for the IRDP phase that follows. Although the requirements for the Wadi Mujib will likely be different from each of the other three areas considered, the approach will be similar.

TABLE 3. PERSON MONTHS REQUIRED TO COMPLETE THE SCOPE OF WORK PHASE AND ONE IRDP PHASE

Specialist	Scope of work phase												Interim period				IRDP phase												
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
Coordinator	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Range/watershed	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Reg./urban planning	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Forester	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Sociologist	1	1	1	1	1	1	1	1	1	1	1	1						1	1						1				
Ag. Engineer	1	1	1	1	1	1	1	1	1	1	1	1						1	1	1					1				
Economist	1	1	1	1	1	1	1	1	1	1	1	1						1	1	1					1				
Training Specialist					1	1												1	1	1	1				1	1			
Range Management Educator					1	1																							
Range Extensionist			1																										
Communication Specialist							1																		1	1			
Lawyer					1																								
Inter. Lawyer					1																								
Systems Scientist			1	1		1																							
Org. Planner				1														1	1										
Animal Scientist											1																		
Wildlife Biologist											1											1	1						
Hydrologist											1							1	1						1				
Soils Specialist											1							1	1						1	1			
Geologist								1										1	1	1									
Ground H <sub>2</sub> O Hydrologist											1							1	1						1				
Watershed Scientist			1								1							1	1						1				
Water Resource Use Specialist																							1	1					
Land Use Specialist																							1	1					
Civil Engineer									1										1	1									
Transportation Specialist								1																					
																								1	1				
	7	7	10	9	11	11	8	9	7	11	7	7	3	3	3	3	3	13	14	8	4	3	6	9	11	6	3	3	
Total PM in 1st Phase	104												12				199												
Total PM Interim	12																												
Total PM Preliminary	83																												
Grand Total	187												12				199												

27

TABLE 4. Staffing Analysis for the Scope of Work and IRDP Phases

DISCIPLINE	Scope of Work Phase												Interim Period				IRDP Phase													
	MONTHS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
Range/Watershed Specialist	P-1	F-1	P-1 T-2	F-5	T-1	F-6	F-4	T-5 F-7	F-2	F-3	P 2-4 P 2-4		T-1	T-1	T-1	T-1	T-1	F-1	F-1	F-1	F-1	P-1	F-1							
Regional/Urban Planner	F-1	F-1	F-1 T-2	F-5	T-1	F-6	F-4	T-5 P-7	F-2	F-3	P 2-4 P 2-4		T-1	T-1	T-1	T-1	T-1	T-1	F-1											
Forester	F-1	F-1	P-1 T-2	P-5	T-1	F-6	F-4	T-5 F-7	P-2	F-3	P 2-4 P 2-4								F-1	F-1										
Sociologist	F-1	F-1	P-1 T-2	P-5	T-1	F-6	F-4	T-5 F-7	F-2	F-3	P 2-4 P 2-4																			
Agriculture Engineer	F-1	F-1	P-1 T-2	P-5	T-1	F-6	F-4	T-5 P-7	F-2	F-3	P 2-4 P 2-4								F-1	F-1	F-1									
Economist	F-1	F-1	P-1 T-2	P-5	T-1	F-6	F-4	T-5 P-7	P-2	F-3	P 2-4 P 2-4								F-1	F-1	F-1									
Training Specialist						T-1	T-3																							
Range Management Educator						T-1	T-3																							
Range Extensionist			T-2																											
Communications Specialist							T-3																							
Lawyer						O-4																								
International Lawyer						O-4																								
Systems Scientist			T-2		O-3		F-3			T-2																				
Organizational Planner					O-3														F-1	F-1										
Animal Scientist																														
Wildlife Biologist																														
Hydrologist																														
Soils Specialist																			P-1	P-1										
Geologist										T-5									F-1	F-1										
Ground Water Hydrologist																														
Watershed Scientist																														
Water Resource Use Specialist			T-2																											
Land Use Specialist																														
Civil Engineer																														
Transportation Specialist																														

The team preparing the scopes of work will be composed of a combination of expatriate and Jordanian experts. It is suggested that six full-time experts (2 expatriates) and an overall coordinator form the principal team assigned to complete the 12-month scope of work phase. Consultants will supplement this team where required. A total of 119 person months will be required during the 12-month scope of work phase. The projected budget (table 5) includes 55 person months of expatriate professional time and 64 person months of Jordanian professional time. The total budget indicates that approximately \$1 million will be required to complete this phase, not including the 64 person months of Jordanian time contracted by the GOJ.

Appendix I contains the project profiles for each of the components described in the budget and includes the terms of reference for consultants assigned to this task.

TABLE 5. Budget Analysis for the Scope of Work Phase of a Rangeland Development Project for Jordan

	Project Admin.	Wadi Mujib P-1	Azrak P-2	Balqa Salt F-3	Jarr Basin P-4	Kanbe Mgt. F-5	Range Rev. P-6	Wstern Harvest P-7	Projects Sub tot	Train. I-1	Research & Ext. I-2	Work. Center I-3	Monitor & Eval. I-4	Soil Survey I-5	Support Sub tot	Regional-ization O-1	Organ. Kestruc. O-2	Regional Planning O-3	Legis-lation O-4	Immediate Need Sub tot	GRAND TOTAL	
<b>PERSONNEL</b>																						
EXPATRIATE @ 7300/PM	FN	12	5	4	4	4	2	2	2	23	4	2	4	4	2	16			2	2	4	55
		87600	36500	29200	29200	29200	14600	14600	14600	167500	29200	14600	29200	29200	14600	116800			14600	14600	29200	401500
NATIONAL Government of Jordan Contribution	PM	12	10	6	6	6	4	4	4	40	2	2	2	4	12							
SUBTOTAL	FN	24	15	10	10	10	6	6	6	63	6	4	6	6	28	0	0	2	2	4	119	
OVERHEAD (50% of salaries)		43800	18250	14600	14600	14600	7300	7300	7300	81950	14600	7300	14600	14600	7300	58400	0	0	7300	7300	14600	200750
<b>DIRECT COSTS</b>																						
TRAVEL (intl)		12000	3429	3429	3429	3429	3429	3429	3429	24000	3000	4500	4500	6000	3000	21000						
TRAVEL (local)		10000	4286	4286	4286	4286	4286	4286	4286	30000												
PER DIEM		9000	2571	2571	2571	2571	2571	2571	2571	18000												
RELLOCATION (3 IND)		30000	8571	8571	8571	8571	8571	8571	8571	60000	6000	9000	9000	12000	6000	42000			3600	3600	6000	87000
OFFICE SUPPORT		100000	0	0	0	0	0	0	0	60000												
MISCELLANEOUS		50000	4286	4286	4286	4286	4286	4286	4286	30000	5000	5000	3000	7000	5000	25000						
TOTAL		342400	77893	66943	66943	66943	45043	45043	45043	413650	57800	40400	60300	62800	35900	263200	0	0	35900	35900	71600	1691250

NOTE: Direct costs for projects P-1 to P-7 have been spread equally over all projects.

**SCOPE OF WORK  
APPENDIX I**

## COMPONENT PROFILE #P-1

### A. PROJECT TITLE:

Integrated Regional Prefeasibility Development Planning of the Wadi Mujib Area.

### B. OBJECTIVES:

The objectives of this planning study are oriented toward reaching five of the 17 general objectives listed in the 1981-1985 five-year plan for Economic and Social Development.

1. To reduce disparities among the various regions in the Kingdom and achieve a more balanced distribution of population.
2. To increase popular participation and widen the base of decisionmaking in the development process.
3. To increase agricultural output with a view to achieving an acceptable level of national food security within the general framework of Arab food security.
4. To develop available and potential water resources and ensure their optimal utilization in a manner to meet the requirements of the socioeconomic development.
5. To improve the peoples living environment, fight soil, water, and air pollution, protect the natural environment and curb the depletion of natural resources.

Also, according to the 1981-1985 five-year plan, the strategy for reaching these objectives is to:

- A. Adopt regional planning as a framework for determining the basic needs of the citizens in various regions.
- B. Develop agriculture within the framework of integrated rural development.
- C. Intensify efforts in irrigated and rainfed farming.
- D. Give due attention to livestock, introducing programs for its development, and integrating animal husbandry with crop production.
- E. Make concerted efforts to tap potential underground water.
- F. Integrate planning for agricultural development through comprehensive planning at the regional level.
- G. Restrain rangeland deterioration.
- H. Develop its productive capacity.

This component of the National Rainfed and Rangeland Watershed Program will help achieve the above objectives through application of accepted strategies. In addition, the program looks toward reinforcing Jordan's institutional capabilities in research and extension in range and rainfed areas. Since one of the major experiment stations is to be planned in the area, a program of adoption research should be developed.

**C. JUSTIFICATION:**

To a very large degree, the problems of Jordan have their roots in its citizens efforts to improve their quality of life. Pressures placed upon the land and water resources to produce more food and fiber, fuel and building material; and, increasing population and living standards have placed the condition of these resources on a downward trend that is extremely difficult to reverse. Further, these efforts have unfortunately been overly sectorial in their planning and execution creating any number of conflicts that, again, take their toll on the land's capability to produce. One model designed to minimize such unwanted characteristics--and maximize the complementarity--of development is integrated regional planning. But, this only works if the strategy and projects are implemented; and this takes determination, will, and sacrifice as well as financing, coordination and good administration. This study is designed to provide administrative and technical training in integrated planning, project formulation, and evaluation as well as to provide a strategy and investment projects.

This component is to serve as the preliminary mission in the integrated development planning process. Its purpose is to design the next phase to consist of some 83 person months of activity over a period of 12 months. It will be undertaken as one of the first efforts of the Technical Mission that will design a detailed Range and Watershed Program for Jordan.

**D. COMPONENT SUBJECT AREA: Regional Development**

**E. SPECIALISTS:**

#	Specialty	Expat. PM	Nat. PM
1	Range	2.5	
1	Watershed Specialist	2.5	
1	Forester		2.5
1	Sociologist		2.5
1	Agricultural Engineer		2.5
1	Economist		2.5

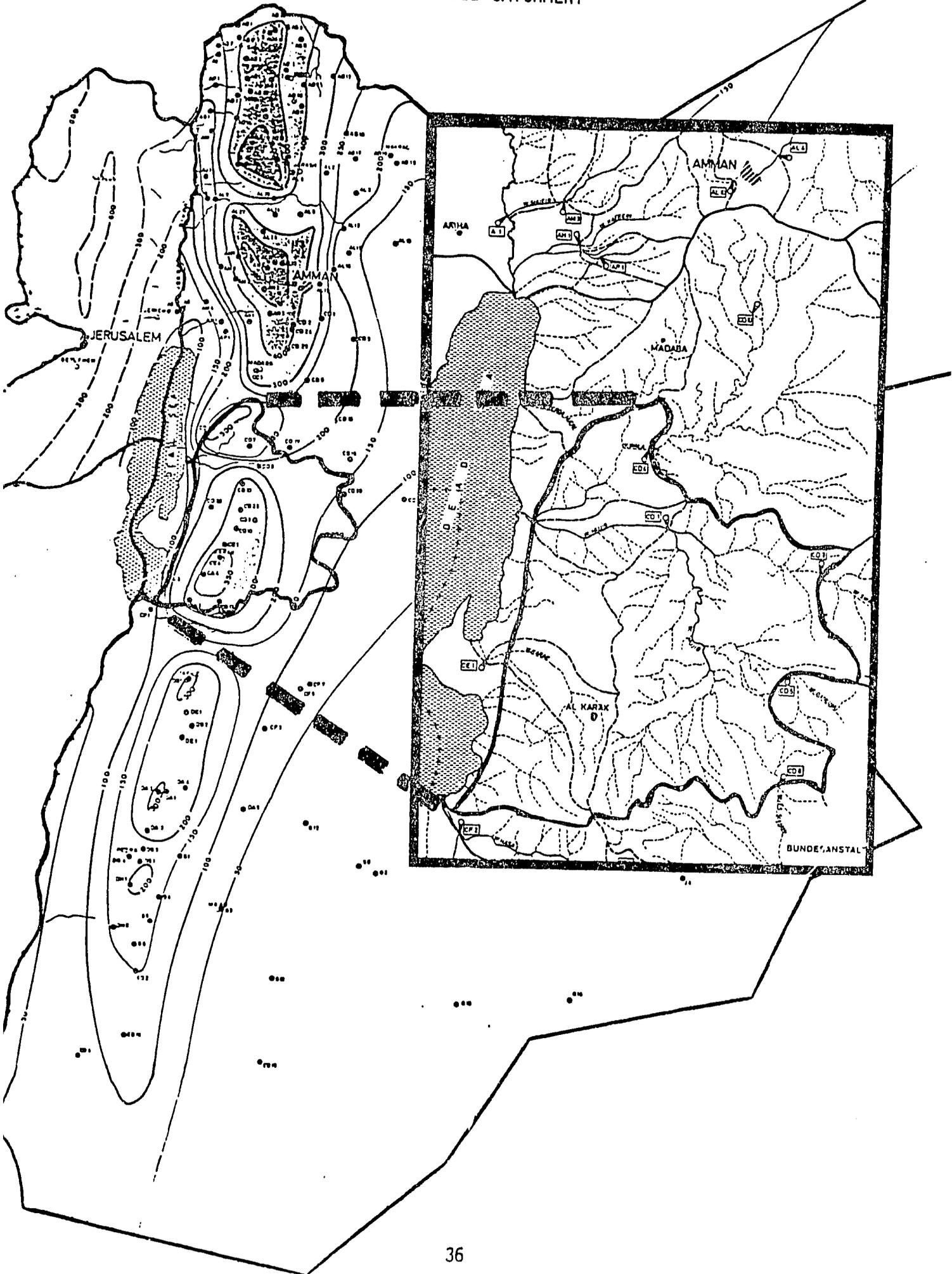
**F. TERMS OF REFERENCE:**

(This Component is to be the responsibility of the "Base Team" developing the Range and Watershed Program; no additional consultants will be required. They will act as the Preliminary Mission for a full blown integrated regional development planning study for the Wadi Mujib Region (map 1), covering approximately 2,563 K<sub>2</sub> of both plateau and desert and includes six major catchments of which the Wadi Mujib is by far the largest (1,550 K<sub>2</sub>). The population of the area is approximately 75,000).

