



League of Arab States  
**Arab Organization  
for Agricultural Development**



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***Environmental Effects  
on  
Arab Region Agriculture***

**Arab Organization for Agricultural  
Development Paper  
(AOAD)**

**KHARTOUM - JUNE 1994**

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## **ENVIRONMENTAL EFFECTS ON ARAB REGION AGRICULTURE**

### ***1- Introduction :***

The majority of the Arab region lands (about 60% of the total land area) fall in the arid and semi-arid region. According to United Nations reports, about 95% of this area receives total annual rainfall of less than 40 mm of rainfall per annum. In addition to such conducive conditions for desertification, the situation is aggravated by the tyrant and unwise exploitation of the natural resources which lead to low crop productivity, loss of grazing pastures and accelerated rate of desertification.

The total arable land of the Arab region amounts to about 198.3 million hectares; 30% of which falls in Sudan, 20% in Algeria, 8% in Morocco and only 0.6% in Iraq. About 80% of this is under rain cultivation. Forests cover about 130 million hectares; about 70% of which is in Sudan and 7% in Somalia. The range lands and pastures cover about 174 million hectares, the majority of it falls in Mauritania, Sudan & Somalia. On the other hand the available water resources, in this region, amounts to about 156 milliard cu. m.; about 86% of which goes to agriculture, 11.5% to industry, and about 5.5% for domestic use.

Despite all of the above limitations, the rate of increase in population is one of the highest in the world (about 3%) compared to the world average of about 1.7%. The total population of the Arab region is about 200 million people (1993 estimation); 70% of them live in the African-Arab countries; while only 30% of them live in the Asian-Arab countries. The percentage of people living in the rural areas represent about 55% of the total population, but this percentage is expected to decrease sharply by the year 2000 due to the ever increasing rate of immigration from rural areas to the urban areas.

It is, now clear that the majority of the Arab population are engaged in different rural activities, which has, in one way or the other, some sort of impact on the limited natural resources available in

the region. Thus any of the human activities, that may have any negative impact on the natural resource will, definitely abset the natural evnvironmental balance which will ultimately affect the wellbeing of the whole population.

## **2. *The main environmental problems :***

### **2..1 *Desertification :***

Desertification in Arab region is related mainly to the human over use and bad management of an already fragile environmental system prevailing in arid and semi-arid region. The main factors causing desertification in this region are :

#### **2.1.1 *The climatic condition :***

The dry and semidry climate dominate the majority of the Arab region. It is characterized by low and fluctuating rainfall, high temperature during summer and high evaporation rate. In addition to this the area is exposed to strong hot dry winds which cause soil erosion.

#### **2.1.2 *Mismanagent of the natural plant cover***

Over grazing, reduces the capacity of regeneration of the grazed plants, and uncover the soil to adverse water and wind erosions.

#### **2.1.3 *Agricultural practices :***

Wrong direction of ploughing and continuous cultivation are few of the wrong agricultural practices which lead to loss of plant nutrients and damage of the soil structure and thus lead to its erosion.

#### **2.1.4 *Soil texure & Structure :***

Desertification is mostly associated with soils poor in its stucture and low in the natural binding material, the organic matter. Most of arid and semi arid lands of the Arab region are very low in their organic matter content and do not exceed 2% by any means. such soils can easily be subjected to erosion, salinization, alkalinity and ultimately bad drainage and water logging.

#### **2.1.5 *Management of water resources :***

Lack of knowldge about the importance of rational water usage lead to the over use of the limited water resources in the Arab region and ultimately the sufferings from the associated problems like salinization of the under ground water, which will directly affect the land productivity.



### **2.1.6 Socio-economic factors :**

The immigration of the productive man-power from the rural to urban areas and, even, to other neighbouring Arab countries in search for opportunities to improve their living conditions lead to complete ignorance of their agricultural land. This caused the subjection of such area to over grazing and tyrant cut of forests which lead to the deterioration of the agricultural qualities and the productivity of the land.

On the return back of the immigrants they tend to utilize what they earn in building of residents on the productive agricultural land, which will lead to more shrinkage of the agricultural land.