The product of this team's work would be a report containing:

- A. A quick prediagnosis of the region's nature, problems, and potential.
- B. A definition of the expected final product for the regional development plan.
- C. A work plan containing the contributions of the contractor who will undertake the study and of the Government.

WADI MUJIB CATCHMENT



D. A draft version of the Technical Cooperation document.

The report should give sufficient detail and orientation to the planning effort that follows so that it will undertake the activities and arrive at the products given below.

#### Phase I Development Diagnosis

##### Activities

- o Diagnosis of the Region
  - Sectoral analysis; emphasis should be on those sectorial activities of whatever kind that are affecting range condition and trend.
  - Spatial analysis, especially relationships between livestock immigration between rainfed and desert areas and relationships between agricultural range management.
  - Institutional analysis, any institution affecting range condition and not just those who work with it.
  - Natural resource analysis. All natural goods and services and this relationships.
  - Synthesis: needs, problems, potentials, and constraints.
- o Relation to national plans, strategies, and priorities.
- o Development strategies:
  - Formulation and analysis of alternatives.
  - Identification of project ideas.

##### Product:

- o Interim Report (Phase I Report)
  - Diagnosis of the region
  - Preliminary development strategy
  - Identified projects

#### Phase II. Project Formulation and Preparation of Action Plan

##### Activities:

- o Project formulation (profile or prefeasibility) and evaluation.

- Production sectors (agriculture, forestry, range, agro industry).
- Support services (marketing, credit, research, extension).
- Natural resources management.
- In addition, social development (housing, education, labor training, health); infrastructure (energy, transportation, communications); and urban services should be looked at but not designed.
- o Action plan preparation:
  - Formulation of packages of projects
  - Policies for priority areas and sectors
  - Enabling and incentive actions
  - Investment timetable
  - Evaluation of funding sources
  - Institutional development and training
  - Promotion

Product:

- o Final Report
  - Development strategy
  - Action plan
  - Formulated projects
  - Supporting actions

**G. PACKAGE WITH COMPONENTS:** 0-1, 2, 3, 4; S-1, 2, 3, 4, 5

**H. APPROXIMATE COST OF PROJECT:**

Salaries (Expat.)	\$36,500
Salaries (Nat.)	\$
Overhead	\$18,250
Travel (Inter.)	\$ 3,429
Travel (Local)	\$ 4,286
Miscellaneous	<u>\$15,428</u>
TOTAL	\$77,893

(Note: Budget does not include project administration and office support)

I. ESTIMATE OF FUTURE INVESTMENT: \$100,000,000 plus over 25 years

## COMPONENT PROFILE #P-2

### A. PROJECT TITLE:

Integrated Regional Prefeasibility Development Planning of the Azrak-Duleil catchment.

### B. OBJECTIVES:

The objectives of this planning study are oriented toward reaching five of the 17 general objectives listed in the 1981-1985 five-year plan for Economic and Social Development.

1. To reduce disparities among the various regions in the Kingdom and achieve a more balanced distribution of population.
2. To increase popular participation and widen the base of decisionmaking in the development process.
3. To increase agricultural output with a view to achieving an acceptable level of national food security within the general framework of Arab food security.
4. To develop available and potential water resources and ensure their optimal utilization in a manner to meet the requirements of the socioeconomic development.
5. To improve the peoples living environment, fight soil, water, and air pollution, protect the natural environment and curb the depletion of natural resources.

Also, according to the 1981-1985 five-year plan, the strategy for reaching these objectives is to:

- A. Adopt regional planning as a framework for determining the basic needs of the citizens in various regions.
- B. Develop agriculture within the framework of integrated rural development.
- C. Intensify efforts in irrigated and rainfed farming.
- D. Give due attention to livestock, introducing programs for its development, and integrating animal husbandry with crop production.
- E. Make concerted efforts to tap potential underground water.
- F. Integrate planning for agricultural development through comprehensive planning at the regional level.
- G. Restrain rangeland deterioration.
- H. Develop its productive capacity.

This component of the National Rainfed and Rangeland Watershed Program will help achieve the above objectives through application of accepted strategies. In addition, the program looks toward reinforcing Jordan's institutional capabilities in research and extension in range and rainfed areas. Since some of the range stations are in the area, a program of adoption research should be developed.

### C. JUSTIFICATION:

The total area of this catchment is about 18 thousand km<sup>2</sup> and it consists of Wadi-Duleil catchment (240 thousand ha) and part of Azraq catchment. The semi-detailed study on Wadi-Duleil is expected to be submitted from the Gorman team in September this year which will cover the surface and ground water conditions, climate and rainfall, erosion, soil, range and other socioeconomic aspects, for the rest of Azraq catchment different information is available about the area, but it has not been studied as a unit yet.

Within the area there are three range stations: Sabha, Surra, and Khanasri, and one wildlife station in Sharumari near Azraq. The ground water in the area is heavily utilized by the farmer and it is mentioned in most studies that the pumping of water is more than the recharging where this problem is started clean these day.

The project area suggested will cover Wadi-Duleil catchment (240 thousand ha) and the northern part of Azraq catchment, (about 150 thousand ha) with total of 600 thousand ha.

To a very large degree, the problems of Jordan have their roots in its citizens efforts to improve their quality of life. Pressures placed upon the land and water resources to produce more food and fiber, fuel and building material; and, increasing population and living standards have placed the condition of these resources on a downward trend that is extremely difficult to reverse. Further, these efforts have unfortunately been overly sectorial in their planning and execution creating any number of conflicts that, again, take their toll on the land's capability to produce. One model designed to minimize such unwanted characteristics--and maximize the complementarity--of development is integrated regional planning. But, this only works if the strategy and projects are implemented; and this takes determination, will, and sacrifice as

well as financing, coordination and good administration. This study is designed to provide administrative and technical training in integrated planning, project formulation, and evaluation as well as to provide a strategy and investment projects.

**D. COMPONENT SUBJECT AREA: Regional Development**

**E. SPECIALISTS:**

#	Specialty	Expat. PM	Nat. PM
1	Range	2.0	
1	Watershed Specialist	2.0	
1	Sociologist		
1	Agricultural Engineer		2.0
1	Economist		2.0
			2.0

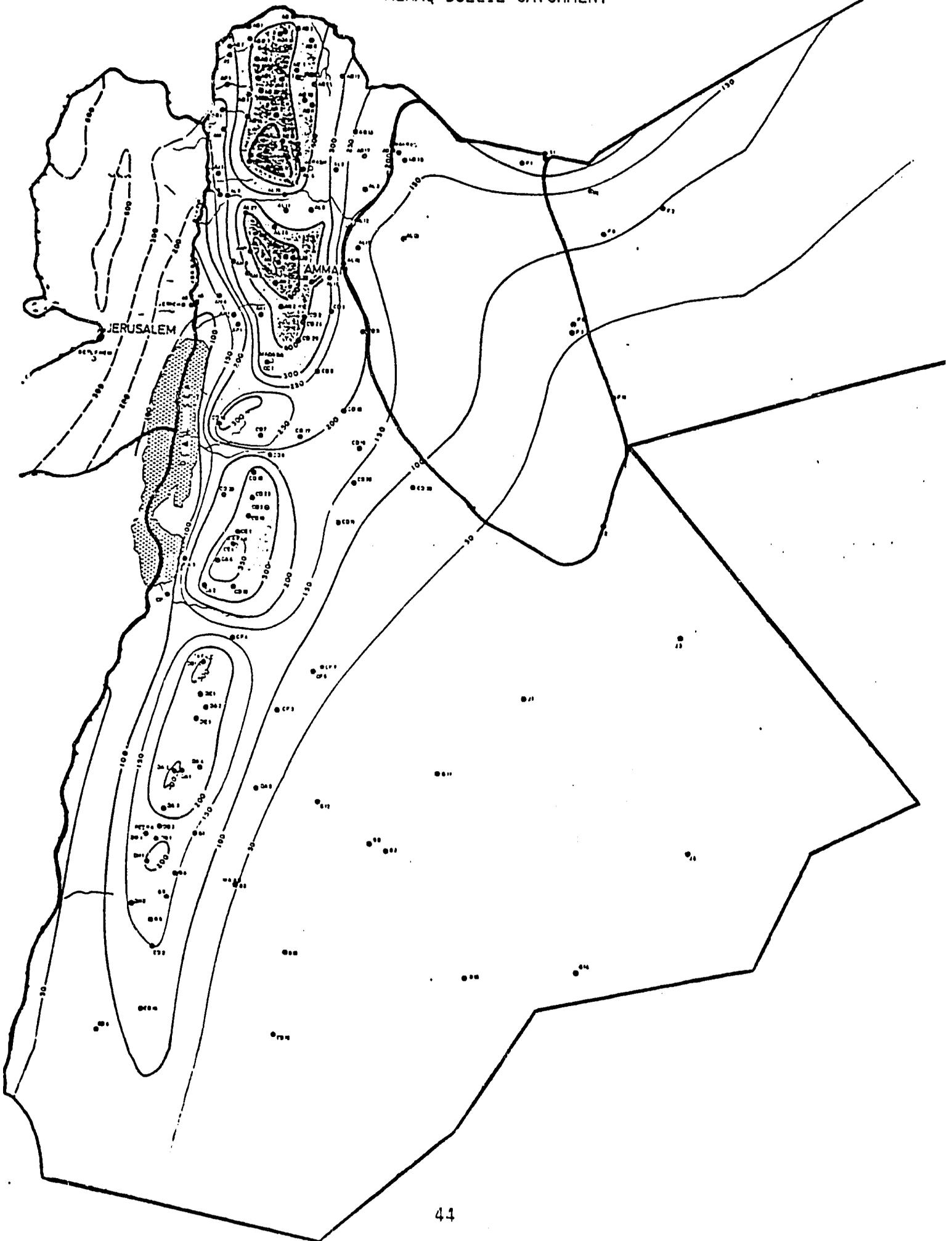
**F. TERMS OF REFERENCE:**

This Component is to be the responsibility of the "Base Team" developing the Range and Watershed Program; no additional consultants will be required. They will act as the Preliminary Mission for a full blown integrated regional development planning study for the Azraq-Dulcil catchment project (map 1), covering approximately 240 thousand ha of mostly desert. The population of the area is approximately \_\_\_\_\_.

The product of this team's work would be a report containing:

- A. A quick prediagnosis of the region's nature, problems, and potential.
- B. A definition of the expected final product for the regional development plan.
- C. A work plan containing the contributions of the contractor who will undertake the study and of the Government.

AZRAQ-DULEIL CATCHMENT



D. A draft version of the Technical Cooperation document.

The report should give sufficient detail and orientation to the planning effort that follows so that it will undertake the activities and arrive at the products given below.

#### Phase I Development Diagnosis

##### Activities:

- o Diagnosis of the Region
  - Sectoral analysis; emphasis should be on those sectorial activities of whatever kind that are affecting range condition and trend.
  - Spatial analysis, especially relationships between livestock immigration between rainfed and desert areas and relationships between agricultural range management.
  - Institutional analysis, any institution affecting range condition and not just those who work with it.
  - Natural resource analysis. All natural goods and services and this relationships.
  - Synthesis: needs, problems, potentials, and constraints.
- o Relation to national plans, strategies, and priorities.
- o Development strategies:
  - Formulation and analysis of alternatives.
  - Identification of project ideas.

##### Product:

- o Interim Report (Phase I Report)
  - Diagnosis of the region
  - Preliminary development strategy
  - Identified projects

#### Phase II. Project Formulation and Preparation of Action Plan

##### Activities:

- o Project formulation (profile or prefeasibility) and evaluation.

- Production sectors (agriculture, forestry, range, agro-industry).
  - Support services (marketing, credit, research, extension).
  - Natural resources management.
  - In addition, social development (housing, education, labor training, health); infrastructure (energy, transportation, communications); and urban services should be looked at but not designed.
- o Action plan preparation:
- Formulation of packages of projects
  - Policies for priority areas and sectors
  - Enabling and incentive actions
  - Investment timetable
  - Evaluation of funding sources
  - Institutional development and training
  - Promotion

Product:

- o Final Report
- Development strategy
  - Action plan
  - Formulated projects
  - Supporting actions

**G. PACKAGE WITH COMPONENTS:** 0-1, 2, 3, 4; S-1, 2, 3, 4, 5

**H. APPROXIMATE COST OF PROJECT:**

Salaries (Expat.)	\$29,200
Salaries (Nat.)	\$
Overhead	\$14,600
Travel (Inter.)	\$ 3,429
Travel (Local)	\$ 4,286
Miscellaneous	<u>\$15,428</u>
TOTAL	\$66,943

(Note: Budget does not include project administration and office support)

I. ESTIMATE OF FUTURE INVESTMENT: \$100,000,000 plus over 25 years

## COMPONENT PROFILE #P-3

### A. PROJECT TITLE:

Integrated Regional Prefeasibility Development. Planning of the Balqa-Salt Area.

### B. OBJECTIVES:

The objectives of this planning study are oriented toward reaching five of the 17 general objectives listed in the 1981-1985 five-year plan for Economic and Social Development.

1. To reduce disparities among the various regions in the Kingdom and achieve a more balanced distribution of population.
2. To increase popular participation and widen the base of decisionmaking in the development process.
3. To increase agricultural output with a view to achieving an acceptable level of national food security within the general framework of Arab food security.
4. To develop available and potential water resources and ensure their optimal utilization in a manner to meet the requirements of the socioeconomic development.
5. To improve the peoples living environment, fight soil, water, and air pollution, protect the natural environment and curb the depletion of natural resources.

Also, according to the 1981-1985 five-year plan, the strategy for reaching these objectives is to:

- A. Adopt regional planning as a framework for determining the basic needs of the citizens in various regions.
- B. Develop agriculture within the framework of integrated rural development.
- C. Intensify efforts in irrigated and rainfed farming.
- D. Give due attention to livestock, introducing programs for its development, and integrating animal husbandry with crop production.
- E. Make concerted efforts to tap potential underground water.
- F. Integrate planning for agricultural development through comprehensive planning at the regional level.
- G. Restrain rangeland deterioration.
- H. Develop its productive capacity.

This component of the National Rainfed and Rangeland Watershed Program will help achieve the above objectives through application of accepted strategies. In addition, the program looks toward reinforcing Jordan's institutional capabilities in research and extension in range and rainfed areas. Since another major development program (Zarqa) is ongoing in the area, close coordination should be developed.

### C. JUSTIFICATION:

The total area at Balqa Governate is about one million ha, of which some 30,000 ha within the Jordan Valley and 15,000 ha in lower Zarqa catchment (LZC).

More than 80% of the area is hilly land with a slope more than 8%. The area that is in fruit trees (mainly olives and grapes), field crops, and forest trees is about 12,000 ha, 10,00 ha, and 6,000 ha, respectively.

Balqa governate was the main beneficiary of the highlands development project (WFP). The main activity was soil conservation measures, fruit tree planting, and, to a less extent, forest tree planting.

To a very large degree, the problems of Jordan have their roots in its citizens efforts to improve their quality of life. Pressures placed upon the land and water resources to produce more food and fiber, fuel and building material; and, increasing population and living standards have placed the condition of these resources on a downward trend that is extremely difficult to reverse. Further, these efforts have unfortunately been overly sectorial in their planning and execution creating any number of conflicts that, again, take their toll on the land's capability to produce. One model designed to minimize such unwanted characteristics--and maximize the complementarity--of development is integrated regional planning. But, this only works if the strategy and projects are implemented; and this takes determination, will, and sacrifice as well as financing, coordination and good administration. This study is designed to provide administrative and technical training in integrated planning, project formulation, and evaluation as well as to provide a strategy and investment projects.

Due to the topography of the area, fruit tree plants and forest trees (that could be used as fodder reserve) are the main components of any future project. Ten- to fifteen-thousand hectares outside the LZC could be developed in line from Zarga and highland development project activities.

**D. COMPONENT SUBJECT AREA: Regional Development**

**E. SPECIALISTS:**

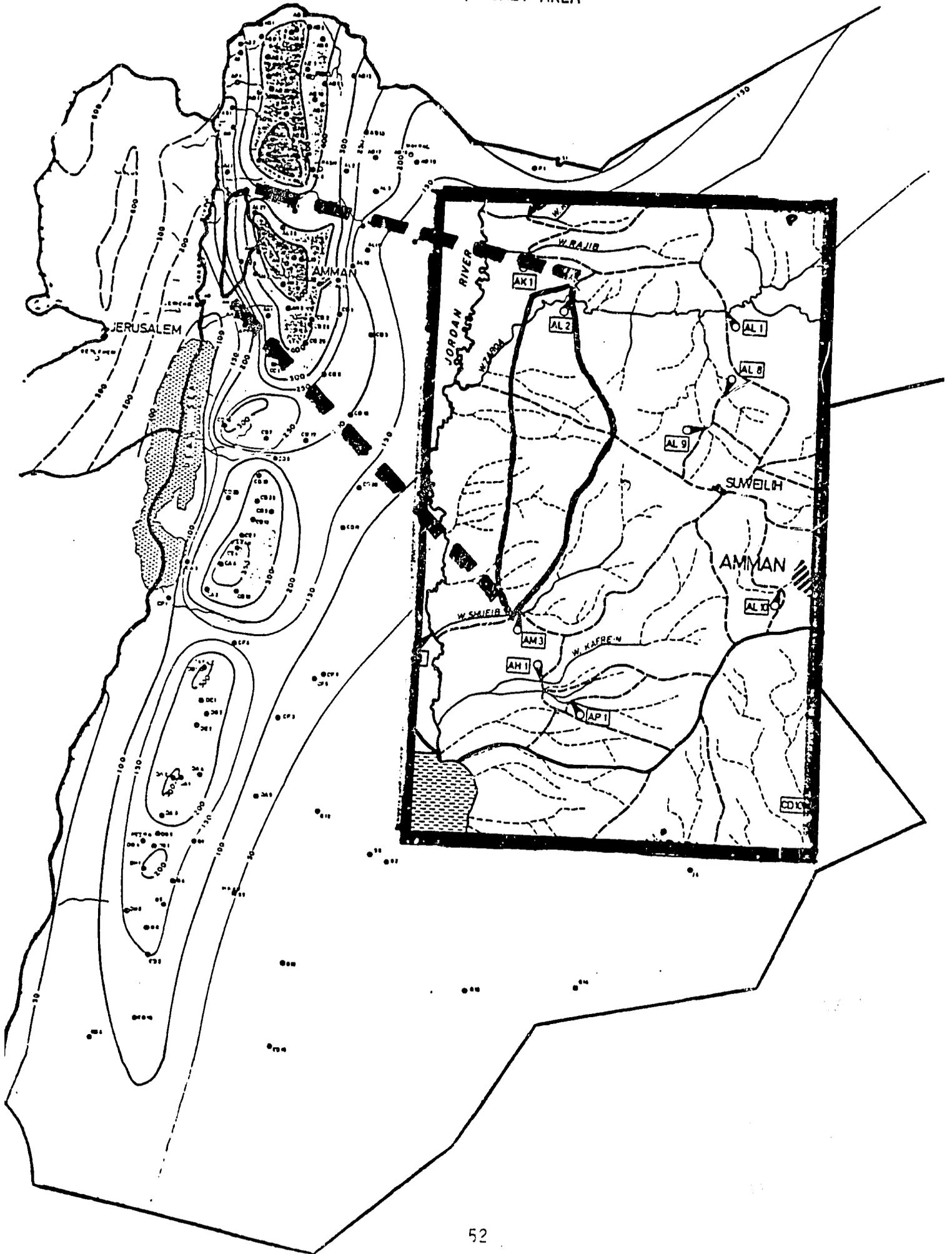
#	Specialty	Expat. PM	Nat. PM
1	Range	2.0	
1	Watershed Specialist	2.0	
1	Forester		1.5
1	Sociologist		1.5
1	Economist		1.5

**F. TERMS OF REFERENCE:**

(This Component is to be the responsibility of the "Base Team" developing the Range and Watershed Program; no additional consultants will be required. They will act as the Preliminary Mission for a full blown integrated regional development planning study for the Balqa-salt Region (map 1), covering approximately 1 million ha of the lower Zarqa catchment. The population of the area is approximately 15.4 million.

The product of this team's work would be a report containing:

BALQA-SALT AREA



- A. A quick prediagnosis of the region's nature, problems, and potential.
- B. A definition of the expected final product for the regional development plan.
- C. A work plan containing the contributions of the contractor who will undertake the study and of the Government.
- D. A draft version of the Technical Cooperation document.

The report should give sufficient detail and orientation to the planning effort that follows so that it will undertake the activities and arrive at the products given below.

#### Phase I Development Diagnosis

##### Activities:

- o Diagnosis of the Region
  - Sectoral analysis; emphasis should be on those sectorial activities of whatever kind that are affecting range condition and trend.
  - Spatial analysis, especially relationships between livestock immigration between rainfed and desert areas and relationships between agricultural range management.
  - Institutional analysis, any institution affecting range condition and not just those who work with it.
  - Natural resource analysis. All natural goods and services and this relationships.
  - Synthesis: needs, problems, potentials, and constraints.
- o Relation to national plans, strategies, and priorities.
- o Development strategies:
  - Formulation and analysis of alternatives.
  - Identification of project ideas.

Product:

- o Interim Report (Phase I Report)
  - Diagnosis of the region
  - Preliminary development strategy
  - Identified projects

Phase II. Project Formulation and Preparation of Action Plan

Activities:

- o Project formulation (profile or prefeasibility) and evaluation.
  - Production sectors (agriculture, forestry, range, agro-industry).
  - Support services (marketing, credit, research, extension).
  - Natural resources management.
  - In addition, social development (housing, education, labor training, health); infrastructure (energy, transportation, communications); and urban services should be looked at but not designed.
- o Action plan preparation:
  - Formulation of packages of projects
  - Policies for priority areas and sectors
  - Enabling and incentive actions
  - Investment timetable
  - Evaluation of funding sources
  - Institutional development and training
  - Promotion

Product:

- o Final Report
  - Development strategy
  - Action plan
  - Formulated projects
  - Supporting actions

G. PACKAGE WITH COMPONENTS: 0-1, 2, 3, 4; S-1, 2, 3, 4, 5

H. APPROXIMATE COST OF PROJECT:

Salaries (Expat.)	\$29,200
Salaries (Nat.)	\$
Overhead	\$14,600
Travel (Inter.)	\$ 3,429
Travel (Local)	\$ 4,286
Miscellaneous	<u>\$15,428</u>
TOTAL	\$66,943

(Note: Budget does not include project administration and office support)

I. ESTIMATE OF FUTURE INVESTMENT: \$100,000,000 plus over 25 years

## COMPONENT PROFILE #P-4

### A. PROJECT TITLE:

Integrated Regional Prefeasibility Development Planning of the Jafr Basin.

### B. OBJECTIVES:

The objectives of this planning study are oriented toward reaching five of the 17 general objectives listed in the 1981-1985 five-year plan for Economic and Social Development.

1. To reduce disparities among the various regions in the Kingdom and achieve a more balanced distribution of population.
2. To increase popular participation and widen the base of decisionmaking in the development process.
3. To increase agricultural output with a view to achieving an acceptable level of national food security within the general framework of Arab food security.
4. To develop available and potential water resources and ensure their optimal utilization in a manner to meet the requirements of the socioeconomic development.
5. To improve the peoples living environment, fight soil, water, and air pollution, protect the natural environment and curb the depletion of natural resources.

Also, according to the 1981-1985 five-year plan, the strategy for reaching these objectives is to:

- A. Adopt regional planning as a framework for determining the basic needs of the citizens in various regions.
- B. Develop agriculture within the framework of integrated rural development.
- C. Intensify efforts in irrigated and rainfed farming.
- D. Give due attention to livestock, introducing programs for its development, and integrating animal husbandry with crop production.
- E. Make concerted efforts to tap potential underground water.
- F. Integrate planning for agricultural development through comprehensive planning at the regional level.
- G. Restrain rangeland deterioration.
- H. Develop its productive capacity.

Primary emphasis of this component of the National Rainfed and Rangeland Watershed Program will be to explore the potential utilization of achieving the above objective through the utilization of water harvesting technologies and to offer accepted strategies that are appropriate for this dry region. In addition, the program looks toward reinforcing Jordan's institutional capabilities in research and extension in range and rainfed areas.

**C. JUSTIFICATION:**

To a very large degree, the problems of Jordan have their roots in its citizens efforts to improve their quality of life. Pressures placed upon the land and water resources to produce more food and fiber, fuel and building material; and, increasing population and living standards have placed the condition of these resources on a downward trend that is extremely difficult to reverse. Further, these efforts have unfortunately been overly sectorial in their planning and execution creating any number of conflicts that, again, take their toll on the land's capability to produce. One model designed to minimize such unwanted characteristics--and maximize the complementarity--of development is integrated regional planning. But, this only works if the strategy and projects are implemented; and this takes determination, will, and sacrifice as well as financing, coordination and good administration. This study is designed to provide administrative and technical training in integrated planning, project formulation, and evaluation as well as to provide a strategy and investment projects.

Migration to this area due to mineral extraction and its associated activities will continue to put pressure on the natural resource base. A German team identified this region as having significant potential for surface water harvesting and the resulting irrigation of agricultural crops. These activities must be coordinated and the resulting interactions evaluated.

**D. COMPONENT SUBJECT AREA: Regional Development**

**E. SPECIALISTS:**

#	Specialty	Expat. PM	Nat. PM
1	Range	1.5	
1	Watershed Specialist	1.5	
1	Civil engineer		2.0
1	Sociologist		1.5
1	Agricultural Engineer		1.5
1	Economist		1.5

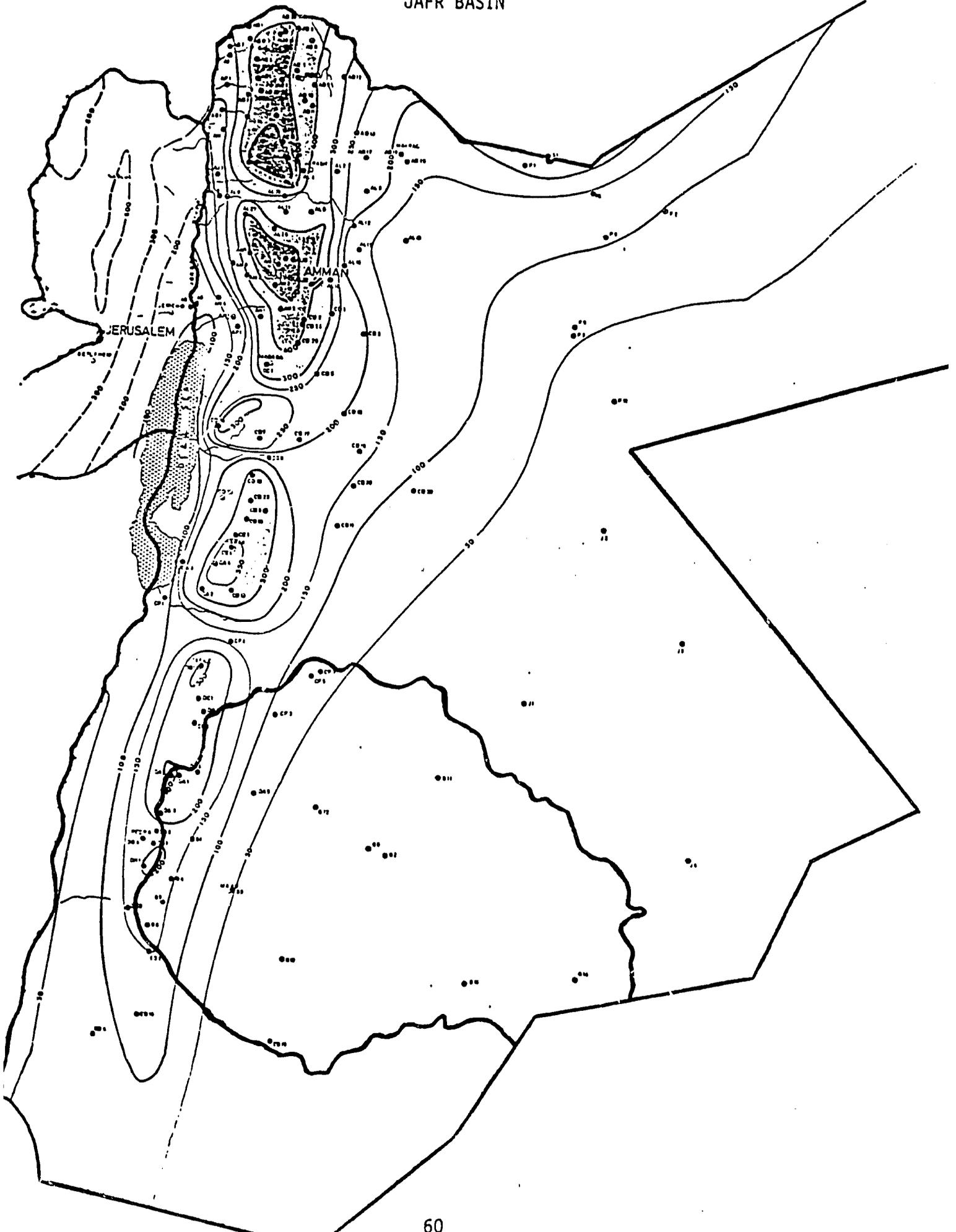
**F. TERMS OF REFERENCE:**

(This Component is to be the responsibility of the "Base Team" developing the Range and Watershed Program; no additional consultants will be required. They will act as the Preliminary Mission for a full blown integrated regional development planning study for the Jafr Basin (map 1), covering approximately 12,000 K<sup>2</sup> of mostly desert. The population of the ara is approximately 22,000.