It can be concluded that desertification is the main problem that is facing developemnt the Arab countries. This problem encompasses all the environmental factors affecting agricultural development like degredation of plant cover, water related diseases, depletion of wild life and urban encroachment on agricultural lands. During the past decade, the Arab governments regional & international organization paid the issue of desertification in the Arab special attention. The council of Arab Ministers concerned with the Environment in his first meeting of 1988 and the last meeting of 1991 recommended that the Arab Organizations working under The Leaque of Arab States should include the issue of desertification in their programme of work.

The Arab Organizatin for Agricultural Development (AOAD) have given serious attention to the problem of desertificatin, since the early eighties. In this respect many studies in this field were finalized (A list of such studies is available).

### **2.2 Pollution by agricultural chemicals :**

The main agricultural policies in the Arab countries is to increase productivity of food crops so as to reduce food shortage gap. To achieve this, the policy called for vertical increase in yield through use of fertilizers and pesticides. This was manifested as direct or indirect negative effects; when the environment fails to accomodate, for one reason or the other, the excessive amounts of chemicals used in agricultural production. The Arab countries spent about 514 million dollars in 1988 on insecticides. About 47% of it were spent by the Nile vally and Horn of Africa region; 26.4% by the Arab Penenciola region 18% by the Mroccan region and only 0.3% by the Eastern Arab region.

On the other hand the consumption of the Arab countries for fertilizers increased from 1,8 million ton in 1982 to 3.0 million tons in 1988 i.e an increase of 183%.

The pollution by agricultural chemicals in the Arab countries causes serious losses both on the health as well as environmental levels.

### ***2.3 Diseases associated with irrigation water :***

The establishment of elaborated systems of irrigation in many Arab countries to irrigate the ever increasing agricultural lands has been found to be associated with the spread of some economically important discases like Malaria and Bilharsia. Both of these disease had very drastic effect on the health and productivity of people living in such environment.

### ***2.4 Endangerment of the biological diversity :***

Factors like desertification, tyrant cut of forests, horizontal spread of agricultural land and urbanizaiton play very important role in loss of valuable plant & animal species that can not be replaced, in many of the countries in the Arab region. Sudan, somalia and Mauritania are the countries having the largest forests and range-land acrages, yet during the few past decades they lost about 70% of their forests due to the tyrant cut of trees and organized agricultural schemes.

### ***2.5 Urbanization :***

The percentage of urban population, in the Arab countries increased from 55% in 1985 to 59% in 1990 and is expected to reach about 64% in the year 2000. At the same time, the percentage of rural population decreased from 45% in 1985 to 41% in 1990 and is expected to decline to 36% in the year 2000.

This pressure on urban area will definately have a drastic negative impact on the environment as it will be reflected as pollution, decrease of agricultural land and loss of valuable biological diversity.

***SUGGESTED ENVIRONMENT  
CONSERVATION PROJECTS***



## **1- Conservation and Development of Forests Project (Morocco, Sudan & Yemen)**

### ***Background :***

The deterioration of the environmental systems and natural resources jeopardised the development perspectives of many developing countries. Forests are considered as one of the important pillars of this system, in addition to what they are producing as food for the natives or wood to be used for different human needs. When the forests are degraded by tyrant cut of trees or complete removal of the forest in face of organized agriculture or urbanization, this will ultimately lead, not only to loss of the wood, but most importantly the productive capacity of the soil; through salanization, laterization, draught and erosion. Other echoes to this catastrophe, usually occur away from the removed forest, specially at areas of rivers discharges where the flow of water become so high during the rainy season and very low during the dry season. Also water erosion becomes so severe in such away that it washes out the rest of the few left trees and grasses. This will lead to the problem of silting out of the dams lacks and ultimately affect the effeciency of the dam and also the generated electricity.

### ***Justifications :***

The Forests and pastorial land in the Arab region were subjected to severe deterioration in the recent years due to the tyrant cut of forests for commercial reasons or domestic consumption. This loss in acreage of forest & pastorial land is estiamted to be around 7.3 million hectars during the period 71-1988 i.e. loss of 430,000 hectars per year.