The product of this team's work would be a report containing:

- A. A quick prediagnosis of the region's nature, problems, and potential.
- B. A definition of the expected final product for the regional development plan.
- C. A work plan containing the contributions of the contractor who will undertake the study and of the Government.

JAFR BASIN



D. A draft version of the Technical Cooperation document.

The report should give sufficient detail and orientation to the planning effort that follows so that it will undertake the activities and arrive at the products given below.

Phase I Development Diagnosis:

Activities:

- o Diagnosis of the Region
  - Sectorial analysis; emphasis should be on those sectoral activities of whatever kind that are affecting range condition and trend.
  - Spatial analysis, especially relationships between livestock immigration between rainfed and desert areas and relationships between agricultural range management.
  - Institutional analysis, any institution affecting range condition and not just those who work with it.
  - Natural resource analysis. All natural goods and services and this relationships.
  - Synthesis: needs, problems, potentials, and constraints.
- o Relation to national plans, strategies, and priorities.
- o Development strategies:
  - Formulation and analysis of alternatives.
  - Identification of project ideas.

Product:

- o Interim Report (Phase I Report)
  - Diagnosis of the region
  - Preliminary development strategy
  - Identified projects

Phase II. Project Formulation and Preparation of Action Plan

Activities:

- o Project formulation (profile or prefeasibility) and evaluation.

- Production sectors (agriculture, forestry, range, agro-industry).
- Support services (marketing, credit, research, extension).
- Natural resources management.
- In addition, social development (housing, education, labor training, health); infrastructure (energy, transportation, communications); and urban services should be looked at but not designed.
- o Action plan preparation:
  - Formulation of packages of projects
  - Policies for priority areas and sectors
  - Enabling and incentive actions
  - Investment timetable
  - Evaluation of funding sources
  - Institutional development and training
  - Promotion

Product:

- o Final Report
  - Development strategy
  - Action plan
  - Formulated projects
  - Supporting actions

G. PACKAGE WITH COMPONENTS: O-1, 2, 3, 4; S-1, 2, 3, 4, 5

H. APPROXIMATE COST OF PROJECT:

Salaries (Expat.)	\$29,200
Salaries (Nat.)	\$
Overhead	\$14,600
Travel (Inter.)	\$ 3,429
Travel (Local)	\$ 4,286
Miscellaneous	<u>\$15,428</u>
TOTAL	\$66,943

(Note: Budget does not include project administration and office support)

I. ESTIMATE OF FUTURE INVESTMENT: \$100,000,000 plus over 25 years

## COMPONENT PROFILE #P-5

### A. PROJECT TITLE:

Survey of Potential for Improved Range Management Practices in the Desert Area Including Pilot Study.

### B. OBJECTIVES:

To conduct a survey throughout the Desert Region of Jordan for the purpose of identifying areas having potential for improved range management practices, evaluate any possible impacts these practices have on existing production systems (positive and negative), design pilot studies in at least two of the existing range stations that include livestock, agriculture, social, and economic components.

(Note: This component must be developed along with the Research and Extension component, T-2.)

### C. JUSTIFICATION:

Desert areas cover most of Jordan and fully 80% has an average annual rainfall of less than 150 cm. Traditional livestock management practices for most of this area have been mostly nomadic over more or less locally accepted grazing areas. Grazing reserves were often part of these traditional systems. External and internal pressures on these traditional systems are requiring changes to be made. The integration of different land uses while improving the productivity and condition of these rangelands is one of the greatest challenges in Jordan.

Estimates of red meat imports into Jordan vary from 35 to 65 percent. Range management practices appropriate for Jordan's social, economic, political, and ecology situations must be found to meet the needs of tomorrow.

D. COMPONENT SUBJECT AREA: Improvement of Desert Rangeland.

E. SPECIALISTS:

#	Specialty	Expat. PM	Nat. PM
1	Livestock specialist	1	1
1	Sociologist	0	1
1	Economist	0	1
1	Range Management Specialist	1	1

F. TERMS OF REFERENCE:

The report of this team would consist of two parts: a) results of the survey and b) a design for a pilot study including selected areas and alternatives, design of the pilot study including costs, and personnel.

1. The consultant will be responsible to the Team Leader in all technical and administrative matters.
2. Submit a report (Scope of Work) upon departure, which outlines:
  - a. General and specific objectives of this component;
  - b. Activities and assumptions which will influence meeting these objectives;

- c. Verification criteria for component evaluation;
- d. Potential benefits for Jordan and the Near East region;
- e. Time and period required of each specialist;
- f. National staff members to be required including the experience and training necessary;
- g. Outline of strategy to train staff members;
- h. Commodities required to undertake the activities contemplated in this component;
- i. Estimate of implementation period;
- j. Estimate of total investment;
- k. Outline at least two levels of funding for each of these giving costs and benefits of each;

3. Interact with specialist working on components: T-2

G. PACKAGE WITH COMPONENTS: P-1, P-2, P-3, P-5, P-6; T-2, T-3, T-4, and T-5

H. APPROXIMATE COST OF PROJECT:

Salaries (Expat.)	\$14,600
Salaries (Nat.)	\$
Overhead	\$ 7,300
Travel (Inter.)	\$ 3,429
Travel (Local)	\$ 4,286
Miscellaneous	<u>\$15,428</u>
TOTAL	\$45,043

(Note: This budget does include project administration costs)

I. ESTIMATE OF FUTURE INVESTMENT: \$5 million over 5 years

## COMPONENT PROFILE #P-6

### A. PROJECT TITLE:

Survey of Appropriate Areas for Range Revegetation and Plot Study.

### B. OBJECTIVES:

To conduct a survey through the Rangelands of Jordan for the purpose of identifying areas having potential and need for revegetation utilizing adapted grasses and(or) shrubs.

To identify an area appropriate for a revegetation pilot study and prepare a detailed scope of work for this study. (Existing Range Stations will be considered.)

### C. JUSTIFICATION:

Where rainfall and soil conditions are suitable and the condition of existing range is very poor, reseeding has been shown to be the most cost effective means of range improvement. Considerable test work has been carried out in Syria, Tunisia, and Morocco on range types that are very similar to those in Jordan. There are ongoing AID-financed range projects utilizing revegetation as a major means of range improvement in Tunisia and Morocco. These projects are also testing a large number of grass and legume species, both indigenous and from North America, Australia, and other dryland range areas of the world. Each project is establishing a foundation seed farm.

Experience in the Near East has shown that successful revegetation is possible where rainfall and soil conditions are suitable. In

general, perennial revegetation is most successful utilizing grasses either as a single species or a limited number of species as a mixture. Depending on specific conditions, the primary species should include those in the genera *Axonopus*, *Phalaris*, *Dactylis* and several others from local selections that do not yet have seed available on a commercial basis. These perennial grasses, when properly managed produce a very favorable return on investment in reseeding areas with rainfall above 200 mm. As rainfall decreases, the depth and quality of the soil must increase for satisfactory seeding.

In areas of poor soil or lower rainfall (below 200 mm) annual grasses such as soft chess *Bromus mollis* and selected varieties of the annual legume medic make a very satisfactory increase in productivity when managed to ensure adequate seed set each year.

These reseeded ranges should be accompanied by planting forage reserves for emergency use and to provide supplemental protein during periods of dry feeding. These reserves should include spineless cactus, acacia, and other palatable shrubs.

A major limitation on reseeding is the cost and availability of adequate quantities of seed. As a result, those Near East countries launching major range revegetation efforts are establishing a local range seed production industry that includes a government operated foundation seed farm from which seed stock is provided to contract growers. Forage seed production requires special equipment for planting, harvesting, and processing. Best seed yields are obtained from spaced row plantings. This requires adequate weed control.

The revegetation process requires the use of specially designed drills for seeding rough untilled rangelands. The seeding needs to

be followed by chemical weed control the first year and protection from grazing during the first two years. Where these are on common public grazing lands, there needs to be agreement of the users on both initial exclusion from grazing and the grazing management to be followed later. Often subsidized supplementary feed is provided during the two years of excluded grazing.

**D. COMPONENT SUBJECT AREA:** Improvement of Desert Rangeland.

**E. SPECIALISTS:**

#	Specialty	Expat. PM	Nat. PM
1	Range	1	
1	Range/watershed	1	
1	Economist		
1	Sociologist		1
2	Agriculture		1
			2

**F. TERMS OF REFERENCE:** For each specialist:

1. The consultant will be responsible to the team leader in all technical and administrative matters.
2. Submit a report (Scope of Work) upon departure, which outlines:
  - a. General and specific objectives of this component;
  - b. Activities and assumptions which will influence meeting these objectives;
  - c. Verification criteria for component evaluation;
  - d. Potential benefits for Jordan and the Near East Region;
  - e. Time and period required of each specialist;
  - f. National staff members to be required including the

- experience and training necessary;
- g. Outline of strategy to train staff members;
- h. Commodities required to undertake the activities contemplated in this component;
- i. Estimate of implementation period;
- j. Estimate of total investment;
- k. Outline at least two levels of funding for each of these giving costs and benefits of each;

3. Interact with specialist working on components

**G. PACKAGE WITH COMPONENTS:**

**H. APPROXIMATE COST OF PROJECT:**

Salaries (Expat.)	\$14,600
Salaries (Nat.)	\$
Overhead	\$ 7,300
Travel (Inter.)	\$ 3,429
Travel (Local)	\$ 4,286
Miscellaneous	<u>\$15,428</u>
TOTAL	\$45,043

(Note: Project administrative costs have not been included)

**I. ESTIMATE OF FUTURE INVESTMENT:** \$ 5 million over 5 years

## COMPONENT PROFILE #P-7

### A. PROJECT TITLE:

Survey of Potential for Water Harvesting in the Desert Area Including Pilot Study.

### B. OBJECTIVES:

To conduct a survey throughout the Desert Region of Jordan for the purpose of identifying areas having potential for water harvest, evaluate any possible impacts of surface water harvest on the ground water resource (positive and negative), design pilot studies in at least two areas including livestock, agriculture, social and economic components.

### C. JUSTIFICATION:

Desert areas cover most of Jordan and fully 80% has an average annual rainfall of less than 150 cm. Despite this, the national water evaluation has suggested that several millions of cubic meters of surface flood water could be "harvested" annually in this desert region. This water could be used for irrigation of agriculture and range lands, water livestock, and for recharging groundwater aquifers.

The major unknown, however, is the influence such a project would have on the groundwater resource in terms of both quality and quantity.

D. **COMPONENT SUBJECT AREA:** Improvement of Desert Rangeland.

E. **SPECIALISTS:**

#	Specialty	Expat. PM	Nat. PM
1	Watershed Hydrologist	1	1
1	Groundwater Hydrologist	0	2
1	Economist	0	1
1	Range Management Specialist	1	0

F. **TERMS OF REFERENCE:** Several methods of water harvest may be used in the area: Small dams, water spreading, use of impermeable materials to increase runoff, reduction of evaporation from ponds, and reduction of transpiration through manipulation of vegetation. The survey should be undertaken early in the first phase of development of the NRP so that a pilot study may be initiated within 12 months after initiation of work on the NRP.

The report of this team would consist of two parts: a) results of the survey and b) a design for a pilot study including selected areas and alternatives, design of the pilot study including costs, and personnel.

1. The consultant will be responsible to the Team Leader in all technical and administrative matters.

2. Submit a report (Scope of Work) upon departure, which outlines:
  - a. General and specific objectives of this component;
  - b. Activities and assumptions which will influence meeting these objectives;
  - c. Verification criteria for component evaluation;
  - d. Potential benefits for Jordan and the Near East Region;
  - e. Time and period required of each specialist;
  - f. National staff members to be required including the experience and training necessary;
  - g. Outline of strategy to train staff members;
  - h. Commodities required to undertake the activities contemplated in this component;
  - i. Estimate of implementation period;
  - j. Estimate of total investment;
  - k. Outline at least two levels of funding for each of these giving costs and benefits of each;
  
3. Interact with specialist working on components

**G. PACKAGE WITH COMPONENTS:** P-1, P-2, P-, P-5, P-6; T-2, T-3, T-4, and T-5

**H. APPROXIMATE COST OF PROJECT:**

Salaries (Expat.)	\$14,600
Salaries (Nat.)	\$
Overhead	\$ 7,300
Travel (Inter.)	\$ 3,429
Travel (Local)	\$ 4,286
Miscellaneous	<u>\$15,428</u>
<b>TOTAL</b>	<b>\$45,043</b>

**I. ESTIMATE OF FUTURE INVESTMENT:** \$5 million over 5 years

## COMPONENT PROFILE #T-1

### A. PROJECT TITLE:

Development of an In-country Training Program in Range and Other Land Management Skills in Jordan.

### B. OBJECTIVES:

To increase the number of trained people with technical and managerial skills available within Jordan to design, plan, and implement development activities on rangeland and other watersheds.

Training needs can be separated into two general categories: 1) Training project and ministry personnel to more effectively participate in a program for developing Jordan's rangeland and watersheds, and 2) developing in-country training at several levels. A brief discussion of these two levels follows:

1. Training project and ministry personnel. Over the next several years, this training must be done abroad in the fields of range and watershed management. A major feature of this training should be an attempt to anticipate development project needs and to complete counterpart training prior to project implementation. This will encourage full participation of counterparts throughout the project.
2. Developing in-country training. In-country training will begin by training trainers so that future training can be conducted in Jordan. Another component will be to design a curriculum that provides a long-term direction and coordination between all parts of the training program. Three components will be necessary:

- o The development of a department within a University in Jordan to offer a minor in range and watershed management. As the need develops, a B.Sc. and graduate curriculum could be offered.
- o The development of a core of trainers within a university, community college, or a ministry that could offer seminars, short courses, and workshops for technicians and extension personnel involved with range and watershed projects.
- o The development of a curriculum for all in-country training that links all training programs together and provides a consistent base for the management of Jordan's rangelands and watersheds.

### **C. JUSTIFICATION:**

Jordan's foresight in seeing the need for trained people and for providing mechanisms to meet future needs has been effective in most disciplines almost to a fault in that trained people have become a major export. Fortunately, there are still a number of very competent people involved in rural development in Jordan but they are spread much too thinly to meet the challenges Jordan faces.

Most of the technical and leadership inputs for development projects involving range and watershed in Jordan have come from expatriates. Projects developed and executed by expatriates often fail to meet the long-term goals and needs of the people because the project may never be initiated or, if initiated, collapses after the external support is withdrawn, or because the design was inappropriate for the situation. Such failures occur because the

affected populations were not involved in the project from design through implementation.

**D. COMPONENT SUBJECT AREA: Training**

**E. SPECIALISTS:**

#	Specialty	Expat. PM	Nat. PM
1 Phd	Range Management Educator	2	2
1 Phd	Training Specialist	2	2

**F. TERMS OF REFERENCE FOR EACH SPECIALIST:**

1. The consultant will be responsible to the Team Leader in all technical and administrative matters.
2. Submit a report (Scope of Work) upon departure, which includes:
  - a. General and specific objectives of this component.
  - b. Activities and assumptions, which will influence meeting this objectives.
  - c. Verification criteria for component evaluation.
  - d. Potential benefits for Jordan and the Near East Region.
  - e. Time and period required of each specialist.
  - f. National staff members to be required including the experience and training necessary.
  - g. Outline of strategy to train staff members.
  - h. Commodities required to undertake the activities contemplated in this component.
  - i. Estimate of implementation period.

- j. Estimate of total investment.
- k. Outline at least two levels of funding for each of these giving costs and benefits of each.

3. Interact with specialist working on components.

**G. PACKAGE WITH COMPONENT:**

**H. APPROXIMATE COST OF PROJECT:**

Salaries (Expat.)	\$29,200
Salaries (Nat.)	\$
Overhead	\$14,600
Travel (Inter.)	\$ 3,000
Travel (Local)*	\$
Miscellaneous	<u>\$11,000</u>
TOTAL	\$57,800

\*(Local support supplied through general project administration)

**I. ESTIMATE OF FUTURE INVESTMENT:** \$20 million over 10 years.

## COMPONENT PROFILE #T-2

### A. PROJECT TITLE:

Range Management Research and Extension

### B. OBJECTIVES:

To enhance the technical information base available to farmers, land owners, and institutions that can lead to the sustainable and increased productivity of Jordan's land and water resources.

To facilitate the two-way communication of information between researchers, extension, and development institutions and the ultimate users of the information, the farmers/livestockmen.

In December of 1983, a UNEP Mission to Jordan outlined a plan to develop a range research station at Lajjoun. A range station already exists on the site and has fenced 11,000 dunum. Farmer cooperatives are functional in the area and have been adopting some of the shrub reseeding practiced by the MOA on the station. In addition, the MOA has fenced approximately 14 other range stations throughout this zone that could serve as substations for research and demonstration areas. This plan should serve as a base to the team in formulating the final scope of work.

The research must be integrally tied to extension and the approach should consider all the activities using a systems approach. Consideration should be given to the demonstrative research activities on farmers lands, and involve the farmers in the preparation and implementation of the research. To achieve this, an understanding of farmer's needs, knowledge, attitude, and skills must be obtained. A survey of the farmer's circumstances should be done

before trying to deal with them as a population ready to absorb and follow any advice and information coming from the research institutions through extension agents.

In addition there are no trained researchers, technicians, or extension agents in these more arid areas. Through the USAID Highlands Project, extension will be developed around four service centers to provide technical service, guidance, and training of the farmers. Training should be coordinated with the Highlands project and the training component in this overall program.

**C. JUSTIFICATION:**

Most of the agricultural research being conducted in Jordan is done in the Jordan Valley or the higher rainfall areas in the highlands. No research is being conducted by Jordan for the lower rainfall areas (under 200 mm) or where the rangelands intermix with the submarginal land currently being plowed and planted to wheat or barley. These submarginal areas are critical to the long-term agricultural productivity of Jordan. Alternatives indicating ways to blend the livestock and cropping production schemes have suggested by earlier teams, but they have not been tested in a way that provides the economic and social information necessary to make suggestions to the farmers/livestockmen.

**D. COMPONENT SUBJECT AREA: Research and Extension**

**E. SPECIALISTS:**

#	Specialty	Expat. PM	Nat. PM
1 Phd	Range Scientist	1	2
1 Phd	Range Extension	1	2

**F. TERMS OF REFERENCE FOR EACH SPECIALIST:**

1. The consultant will be responsible to the Team Leader in all technical and administrative matters.
2. Submit a report (Scope of Work) upon departure, which outlines:
  - a. General and specific objectives of this component.
  - b. Activities and assumptions, which will influence meeting these objectives.
  - c. Verification criteria for component evaluation.
  - d. Potential benefits for Jordan and the Near East Region.
  - e. Time and period required of each specialist.
  - f. National staff members to be required including the experience and training necessary.
  - g. Outline of strategy to train staff members.
  - h. Commodities required to undertake the activities contemplated in this component.
  - i. Estimate of implementation period.
  - j. Estimate of total investment.
  - k. Outline at least two levels of funding for each of these giving costs and benefits of each.
3. Interact with specialist working on components T-1 and the USAID Highlands Project.

G. PACKAGE WITH COMPONENT:

H. APPROXIMATE COST OF PROJECT:

Salaries (Expat.)	\$14,600
Salaries (Nat.)	\$
Overhead	\$ 7,300
Travel (Inter.)	\$ 4,500
Travel (Local)*	\$
Miscellaneous	<u>\$14,000</u>
TOTAL	\$40,400

\*(Local arrangements supplied through project administration)

I. ESTIMATE OF FUTURE INVESTMENT: \$5 million over 4 years

## COMPONENT PROFILE #T-2-1

### A. PROJECT TITLE:

Watershed Management Research (incorporate in T-2).

### B. OBJECTIVES:

To organize and develop a fully staffed and functioning watershed research unit over a five-year period that will be able to undertake applied research with the aim of increasing the amount of usable water in the more important arid and semiarid areas and decreasing the amount of erosion and sedimentation originating in the rainfed areas of Jordan.

### C. JUSTIFICATION:

The arid and semiarid nature of Jordan's climate and its physiographic characteristics combined with current and past land use patterns have created conditions of water scarcity, soil degradation, and sedimentation of reservoirs, canals, and stream beds. Much of the work in watershed management in Jordan has been in the area of erosion control through building expensive checkdams and terraces or through afforestation, which effectively shuts out all other uses and which may be in conflict with efforts to improve water supply and livestock production. Though much of this effort has reduced erosion, research efforts should be aimed at comparing costs and benefits of treatments.

D. COMPONENT SUBJECT AREA: Research and Extension

E. COMPONENT SPECIALISTS:

#	Specialty	Expat. PM	Nat. PM
1	Phd Watershed Scientist	1.5	
1	Forester		2.0

F. TERMS OF REFERENCE FOR EACH SPECIALIST:

1. The consultant will be responsible to the Team Leader in all technical and administrative matters.
2. The consultant submit a report (Scope of Work) upon departure, which outlines:
  - a. General and specific objectives of this component.
  - b. Activities and assumptions which will influence meeting the objectives.
  - c. Verification criteria for component evaluation.
  - d. Potential benefits for Jordan and the Near East Region.
  - e. Person months and timing required of each specialist to work with the Project/Activity.
  - f. National staff members that will be required, including the experience and training that will be necessary.
  - g. Outline of strategy to train the national research unit staff members.
  - h. Commodities required to undertake the activities contemplated in this component.
  - i. Estimate of implementation period.

- j. Estimate of total investment.
  - k. Outline at least two levels of funding for each of the Project/Activity, giving costs and benefits of each.
3. Interact with specialists working on Components T-2-2, T-2-3, T-2-4, T-4, T-5, D-2, and D-3.

**G. PACKAGE WITH PROJECT/ACTIVITY: Range Research and Extension**

**H. APPROXIMATE COST OF PROJECT:**

Salaries (Expat.)	\$
Salaries (Nat.)	\$
Travel (Inter.)	\$
Travel (Local)	\$
Miscellaneous	\$ _____
<b>TOTAL</b>	<b>\$</b>

**I. ESTIMATE OF FUTURE INVESTMENT: \$2,500,000 over 5 years**

### COMPONENT PROFILE #T-3

**A. PROJECT TITLE:**

A Rangeland /Watershed Documentation Center in Jordan

**B. OBJECTIVES:**

To establish a system and organization to assemble research and development information relating to rangeland and watersheds.

To make this information available to other documentation centers, organizations, and individuals.

To facilitate and encourage communication between those working on range and watershed problems in Jordan and elsewhere.

The initial activities of the documentation center will focus on Jordan. As the center matures, it could serve as an international center. Some of the functions of this center could be as follows:

- o Collect relevant literature in a small specialized library.
- o Provide access to other computerized data bases.
- o Collect proposals, reports, and publications from all projects within the range and watershed program. Thus providing a permanent record of all development activities in Jordan.
- o Provide linkages between other more general agricultural documentation centers like ACSAD and ICARDI.

**C. JUSTIFICATION:**

Activities that include some aspect of range and watershed management have been documented in some way by individuals from many countries and activities for decades. Yet, it is extremely difficult to locate and review all the previously developed information. This information could be invaluable in the preparation of development plans and their implementation. Such a center could prevent needless expenditures of time and money reinventing previously tested methodologies.

**D. COMPONENT SUBJECT AREA: Research and Extension**

**E. SPECIALISTS:**

#	Specialty	Expat. PM	Nat. PM
1 Phd	Natural Resource Specialist	2	
1 Phd	Communication Specialist	2	

**F. TERMS OF REFERENCE FOR EACH SPECIALIST:**

1. The consultant will be responsible to the Team Leader in all technical and administrative matters.
2. Submit a report (Scope of Work) upon departure, which outlines:
  - a. General and specific objectives of this component.
  - b. Activities and assumptions which will influence meeting the objectives.
  - c. Verification criteria for component evaluation.
  - d. Potential benefits for Jordan and the Near East Region.

- e. Time and period required of each specialist.
  - f. National staff members that will be required, including the experience and training that will be necessary.
  - g. Outline of strategy to train staff members.
  - h. Commodities required to undertake the activities contemplated in this component.
  - i. Estimate of implementation period.
  - j. Estimate of total investment.
  - k. Outline at least two levels of funding for each of these giving costs and benefits of each.
3. Interact with specialists working on Components T-2-2, T-2-3, T-2-4, T-4, T-5, D-2, and D-3.

**G. PACKAGE WITH COMPONENT:** Range Research and Extension

**H. APPROXIMATE COST OF PROJECT:**

Salaries (Expat.)	\$29,200
Salaries (Nat.)	\$
Overhead	\$14,600
Travel (Inter.)	\$ 4,500
Travel (Local)*	\$
Miscellaneous	<u>\$14,000</u>
TOTAL	\$62,300

\*(Note: Local support supplied through project administration)

**I. ESTIMATE OF FUTURE INVESTMENT:** \$5 million over 5 years

## COMPONENT PROFILE #T-4

### A. PROJECT TITLE:

Monitoring and Evaluation

### B. OBJECTIVES:

1. Identify the socioeconomic indicators relevant to monitor and evaluate the program activities and to test those indicators.
2. Prepare detailed system analysis, which will include methods of data collection, process to be applied. Also prepare the information and statistical figures needed.
3. Propose unified forms and ways to measure the achievements and program according to the indicators proposed.
4. Train and prepare Jordanian counterpart to do the work.

### C. JUSTIFICATION:

Jordan, like many other countries in the world, is lacking the proper monitoring and evaluating system, which enables the planner and decision maker to know how the project is doing, that will cover physical, financial, social, and political aspects.

The proposed project will solve the problem through providing the above mentioned services.

**D. COMPONENT SUBJECT AREA:** Research and Extension

**E. SPECIALIST:**

#	Specialty	Expat. PM	Nat. PM
1	Agr. Economist/M and E (Exp.)	1	
1	Agri. Economist	1	
1	Systems Scientist	1	
1	Wildlife Biologist	1	

**F. TERMS OF REFERENCE:**

- o Submit a report which includes the detailed objective and components of the project and cost-benefits analysis of the project in addition to the recommendations and the plan of work for implementation.
- o Propose a monitoring and evaluation system to be followed in the project.
- o Coordinate and interact with the other groups or teams in the country.
- o Responsible to team leader.