The most affected countries, by this deterioration are, Morocco, Sudan & Yemen.

The area of forests in Morocco is estimated as 8.969 million hectars, about 8% of the total area of he country, the majority of it falls in arid and semi-arid areas of the country. Inspite of this relatively small percentage of forest area compared to the total country area, yet it is decreasing at rate of 35,000 hecatrs per annum.

In Sudan the area of forests is about 58 million hectars which was representing about 53% of the total area in 1968. In 1992 this area was diminished to 45 million hectars (about 18% of the total area of

the country). The most dangerous thing is that these forests produces, gum arabic which represents about 10% of the total country exports.

Similarly the area of forests in Yemen is decreasing at a very fast rate. The area of forests were about 4 million hectars in the early seventies. In 1990 the area of forests was only about 2 million hectars i.e. it decrease at a rate of about 100,000 hectars per year.

The above examples should pave the road for some quick action to salvage what is left from this wealth, knowing that, any of the above three countries has serious plans to compat this problem.

***Objectives of the project :***

1. To provide technical & institutional support for governmental agencies involved in developemnt of forests in the three countries.
2. To develop an environmentally feasable technologies that substitute the tyrant cut of forests.
3. To develop a suitable extension system for adoption of the technologies developed by the project.
4. To develop credit facilities that help in production of technologies that reduce the tyrant cut of forests.
5. To encourage the envolvemnt of local people and other NGO's in activities dealing with conservation and development of forests.

***Project Components :***

1. Techical and financial support for government agencies envolved in conservation and development of forests.
2. Development of technologies related to development of forests.
3. Development of technologies that can substitute the needs for tyrant cut of forests.
4. Selection of sites for the project in each of the three countries.
5. Establishment of forest extension unit.
6. Development of credit facilities.

***Duration of the project :***

***The project will be executed in 3 phases :***

***Phase I :***

It will continue for 3 months, and it will be dealing with the establishment of organization and administrative structure of the project.

***Phase II :***

It will continue for 9 months during which development, experimentation and evaluation of technologies will be executed, besides designing of the extension programme and selection of sites for the project.

***Phase III :***

This phase will continue for 2.5 years. It will be fully utilized for the execution of the project with all of its components.

***Phase IV :***

This phase will continue for 6 months and it will be devoted for the final evaluation of the project.

***Expected results :***

***Immediate results :***

1. Improvement of planning, monitoring, follow-up and execution capacities of the governmental agencies involved in development and conservation of forests .
2. Establishment of a statistical data base concerned with conservation and development of forests.
3. Production of tested technological packages for conservation and development of forests.
4. Production of tested alternative technological package for the tyrant use of forests.
5. Implementation of small fund generating projects for the private as well as the cooperative sector.



6. Increase of environmental awareness among the inhabitants in the area of the project.
7. Increase of involvement of local people in efforts essential for development and conservation of forests.

***Medium term results :***

1. Conservation of the now existing forests and establishment of new areas.
2. Improvement of health conditions of the inhabitants.
3. Improvement of the economical conditions of the beneficiaries from running of small projects funded by credit activity.
4. Limitation of desertification.
5. Improvement of agricultural soil.

***Long term results :***

1. Reduction of the fluctuation of rains, in amount and duration in the climatic region of the project .
2. Increase in the efficiency of irrigation systems and electrohydrological stations and other similar establishments.
3. Conservation of the biological diversity.
4. Increase the future renewal capacities of the natural resources.
5. Increase the chances for the coming generations to make use of the renewable natural resources.

Summary of Budget :

I T E M S	\$
1. Institutional support	1,000,000
2. Forests develop. technologies	1,000,000
3. Improvement of alternative tech.	1,500,000
4. Forest extension	1,000,000
5. Credit	3,000,000

## **2- Establishment of A National Center for Conservation of Plant Genetic Material in the Sudan**

### ***Background :***

Biological diversity plays very important role in the insurance of food security and the welfare of human beings. Adverse environmental factors like desertification, negative side effects associated with urbanization, tyrant cut of forests and over grazing has drastic negative impacts on quality and quantity of living material in the biosphere, these in turn have negative effects on the economical, scientific & cultural aspects represented by the biologic diversity.