**G. PACKAGE:**

**H. APPROXIMATE COST OF PROJECT:**

Salaries (Expat.)	\$29,200
Salaries (Nat.)	\$
Overhead	\$14,600
Travel (Inter.)	\$ 6,000
Travel (Local)*	\$
Miscellaneous	<u>\$19,000</u>
TOTAL	\$68,800

\*(Local support supplied through administrative budget)

**I. ESTIMATE OF FUTURE INVESTMENT:** \$1.3 million over 3 years

69

## COMPONENT PROFILE #T-5

### A. PROJECT TITLE:

Soil and Landuse Survey

### B. OBJECTIVES:

To propose a national soil and land classification system for Jordan.

To define the work done and the areas surveyed in prior surveys.

To define the organization needed within the country to complete and maintain a soil and land classification system.

### C. JUSTIFICATION:

In Jordan, there is no unified soil classification system followed at this time. Soil and land capability classification is essential for any agricultural and nonagricultural project and it is most helpful if all organizations throughout a region used the same system. Dr. William Johnson has made a preliminary recommendation for a soil survey system. This project would expand his work and prepare the detailed workplan for the survey.

**D. PROJECT/ACTIVITY SUBJECT AREA:** Research and Extension

**E. SPECIALIST:**

#	Specialty	Expat. PM	Nat. PM
1	Soil Scientist	1	2
1	Cartographic/Meteorologist	1	2

**F. TERMS OF REFERENCE:**

- o To develop a plan to survey the entire country, work will be accomplished first in areas of other development needs.
- o Responsible to team leader.
- o Coordination and interaction with other groups or teams working in Jordan.
- o Submit a report defining the objectives, components, cost/benefit analysis of the project in addition to the recommendations and a plan of work for implementation.
- o Propose a monitoring and evaluation system to be followed in the project.

**G. PACKAGE WITH PROJECT/ACTIVITY:**

<b>H. Salaries:</b>	Salaries (Expat.)	\$14,600
	Salaries (Nat.)	\$
	Overhead	\$ 7,300
	Travel (Inter.)	\$ 3,000
	Travel (Local)*	\$
	Miscellaneous	<u>\$11,000</u>
	TOTAL	\$35,900

\*(Local support will be supplied through the administrative unit)

**I. ESTIMATE OF FUTURE INVESTMENT: \$1.8 million over 3 years**

## COMPONENT PROFILE #T-6

### A. PROJECT TITLE:

Urban Watersheds (additional project that should receive a high priority even though not located directly on rangeland)

#### NOTE:

The original terms of reference for this mission were to write a scope of work for a second phase having as its purpose to develop "scopes of work" that could be treated (funded, implemented) separately but which, together, would make a national range and watershed plan for Jordan.

Over two of the three weeks of work in Jordan were devoted to this objective. Throughout, however, the team met with both USAID Mission personnel and, upon his return to Jordan, with the President of the NPC on two occasions. On Saturday, June 9, it became more or less clear that what was wanted from the Mission was a Rangeland Program which emphasized the desert region and not a National Range and Watershed Program.

Much of the work of the Mission on the original terms of reference was adapted to this revised objective. Some, however, could not be adapted. One such component was that developed for urban watershed protection and rehabilitation in the rainfed areas. It was felt that this component was of high enough priority to be included here as an addendum.

As a component, it is an agreement with the activities of organizational restructuring, review and revision of legislation, and regional planning. Though it does not fit the second phase of work developed by this mission, it is felt that NPC together with the Jordan water authority and other involved agencies should begin work immediately on treatment

of the Amman-Zarqa Urban Watershed. This watershed is, perhaps, the major contributor of sediments to the King Talal Reservoir. This portion of the Zarqa Basin is not receiving the kind of effort it demands given its importance. With comparatively little effort, and in a comparatively short time frame and minimal cost, it is estimated that sediment's originating in the Amman Urban Watershed could be significantly reduced at a savings of millions of dollars in urban storm drain maintenance, reduced flood damage to the city and sediment reduction in the King Talal Reservoir.

#### **B. OBJECTIVES:**

To reduce flood peaks and sediment loads from runoff originating in areas of urban and industrial development;

To draft legislation and building codes; design storm drain systems and retention reservoirs; develop codes for the design, construction and maintenance of roads and for the regulation of open cast mining;

To design water-harvesting measures which will help solve the problems of water scarcity in rural populated areas.

#### **C. JUSTIFICATION:**

At this time fully one third of the 1.3 million cu mt of sediments reaching the King Talal Dam, has its origin in the upper catchment of the Zarqa River where urbanization of the Amman-Zarqa population center is rapidly taking place and now accounts for approximately 1,000,000 people. Construction relating to this urbanization trend in terms of housing, business, office buildings, industries and mining of building materials has exacerbated conditions for rapid and high volume runoff rates and large sediment loads.

Although the 1981-1985 5-year plan calls for storm drainage systems in the major cities, significant work remains for their design and construction. Further, legislation and building codes need to be written and enforced that control site development including slope stabilization and on-site erosion control as well as to regulate open cast mining. Primary and secondary roads in the highland area also need to be worked on to reduce sediments from cut and fill both during construction and maintenance.

**D. PROJECT/ACTIVITY SUBJECT AREA: Development Implementation**

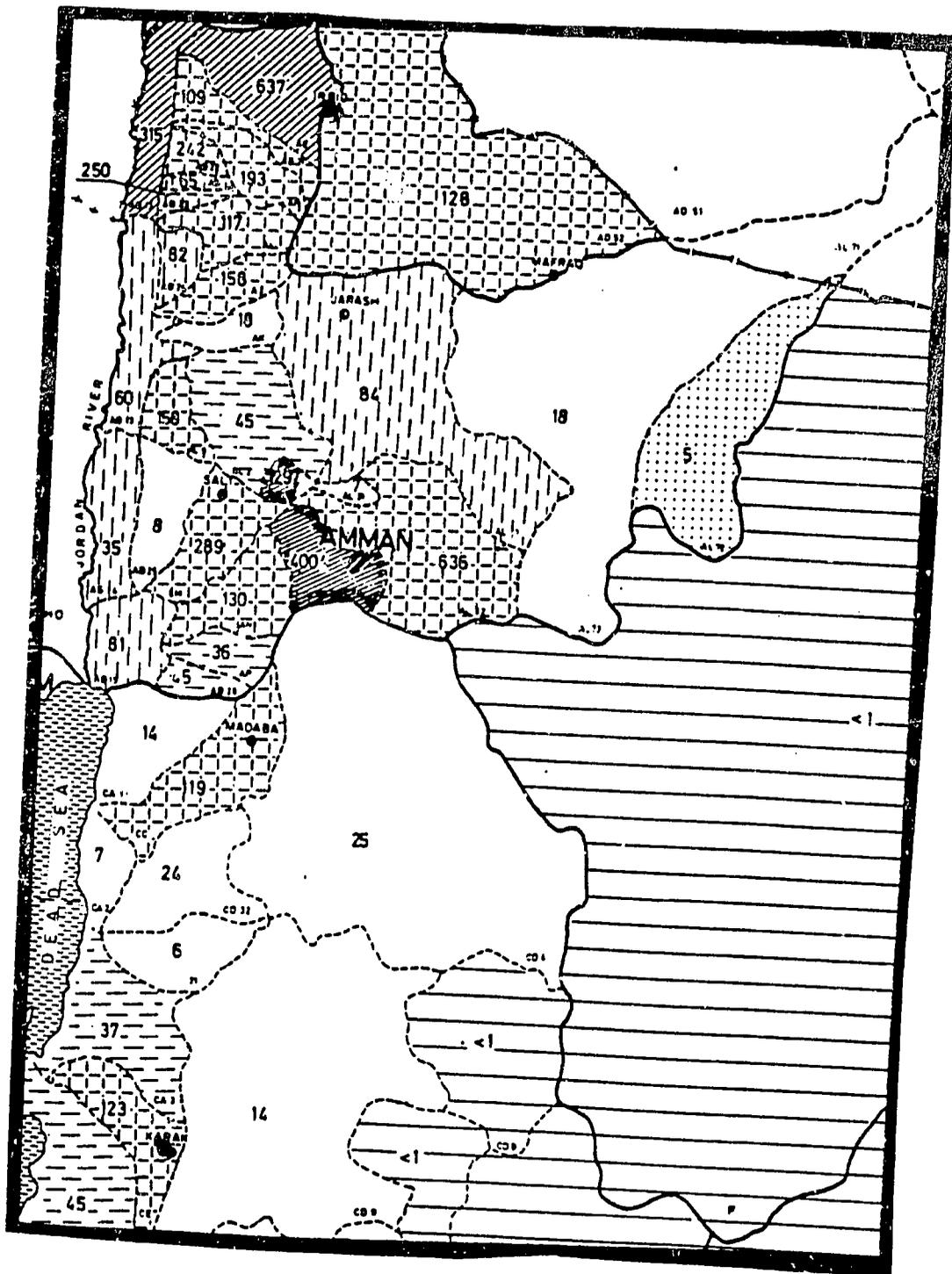
**E. SPECIALIST:**

#	Specialty	Expat. PM	Nat. PM
1	Urban/Reg planning	2	
1	Watershed Managementogist	1	
1	Civil Engineer	2	
1	Lawyer		2
1	Forester		1

**F. TERMS OF REFERENCE:**

1. The consultant will be responsible to the Team Leader in all technical and administrative matters.
2. Submit a report (Scope of Work) upon departure, which outlines:
  - a. General and specific objectives of this component;
  - b. Activities and assumptions which will influence meeting these objectives;
  - c. Verification criteria for component evaluation;
  - d. Potential benefits for Jordan and the Near East Region;
  - e. Time and period required of each specialist;

# URBAN WATERSHEDS



Note: Background numbers show the number of people/Km<sup>2</sup> in 1975.

- f. National staff members to be required including the experience and training necessary;
- g. Outline of strategy to train staff members;
- h. Commodities required to undertake the activities contemplated in this component;
- i. Estimate of implementation period;
- j. Estimate of total investment;
- k. Outline at least two levels of funding for each of these giving costs and benefits of each;

3. Interact with specialist working on components D-2, D-3, D-4, T-1, and T-3.

**G. PACKAGE WITH COMPONENTS:** Implementation Zones.

**H. APPROXIMATE COST OF PROJECT:**

Salaries (Expat.)	\$
Salaries (Nat.)	\$
Travel (Inter.)	\$
Travel (Local)	\$
Miscellaneous	\$
TOTAL	\$

**I. ESTIMATE OF FUTURE INVESTMENT:** \$2,000,000 to the feasibility level in Amman-Azraq and Irbid over 10 years.

CURRENT MISSION SCOPE OF WORK  
APPENDIX 2



# JES

JOINT ENVIRONMENTAL SERVICE

# IIED

North American Headquarters: IIED, 1775 Massachusetts Avenue, N.W., Washington, D.C. 20036

Telephone (202) 462-0900 Telex: 64414

European Headquarters: IUCN, Avenue du Mont-Blanc, 1196 Gland, Switzerland

Telephone 022/64 7181 Telegrams: iucnature Gland Telex: 22618

London Office: IIED, 11 Park Street, London, W1P 0DR

Telephone 01-580 7656-7/01-580 9790-7 Cable: Earthscan London W1 Telex: 261681

JES/W Contract No. 37 - NE  
May 9, 1984

Dr. Dennis Child  
Winrock International  
Route 3  
Morrilton, Arkansas

Dear Dr. Child,

The International Institute for Environment and Development (IIED), on behalf of the Joint Environmental Service (JES) of IIED and IUCN would like to contract with you for your services in support of the USAID/NE Bureau, Mission to Jordan and the National Planning Council, Government of Jordan initiative to generate a scope-of-work for a national range and watershed management program. These services would provide NE and the Environmental Planning and Management Project with scopes of work for an integrated set of programmatic options which would constitute, in aggregate, a national program for range and watershed research and management.

You should note that JES is not a legal entity but a service operated by IIED and IUCN. Both organizations conduct work under its style and title. The IIED is responsible in law for the fulfillment of this contract and all difficulties arising from it should be referred to me.

#### SCOPE OF WORK

You will meet with USAID/NE, EPM and Drs. Saunier and Berwick (the co-principal investigators) to discuss the conduct of this project. You and Dr. Saunier will continually assess the needs of this project and agree upon the most productive division of labor. Dr. Saunier will produce deliverables to you for incorporation and presentation.

As developed in our communications and in contact with USAID, your scope of work will consist of the following tasks and deliverables:

**Task 1**

The team will assemble and review appropriate background information prior to departure from the U.S. This review will include an overview of materials concerning biological, geographical, hydrological and socio-economic aspects of Jordan. The review will also cover the administrative and legal structures currently in use in Jordan as they relate to range and watershed management. The team will be provided with the above materials by the Environmental Planning and Management Project staff.

**Task 2**

After briefings by USAID staff on arrival, the team will meet with representatives of Government of Jordan organizations including:

- o National Planning Council
- o Ministry of Agriculture
- o Ministry of Interior
- o Jordan Valley Authority
- o National Water Authority
- o Royal Scientific Society
- o Representatives of the Academic and Scientific Community
- o Others as deemed appropriate by USAID

The team will make field trips, as appropriate, to evaluate current conditions, management practices and projects in range and watershed areas. In addition, the team will conduct interviews with agriculturalists and pastoralists.

**Task 3**

As the national program is intended to result in an integrated approach to reduce soil erosion and improve land use it is critical that the discrete projects receive proper support and coordination in areas which transcend the scope of individual projects. These crosscutting areas might include:

- o Coordination among cooperating organizations and donors
- o Evaluation and identification of linkages between the national program and other development concerns

- o Evaluation and identification of linkages between projects included within the national program
- o Inventory and planning for academic and practical training
- o Data base and library management requirements
- o Legal and institutional analyses and studies
- o Coordination of applied and basic research programs
- o General scientific, technical and management support services

On the basis of scientific, technical and practical experience the team will prepare a detailed scope of work for development of a national program for range and watershed management. The assessment will evaluate the widest range of programmatic options available for consideration including information exchange, training, basic research, applied research, short-term activities and long-term programs.

The scope of work shall identify an integrated series of projects which when collectively viewed will constitute a national program. The team will develop the scope of work such that each proposed activity included in the national program will have prepared for it a technical description, cost estimate and implementation time frame. Each project activity will be reviewed by the team with reference to:

- o Technical feasibility
- o Data requirements
- o Reliability of the intervention
- o Management requirements
- o Staff requirements
- o Estimated cost (capital and recurrent)
- o Implementation period
- o Potential benefits
- o Potential contracting mode(s)
- o Evaluation requirements
- o Special consideration as appropriate

The team shall refrain from making any official recommendations in the assessment. A detailed draft of the assessment shall be prepared and presented for review by the Mission prior to departure of the team from Jordan.

#### Task 4

You as the team leader shall be available for a technical debriefing of AID technical staff in Washington after completion of the TDY to Jordan. You will support this presentation on or about 19 June, 1984.

#### Task 5

The team will provide AID with 30 copies of the final evaluation and a master copy suitable for in-house reproduction.

### SCHEDULING

		<u>Level of Effort</u> (pers. days)	<u>Date of Completion</u>
Task 1	Review Materials	4	May 18, 1984
Task 2	Meetings/Field Trips	26	June 9, 1984
Task 3	Draft Program Scopes	14	June 9, 1984
Task 4	EPM/USAID briefings and re-draft	6	June 19, 1984
Task 5	Final Report	5	July 2, 1984

### DISBURSEMENTS

If you decide to make your own travel arrangements, IIED will reimburse you for the expense upon receipt of the unused portion of your ticket. You are required to travel on an American carrier whenever possible and will be reimbursed for the value of a tourist class round trip fare.

The team leader will receive in advance a contingency fee to cover taxis, photocopying and any other unexpected expenses. IIED will expect receipts for any expenses over \$15.00 and a reimbursement of any of the fee that is not used. IIED cannot guarantee reimbursement of expenditures made beyond the fee without written request and IIED approval. IIED cannot guarantee reimbursement for expenditures which exceed the contingency fee advance without a written request from you and IIED's approval.

Your initial disbursement of \$7,493 will cover all per diem, in-country (Jordan) travel, secretarial, and ODC expenses.

Final payment will be made upon submission of your final report and receipt of a signed, completed standard IIED invoice which will be provided to you.

If in the course of your work you should find that the scope of the job required any significant changes, IIED will be expected to be informed of this before the changes are implemented.

If the terms of this contract are acceptable to you, please sign below and return this copy to me. The enclosed copy is for your records.

Yours sincerely,

Stephen Berwick  
Director  
Environmental Planning and Management

Acceptance:

\_\_\_\_\_  
Dennis Child

\_\_\_\_\_  
Social Security No.

\_\_\_\_\_  
Date

cc: Molly Kux  
Ming Ivory  
Steve Lintner  
Richard Sandbrook  
Michael Cockerell

**ESTIMATED BUDGET**

(for convenience of the participants but not to be construed as part of this contract)

Salary

I.	Team Leader - 30 days @ \$242/	\$7,260
II.	Co-Principal Investigator - 23 days @ \$242/	5,566
III.	Secretarial - 5 days at \$50.	250
	Sub-Total	<hr/> \$13,076

Travel

I.	International	
*	o Team Leader: Little Rock - Amman - Little Rock	\$1,300
*	o Co PI: Baltimore - Geneva - Amman - Paris	1,300
II.	In-Country	
	o Team in Jordan	1,050
	o Team Leader: Little Rock - Washington, DC r.t.	550
	o EPM: Washington, DC - Little Rock r.t.	550
III.	Per Diem	
*	o Team Leader, Co PI 40 days @ \$79/	3,160
	o Team Leader 5 days @ \$75/	375
	o EPM 5 days @ \$64/	320
	Sub-Total	<hr/> \$8,605

Other Direct Costs

I. Communications, photocopying, etc.	\$250
---------------------------------------	-------

TOTAL	<hr/> \$21,931
-------	----------------

\*borne by USAID/Jordan

**APPENDIX 3**  
**LIST OF PERSONS MET**

1. Mr. Omar Abdullah Dokhgan, President, NPC
2. Mr. Hassan Nabulsi, Director General, JCO
3. Dr. Sami Suuna, Director General, ACC
4. Dr. Sallm Al-Loai, Under Secretary, MOA
5. Dr. Ziad Fareiz, General Secretary, NPC
6. Mr. Mahmond Tal Houni, General Secretary, JWA
7. Mr. Mousa Araba, Deputy Director or General, JCO
8. Mr. Mahmoud J. El-Juneidi, Director, Zarqa Project, MOA
9. Mr. Kabilay Esenbel, Deputy, Representative UN/FAO World Food Program, Jordan
10. Dr. Juliman Arabiat, Acting Head, Ag. Economics, VOJ
11. Mr. Jami Tuffaha, JWA
12. Mr. Nabeal Swevs, NPC
13. Dr. Abid Alazeiz Alweshah, JWA
14. Dr. Ahmad Abu Shaikheh, NPC
15. Mr. Munther Azar, NPC
16. Mr. Maher Z. Bbu Jafar, General Director, Royal Society for the Conservation of Nature
17. Mr. Marwan Kokash, Deputy Assistant, WFP
18. Mr. Ahmad Ab Oklah, Director of Maan, MOA
19. Mr. Khalid Nawaise, Director of Karak, MOA
20. Mr. Riad Tuama, JCO
21. Mr. Jaml Mohamad Ali, JCO
22. David Harvey Dryland Project, JCO
23. Goerge Goodard, JCO
24. Mr. Rushdi Abed Almon'am, Alfuzaz Station, MOA
25. Mr. Ahmed Abu Liau, Forest Supervisor, Maan, MOA
26. Mr. Abraheiw Alomar, Forest Supervisor, Karak, MOA
27. Mr. Salem Swalqa, Thu'wanch Station, MOA
28. Mr. Gerald Gower, Acting Mission Director, USAID,
29. Mr. Tom Rishoi, USAID Projects Office
30. Dr. Kenneth Laurent, USAID Agriculture Office
31. Mr. Fuad Qushair, USAID Projects Office

**HELPFUL REFERENCES**

**APPENDIX 4**

#### APPENDIX 4 BIBLIOGRAPHY

- Abonkhaled, A. and M. Hanbali. 1974. Evaluation of Data on Crop Water Use and Irrigation Methods in Jordan. FAO Project Development and Use of Groundwater Resources of East Jordan. Beirut.
- AERO-PRECISA. 1965. Hashemite Kingdom of Jordan. Topographic Maps at 1:10,000 Universal Transverse Mercator. Produced for the United Nations Special Fund Project for Training and Demonstration in Afforestation in Jordan.
- Arab Centre for the Studies of Arid and Dry Lands and Arab Organization for Agricultural Development. 1982. Study on the Inventory and Evaluation of Fodder Resources in the Arab World. Jordan.
- Arab Organization for Agricultural Development. 1975. Evaluation of the Animal Production in Jordan.
- Arab Organization for Agricultural Development. 1975. Range Improvement and Fodder Production in Jordan.
- Arab Organization for Agricultural Development. 1976. Feasibility Study on Rainfed Land in Amman Governovate in Jordan.
- Arab Organization for Agricultural Development. 1978. Feasibility Study for the Producing Fodder Concentrates in Syria and Jordan.
- Arab Organization for Agricultural Development. 1979. Study on Range Improvement in South Jordan.
- Arab World League and Arab Organization for Agricultural Development. 1981. A Study for the Improvement of the Road Network and Integrated Rural Development of the Lower Part of the King Tallal Dam Catchment Area. Khartoum.
- Balqa and Amaan. 1978. Feasibility Study of Rainfed Land in Amman Governovate of Jordan.
- Bender, F. 1968. Geologie von Jordanien: Beitrage zur Regionalen Geologie der Erde. Vol. 7 (including geol. map 1:750,000). Gebrunder Borntraeger, Berlin.
- Bender, F. 1969. Geologioche Forschung in Jordanien: Ger., Bundesamtstalt Bodenforschung 3 Hanover-Bucholg, Alfred Bentz Hans. Geol. Jahr 6, Berg. No. 81:5-12.
- Bender, F. 1974. Geology of Jordan. Supplementary edition in English with minor revisions. Translated from the German in cooperation with the Nat. Res. Authority, Amman, Jordan by Mah'd Kemal Khodeir in association with D. Parkes and V. Wilking. Gebrunder Borntraeger, Berlin-Stuttgart.

- Bender, F., et al. 1969. Geologische Karte von Jordanien 1:250,000  
Ger. Brendes-anstalt Bodenforschung, Hanover-Deutsche Geologische  
Mission in Jordanien.
- Blatter (1) Amman  
(2) Aqaba-Ma'an  
(3) El Azrag  
(4) Mattat El Tufur  
(5) Bayir
- Burdon, D. J. 1959. Handbook on the Geology of Jordan. Hashemite  
Kingdom of Jordan, Amman.
- Clapp, F. G. 1936. Geology and Bitumens of the Dead Sea Area, Pales-  
tine, and Transjordan. Am. Assoc. Petr. Geology. B. Vol. 20.,  
No. 7:881-909.
- Coy, R. E. 1942. Palestine Transverse Mercator Military Grid. Topo-  
graphic Maps by 517 Corps. Field survey from air photography.
- Dajani, J. S. 1979. A Baseline Socioeconomic Study of the Southern  
Ghors and Wade Araba. USAID.
- Dajani, J. S., J. Hazleton, R. Rhoda, and D. Sharry. 1980. An Interim  
Evaluation of the Jordan Valley Development Effort 1973-1980.  
USAID.
- Dajani, J. S. and M. Murdock. 1978. Assessing Basic Human Needs in  
Rural Jordan. USAID.
- Dapples, E. C. 1941. Surficial Deposits of the Deserts of Syria,  
Transjordan, Iraq, and Western Iran. J. Sed. Pet. Vol. 11, No. 3:  
124-141.
- Dearden, A. 1958. Jordan. Robert Hale, London.
- Draz, O. 1979. Report on Rangeland Development and Stabilization of  
Nomadic Sheep Husbandry in Jordan. FAO.
- Draz, O. 1979. Report on Rangeland Development and Stabilization of  
Kingdom of Jordan. UNDP/FAO Consultant.
- FAO. 1949. Rainfed Agriculture in the Middle East and North Africa.
- FAO. 1964. Mediterranean Development Project, Country Report: Jordan.
- FAO. 1969. Project for Training and Demonstration in Afforestation in  
Jordan. Interim Report No. 30.
- FAO. 1970. Dryland Farming Jordan, Soil Conservation in the Bag'a  
Valley. UNDP, AGS:SF/JOR 18. Technical Report 2. Based on the  
work of D. W. Sanders, Soil Conservation Officer, Rome.

- FAO. 1970. The Hydrogeology of the Mesozoic, Cainozoic Aquifers of the Western Highlands and Plateau of East Jordan. Technical Report 2.
- FAO. 1974. Report on Rainfed Areas Agricultural Development Project Preparation Mission in Jordan. Vols 1 and 2.
- FAO. 1981. Review of Rural Development Strategy and Policies: The Hashemite Kingdom of Jordan: WCARRD Follow-up Mission.
- FAO. 1982. Improving Delivery Systems of Agricultural Services to Small Farmers in Jordan. Technical Report.
- FAO/DANIDA. 1981. Workshop on Water Lifting Devices in Asia and the Near East. Danish Funds in Trust. Bangkok 4-14 Dec. 1979.
- FAO/UB. 1982. Regional Study on Rainfed Agriculture and Agro-Climatic Inventory of Eleven Countries in the Near East Region.
- FAO/UN. 1970. Investigation of the Sandstone Aquifers of East Jordan. Annex 1 -- Appendices Report No. AGL:SF/JORG. Technical Report 2.
- FAO/UN. 1970. Training and Demonstration in Afforestation and Forest Management. Jordan. Final Report. Publication No. FAO/SF:89/JOR6.
- FAO/UN. 1971. Investigation of the Sandstone Aquifers of East Jordan. The Hydrogeology of the Southern Desert of Jordan. Publication No. LA:SF/JORG. Technical Report 1.
- FAO/UN. 1972. Investigation of the Sandstone Aquifers of East Jordan. Report No. AGL:SF/JOR9. Technical Report 4.
- FAO/UN. 1973. Development and Use of the Groundwater Resources of East Jordan. Report No. JOR/7/525.
- FAO/UN. 1979. Land Evaluation Criteria for Inigatia World Soil Resources Reports. Publication No. 50.
- FAO/UN. 1979. Near East Readings on Agricultural Investment Projects. Near East Workshop on Agricultural Investment Projects. Publication No. 20.
- FAO/UNF. 1978. Protection of Zarqa Viva Catchment -- Kalesky GT2. 1978 Population, Employment, and Economic Development in Jordan. Pa Paz Project.
- Glubb, J. B. 1967. Syria, Lebanon, Jordan. Thames and Hudson.
- Great Britain, Directorate of Survey, War Office, and Air Ministry. 1960. Maps of the Hashemite Kingdom of Jordan at 1:500,000 Series 1404, Edition 3-GSGS.

- Great Britain, Admiralty, Naval Intelligence Division. 1943. Palestine and Transjordan, London.
- GTZ. 1978. National Water Master Plan of Jordan, A Study. (1-7 volumes inclusive). Federal Republic of Germany.
- GTZ. 1981. Summary of Project Proposals on the Zarqa Conservation Farming and Afforestation Programme. Federal Republic of Germany.
- Hamman, M., M. McNulty, and F. O. Regan. 1983. Methodology and Institutional Framework for Community Development Study at the Micro-regional Level. USAID.
- Harris, G. L., et al. 1958. Jordan, Its People, Its Society, Its Culture. New Haven, HRAF Press.
- Hashemite Kingdom of Jordan. North East Ghor Irrigation and Rural Department Project: Annex 14: Farm budgets, Project Charges, and Farmer's Income.
- Hashemite Kingdom of Jordan Forest and Range Department. Hints on some Qataf (Atriplex) Varieties Found in Jordan.
- Hashemite Kingdom of Jordan, Investment Centre. Report of the Rainfed Areas Agricultural Development Project Preparation Mission in Jordan. Vols. I and II, 1974.
- Hashemite Kingdom of Jordan, Irrigation Department. Natural Resources Authority. 1974. Medium Term Plan for Development of Groundwater Irrigation in E. Jordan (Annexes).
- Hashemite Kingdom of Jordan, Irrigation Department. Natural Resources Authority. 1978. Proceedings of the National Water Symposium. Amman.
- Hashemite Kingdom of Jordan, Lands and Surveys Department. Topographic Maps at 1:500,000. Prepared for the Ministry of Economy and the United States Agency for International Development to Jordan. Compiled by photogrammetric methods from aerial photography dated 1961 and 1963, and from existing data furnished by the Jordan Department of Lands and Surveys.
- Hashemite Kingdom of Jordan, Lands and Surveys Department. 1949. Topographic Maps at 1:250,000 Ordnance Survey, Southampton.
- Hashemite Kingdom of Jordan, Ministry of Agriculture. 1973. Agricultural Law.
- Hashemite Kingdom of Jordan, Ministry of Agriculture. Agricultural Research and Extension Department. 1974. Report on Agricultural Zoning. Working Paper. Amman.