Sudan with its largest land area of all Arab country, encompasses wide variety of bioclimatic regions; extending from the desert to the equatorial region, thus furnishing excellent condition for the growth of wide variety of plants. In recent years this wealth of plants has been endangered by many of the adverse environmental factors mentioned above. The preservation of such genetic material is not only important for Sudan but also for all Arab countries.

### ***Project justifications :***

1. Present & future development of agriculture depends on the use of improved high yielding varieties developed by the local research stations or imported from abroad. This will definitely lead to neglegance of the old local types already adapted to the conditions of the area where they are grown.
2. The recent boom in agricultural development depends, for some of its components on the increase in acreage which means reclamation of new lands. This will in turn result in loss of an appreciable amount of the already existing natural plant cover.
3. Establishment of irrigation ifrastructures like dams and canalization is definitely the second most important factor after the land resource. The flooding of land by the water stored in the lake behind the dam will lead to loss of very valuable indogenous natural plant species.



4. The tyrant cut of forest trees and over grazing usually lead to loss of some improtant plant species.

***Objective of the project :***

1. To preserve the genetic diversity in agricultural, pastorial and forest plants.
2. To formulate a comperhensive and effective mechanism, with financial and legislative powers to ensure the protection of the genetic diversity in food crops and other endangered plants in Sudan.
3. To availle the collected material to the welfare of the human beings of the Sudan, Arab countries and other parts of the world.
4. To collect and store all the available sudanese genetic resource enteries.

***Project compnents :***

1. Establishment of :
  - Refregerated storage rooms.
  - Data collection & analysis rooms with computers.
  - Laboratories
  - Offices.
  - Any other buildings
2. Survey and collection of samples.
3. Training.
4. Research and classification of the collected material.

***Duration of the project : 5 years.***

***Expected results :***

1. Long as well as medium storage period for seeds, besides preservation of the plants that do not produce seeds by growing them in the field or under artificial conditions.
2. Design and excution of a perminant programme for propagation of seeds and continuous evaluation of the preserved genetic resources and availing it to the plant breeders and other scientists.

**3. Documentation of all the information dealing with genetic resources preserved in the center.**

**4. Establishment of a new base for advancement of scientific research**

**Summary of Budget :**

	<b>Local component</b>	<b>Foreign component</b>
<b>Buildings</b>	50,000,000	150,000
<b>Equipment</b>	5,000,000	3,000,000
<b>Transport facilities</b>	10,000,000	50,000
<b>Training</b>	5,000,000	450,000
<b>Consumables</b>	50,000,000	50,000
<b>Total</b>	120,000,000	3,700,000



### ***3- Genetic Resources Protectorates Project For the Endangered Wild Animal Species of Desert Areas***

#### ***Background :***

Sound plans for combating desertification should take into consideration all the basic elements of production, including soil, water, plant and wild animals. The genetic resource protectorate for wild animals should receive special attention, since it was subjected to severe negligence and miss-use, during the few last decades, due to the deterioration of the natural habitat, draught, tyrant hunting and removal of plant cover.

The importance of preservation of indigenous wild animal species is stemming from some national, regional as well as international considerations. The value of wild animals species as an international wealth besides their environmental, economic, scientific and recreational values are increasing from one day to the other.

Saudi Arabia, Sudan and Eriteria are suggested to host this project, since all of the three are encompassed within the Afrotropical realm, and have similar environments as well as animals. This helps in setting a common administrative plan under which the extinct animals in one country can be substituted by the same species from any of the other two countries contributing in the project, besides exchange of experts.

This project is based on the outcomes of the World Strategy for Conservation of Nature (1990) and Earth Summit (1992) conferences, which call for establishment and support of natural protectorates within the framework of attention paid to all elements of natural resources at the national, regional or international levels.

In spite of the fact that the deserts in Sudan constitutes about 35% of the total country area, yet there is no single natural protectorate established in the area. Many of the endangered animal species live in this habitat. Despite the fact that Sudan established some areas as protectorates in Eastern Sudan. Unfortunately they are lacking protection as well as scientific administration needed for conservation of its biological diversity.

As for the newly independent country of Eriteria which was

As for the newly independent country of Eritrea which was fighting its independence war for the last 20 years, suffered a lot from the loss of its wild wealth. The long list of priorities competing for its limited financial resources gave no chance to pay any attention to the endangered animal resources.

On the other hand the fast economic growth of Saudi Arabia, after the discovery of petroleum, had some negative effects on the natural habitat, especially wild life. The National Corporation for Protection of Wild Life was established in Saudi Arabia in 1986 and since then it finalized many of the conservation projects for wild animals. Besides this the corporation has active research programmes dealing with biological research and multiplication of wild animals as a step before their release in the protectorates established in their natural habitat.

***Objective of the project :***

1. Establishment of wild animal protectorates in Saudi Arabia, Sudan and Eritrea to conserve the endangered species of wild animal .
2. To supply the extinct animal species in one country from those available in the other countries contributing in the project.
3. To exchange information and expertise in the field of conservation of endangered wild animal species of the deserts.

***Project Justification :***

1. As a result of increase in population in the few last decades, and in absence of national plans for utilization of the natural resources, one would observe the quick deterioration of natural resources like plant cover and wild animals. This picture has been exaggerated by the continuous drought spells which ultimately lead to a faster rate of desertification.
2. Absence of integrated look and weak understanding of multiple usages of the natural resources concept, lead to the ignorance of the importance of conservation of the wild animal species.
3. Attention paid to wild animals & their habitat is still very minor, and thus lead to the meager economical returns from investing in such activity.

4. Lack of legislative and technical infrastructure capable of protecting the wild life facilitate the degradation of these natural resources.

***Project components :***

1. Preliminary surveys of the selected areas of the project.
2. Management plan of the project.
3. Extension and education to the target groups of local people in the project area and then to the discission makers.
4. Establishment of wild animal protectorate in the desert regions of the three countries.

***Project duration : 3 years.***

***Expected results :***

***Immediate results :***

1. Establishment of natural potectorates for wild animals through detailed administritive plans. And strengthing methods of protection for the protectorates and their animals.
2. Development of the natural resources will definetely lead to development of water and range resources which will lead to retardation of the rate of desertification, increase in the number of the wild animals and conservation of other natural resources.
3. Development of the wild life administration through availing of the logistic support.
4. Development of tourism associated with wild life.
5. Increase the awarness of the local people to the value of wild life through their envolvment in execution of wild life programmes.
6. Strengthening the co-operation between the countries contributing in the project, in the field of protection of wild life.



***Medium term results :***

1. Gradual improvement of natural habitat and increase in the number of wild animals.
2. Reduction of the rate of deterioration of the natural resources and compating of desertification.
3. Positive contribution from local people and increase in environmental awarness.

***Long term results :***

1. Decrease of the rate of desertification.
2. Extending the project experience into other countries.
3. The project contributed to international efforts for conservation of environment, compating of desertification and conservation of wild animals genetic resources.
4. Contribution of the project to the sustainable agriculture development.

Summary of Budget:

I T E M S	\$
1. Staff & Experts	950,000
2. Surveys, Admin. plans, rehabilitation of irrigation and other plant habitats and reintroduction of wild animals and training	460,000
3. Logistics	450,000
4. Running costs	120,000
5. Other expenses	198,000
T o t a l	2,178,000

#### **4 - Natural Resources Inventory through Standardized Geo-Referenced Data-base for Sustainable Agricultural Development, Planning and environment conservation**

##### **INTRODUCTION :**

The overall aim of the proposed project is to complete, standardize , organize and make readily available resource data on soils, water, land, vegetation and climate in the Arab Region , in order to achieve a more efficient and sustainable utilization of the land and to conserve the environment .