- Hashemite Kingdom of Jordan, National Planning Council. Five-year Plan for Social and Economic Development (1981-85).
- Hashemite Kingdom of Jordan, Research and Investigation Department. Natural Resources Authority. 1966. Review of Spring Flow Data prior to October 1965. Technical Paper No. 40. Amman.
- Hashemite Kingdom of Jordan, Statistics Department. 1980. Family Expenditure Survey.
- Hashemite Kingdom of Jordan, Statistics Department. 1983. Jordan Demographic Survey 1981. Principal Report.
- Hashemite Kingdom of Jordan, Statistics Department. 1978 and 1980. Survey of Agricultural Land Irrigated by Artesian Wells.
- Hashemite Kingdom of Jordan, War Office and Air Ministry. Survey Department. 1956. South Levant. Topographic Maps at 1:250,000. Compiled, drawn, and reproduced by 42 Survey Engineer Regiment. GSGS 8050 (MDR) Edition 1.
- Hindle, P. 1964. The Population of the Hashemite Kingdom of Jordan, Geol. Jnl. 130:261-264.
- Huckriede, Reinhold, and Wiesemann. 1968. Der Jungpleistozane. Pluvial--see von El Jafr and weitere Deten zum Quartar Jordaniens. Geol. Paleontol. Vol. 2:73-89 (incl. geol. map at 1:100,000).
- Hunting Technical Services, Ltd. 1956. Report on the Range and Classification of the Hashemite Kingdom of Jordan. Department for Range and Water Resources, Jordan.
- Hunting Technical Services, Ltd. and Sir. M. MacDonald and Partners. 1964. East Bank Water Resources. Report of Hydrology for Central Water Authority, Jordan.
- International Bank for Reconstruction and Development. 1961. The Economic Development of Jordan: Report of a mission organized by the IBRD at the request of the Government of Jordan. Baltimore, Johns Hopkins University.
- Investment Centre. 1974. Report of the Rainfed Areas Agricultural Development Project Preparation Mission in Jordan, Vol. 1, 1974 and Vol. II, 1974.
- Ionides, M. G. 1940. Report on the Water Resources of Transjordan and Their Development. Incorporating a Report on Geology, Soils, and Minerals and Hydro-Geological Corrections by G. S. Blake. Government of Transjordan.
- Japan International Cooperation Agency. 1980. Integrated Regional Development Study of Northern Jordan. Tokyo.

- Jordan, University of. 1979. Levels and Trends of Fertility and Mortality in Selected Countries of West Asia.
- Kerak and Maan. 1977. Feasibility Study of Rainfed Lands in Amman Governovate of Jordan.
- Kilani, A. 1983. Water Resources Assessment in Jordan. Natural Resources Authority, Amman.
- Lloyd, J. W. et al. 1968. A Groundwater Recharge Study in N.E. Jordan Inst. Air. Eng. Proc. Vol. 35:615-631.
- Long, G. A. 1957. The Bioclimatology and Vegetation of Eastern Jordan. FAO/57/2/1109, Rome.
- Moorman, F. 1958. Soils of East Jordan, FAO Rome.
- Morf, H. 1934. Vorweisung und Besprechung von morphologischen Flugaufnahmen aus Palastina und Transjordanien (abs). Schweizer. Naturf. Geo. Verh. 115:448-449. (Zurich). (Physiography of Palestine and Transjordan)
- O'Regan and T. C. Schmidt. 1983. Recommendations on the Development and Execution of a Microregional Planning Study; Rural Village Survey and Revenue Generation Study. USAID.
- Park, B. C. 1955. Technical Report on Range Improvement, Development, and Management for the Hashemite Kingdom of Jordan. ICA.
- Quennell, A. M. 1951. The Geology and Mineral Resources of (former) Transjordan. Colonial Scol. and Min. Res. V.2 No. 2:85-115 (Map at 1:500,000).
- Quennell, A. M. 1951. Notes on a New Geological Map of Transjordan (abs). Int. Geol. Cong. 18th Great Britain Rept. pt. 14, p. 55.
- Sagric. 1983. Land Use Capability Planning Study. Jordan.
- Sa'Sa, A. R. 1973. Die Sozial Kulturellen Probleme der Se Bhaftmachung Von Kamel-Nomaden en Sud-Jordanien. (El Jafr Region). Inangular Doctoral Dissertation.
- Sa'Sa. A. R. 1978. Socioeconomic and Cultural Projects Concerning Beduin Settlements. Ministry of Agriculture. (Arabic).
- Sa'Sa. A. R. 1982. Beduin Settlement Projects -- Goals, Implementation Problems. Ministry of Agriculture.
- Sa'Sa. A. R. 1982. Irrigation and Land Reclamation Division and Beduin Settlement Projects: Goals, Implementation, and Problems of projects. Ministry of Agriculture.

- Schattner, I. 1962. The Lower Jordan Valley, Scripta Hierosolymitana, 11 Jerusalem.
- Solignac, J. L. M. 1956. The Development Possibilities of the Azraq Area. Ec. Planning Div. Amman. Hashemite Kingdom of Jordan. Ministry of Economy.
- Steitieh, A. et al. 1981. Population, Employment, and Economic Development of Jordan. Univ. of Jordan.
- Trent, V. A. and R. F. Johnson. 1967. Geologic map of the Haql Quadrangle, Kingdom of Saudi Arabia, including a portion of the Hashemite Kingdom of Jordan ceded to Jordan after mapping was completed. 1:100,000. Saudi Arabia, Min. Petrol. Min. Res. Jeddah--USGS, Washington, D.C. (USGS Min. Invest. Map M1-12).
- Tutunji, R. 1978. Report on the Status of Women in Jordan. Dept. of Women's Affairs, Ministry of Labour, for USAID Mission.
- UN/ECWA. 1983. The International Drinking Water Supply and Sanitation Decade Activities in the Ecura Region. 1981-1990. Baghdad.
- UNDP/FAO/NRA. 1974. Medium Term Plan FA Development of Groundwater Irrigation in East Jordan. Project No. JDR/71/525 with Annexes.
- UNEP. 1983. Report on Range Rehabilitation in the Eastern Low Rainfall Areas.
- USAID. 1983. Project Identification Document: Highland Development Project.
- U.S. Geological Survey and Arabian American Oil Company. 1963. Geologic Map of the Arabian Peninsula. 1:2,000,000. Joint Sponsors: Kingdom of Saudi Arabia, Ministry of Petroleum and Mineral Resources, and the U.S. Department of State. Miscellaneous Geologic Investigations Map 1-270 B-2.
- de Vanmas, E. 1967. Phenomenes Karstiques en Mediterranee Orientale in Phenomenes Karstiques. Fr. Cent. Resh. Dos. Cartogr. Geogr. Mem. Doc. Vol. 4:193-277.
- Wetzel, R. and D. M. Morton. Contribution a la Geologie de la Trans-jordanie. Notes et Memoires Moyen Orient t 7:95-191.
- WFP. 1983. Project for JOR 2422 Expansion.
- WFP/PAM/PMA. Project for CFA Approval on Assistance to Primary Schools. Project Summary.
- WFP/PAM/PMA. Project Summary on Assistance to Maternal and Child and Family Health Centres.

- White, L. P. 1969. Vegetation Arcsin Jordan. *Jrnl. of Ecology*, Vol. 57, No. 2:461-464.
- WHO. 1981. The International Drinking Water Supply and Sanitation Decade Directory.
- Willimott, S. G. et al. 1964. Conservation Study of the Southern Highlands of Jordan. Ministry of Overseas Development. London.
- Wolfart, R. 1961. Ergebnisse hydrogeologischer Arbeiten in Jordanien und Saudi Arabien. *Dent. Geol. Geo. Z.* Vol. 113 No. 1, 8.
- Wood, P. S. 1975. Report on Forestry Research Project, Jordan. IDRC. Canada.
- World Bank. 1981. Kingdom of Jordan -- Rainfed Agricultural Subsector Memorandum. Report No. 3285-10.
- World Bank/UNDP. 1982. A Model for the Development of a Self-Help Water Supply Programme. Technical Paper No. 2.
- Zureik, H. 1977. The Changing Role of Arab Women. Conference Report. ECWA/UNFPA/ILO.

RELATED PROJECT ACTIVITIES CURRENTLY UNDERWAY  
APPENDIX 5

**APPENDIX 5**  
**RELATED PROJECT ACTIVITIES CURRENTLY UNDERWAY**

P-8 Al-Hammad Catchment (Pan-Arab). This project covers an area of about 166,000 square kilometers of four Arab countries; Iraq, Saudi-Arabia, Syria, and Jordan. The detailed studies sponsored by ASCAD and the Arab Fund for Socioeconomic Development were submitted to the governments this year. The study evaluated the available resources and the socioeconomic conditions in the Al-Hammad area. This project study began in 1979 with a total cost of \$27 million for the four-year period. The main objectives of the project were to:

- Settling the Bedoens in 15 to 20 centers where the developments and infrastructure will be made available.
- Increasing the red meat production by about 260 percent and milk production by about 300 percent. The total value of the production is estimated to be \$600 million.
- Increasing the carrying capacity from 2.2 million head of sheep and goats and 35,000 camels to 3.5 million head of sheep and goats and 50,000 camels.
- Implementing a range development program for 12 million hectares by introducing organized grazing, fodder distribution, and range improvement.
- Improving water spreading and the productivity of rangeland by following better planting and plowing techniques.

- Making more effective use of surplus groundwater for growing fodder crops.

P-9 Wadi Al-Arab Catchment. This catchment has an area of about 31,900 ha and lies near the northern border of Jordan where a dam is currently under construction. A team from the Arab Organization for Agricultural Development is currently working to develop a scope of work for the development of this area. Their report should be available in late 1984.

The area has a population of about 62,000 inhabitants distributed over 319 villages and settlements. About 10% of the population is involved in agriculture. The main activities being suggested by this group are to improve varieties of crops and forages to stabilize the watershed and to improve the research and extension activities in the region.

P-10 Wadi Araba. The Wadi Araba catchment is located in the southern end of the Rift Valley and is about 1,390 square kilometers. Several groups have surveyed this area to determine the feasibility for further development. Regionalization will allow future priority comparisons.

P-11 Zarqa. The Zarqa project consists of three subcatchments. primary activities have been in the lower Zarqa to date with activities in the other expected soon. The projects pilot implementation phase began in 1982 on 82,000 ha and the main implementation work is expected to begin in 1986 and be completed by 1993.

P-12 Aqaba. The Aqaba authority is relatively new and will be developing its own projects as planning continues. It occupies about 12,800 square kilometers.

- P-13 Highlands Development Project (MOA & WFP). This project is operating in the highlands region where the rainfall exceeds 250 mm. The project aims at reclaiming the highland watersheds through soil conservation practices and tree planting. Since the project was initiated in 1965, 25,000 hectares have been reclaimed and planted with fruit trees.
- P-14 Highlands Development Project (USAID). The project identification document was completed in February of this year. The main objective of this project will be to improve the research and extension service to the people of the highlands. Agricultural credit for these farmers is also a key component of this project.
- P-15 Land Capability study (Australia). This study covers all the rainfed land in Jordan. The area is being mapped into different classes according to each units capability and potential.
- P-16 Lajjoun Range Rehabilitation Project (UNEP). The objective was: To provide a model of range development of sufficient scale that areas outside the project will be likely to replicate the project both in Jordan and the West Asia Region as a whole. This project was developed by a UNEP mission in December 1983. The location and general scope of work seem appropriate but implementaton has not begun. The project description should be reviewed while desiging projects D-1 and T-2.

#### Other Related Projects

1. Afforestation (GCJ & WFP). A total of 125,000 hectares are registered as forestland in Jordan. Of this 35,000 hectares is natural forest. Another 25,000 hectares has been planted since 1948 through the Department of Forestry and Range in the MOA. The MOA plans to plant another 25,000 hectares in the near future.

2. Wadi Al-Duleil Project (German & MOA). A semidetailed study of the Wadi Al-Duicil catchment (240,000 hectares) is expected to be finished in September 1984. The initial surveys have completed by a joint German and Jordanian team and the team is now selecting some pilot study sites.
3. Range Improvement. The attempt to protect and improve rangeland started over 50 years ago. Since that time approximately 15,000 hectares have been fenced and protected under the control of Department of Forestry and range. Some of this land has been partially revegetated with palatable shrubs.
4. Research Activities (Ford foundation, ICARDA, UJ/FA, and MOA/DRE). A five-year research project has been finished with the main objective being to improve the productivity of wheat and barley in the highlands.
5. Seed Multiplication Project (Germany, MOA, & JCO). This project is aimed at developing and testing certified and higher yielding varieties of cereals.
6. Dryland farming project (GOJ & Australia). To promote fodder production through introducing fodder crops into the rotation (medics/vetch).
7. Wheat Production Project (GOJ). A study on the feasibility of growing wheat in the Jordanian desert under irrigation is complete. A team from different organizations is preparing a detailed plan for the implementation phase. Preliminary guidelines suggest that about 9,000 hectares will be planted within this project.

8. Rangeland and Forage Development Projects (GOJ/WFP). To improve the rangeland by planting forage shrubs and protecting the plantings from grazing and to promote fodder production by introducing legumes into the cropping pattern and encourage sheep fattening through short-term credit.