The conventional approach toward using the agricultural land in the Arab Region has been to allow and encourage agricultural development hazardly and randomly without applying tested technology and thus prevented the use of the land to sustain continued production systems. This has led to a serious deterioration and waste of the natural resources mainly soil and water. This approach assumes that the future is out of our control . Therefore, it is suggested that regional projects based on ecological -economic zoning by utilizing natural resources information systems and analytical tools for land use planning to be adopted in order to halt this deterioration and conserve and rehabilitate the natural resources . The basic data on the land use generated by the natural resources information systems would also facilitate and optimize specific and more reliable detailed statistics which are urgently needed for the Arab Region for its agricultural development planning on sustainable basis.

Evaluation of natural resources and ecological-economic zoning form an essential part of a decision support structure for sustainable land use planning .

The present problems in land use , as related to the various physical and chemical constraints of the soils, excessive irrigation and over-exploitation of the land and water resources, resulting in salinization , desertification and land degradation in general , require a regional approach based on an interregional system for the exchange of resource data ;

There is already a vast amount of resource data in the Region, but often dispersed and not accessible . In several countries data collection on natural resources is expected to increase through national or multilateral programs. Only with a coordinated approach there would be an optimal effect to the Region as a whole .

The establishment of Geographic Information Systems (GIS) and their component resource databases enables the systematic and comprehensive storage and retrieval of all necessary data. Introduction of this technology on the regional basis, with subsequent linkages to national systems, would strongly enhance the organization of natural resources data and application to regional and national resource studies planning , and strategies.

For practical purposes, such as functional field programs and funding it is necessary to subdivide the region. A logical geographic sub-division would be the following :-



**site (1)**

Jordan  
Lebanon  
Iraq  
Palestine

**Site (2)**

Saudi Arabia  
Yemen  
Oman  
United Arab Emirates  
Qatar  
Bahrain  
Kuwait

**site (3)**

Morocco  
Mauritania  
Algeria  
Tunisia  
Libya

**Site (4)**

Sudan  
Egypt  
Somalia  
Djibouti

The main regional center (Headquarter of the project ) will be the Arab Organization for Agricultural Development in Khartoum . However, the selection of four regional sub-centers for the above four geographic sub-divisions will be open .

Achievement of the objectives of the proposed projects will enable application of the results and quantified interpretation of the available maps in follow-up projects related to land use planning, determination of the potential of land for irrigation and rainfed agriculture, identification of range land and forest areas, land management, erosion and degradation of the land, salinization and desertification .

**THE PROPOSED PROJECT****OVERALL OBJECTIVES :**

The overall aim of the project is to complete, standardize and organize resource data on soil, water, land vegetation, and climate in the countries of the Arab Region through computerized geographically referenced resource databases in order to achieve a more efficient and sustainable utilization of the land , with the objective to preserve the environment and enhance self-sufficiency in food production. The basic data generated by the above natural Resources information systems would facilitate and optimize specific and more reliable detailed statistics which is urgently needed for the Arab Region for its agricultural Development and planning on sustainable basis.

### **DEVELOPMENT OBJECTIVE**

To improve the food security situation and preserve the environment in the Arab Region by efficient utilization of the natural resources through transfer of technology with the aid of standardized geographically referenced computerized databases on natural resources.

### **IMMEDIATE OBJECTIVES :**

1. To have improved by 1997 the regional physical planning base for agricultural development through the availability of a standardized GIS based soil inventory at a related scale of 1:1 million .
2. To have established by 1997 an efficient technology transfer system based on geographic information systems (GIS) and standardized natural resources databases .
3. To create by 1997 a well trained personnel in each participating country for the operation of GIS and data bases on natural resources.

### **PROJECT ORGANIZATION :**

The project will be executed in the above mentioned Arab countries by **AOAD**. **AOAD** in Khartoum will be the headquarter of the project. Three sub-centers will be selected according to the above logical geographic subdivisions.

### **BRIEF DESCRIPTION :**

The above proposed project is designed to develop a unified computerized maps and land information systems "data bases and GIS" , for the natural resources with the establishment of unified computerized information on soil types , their spatial distribution and their properties , water, land vegetation and climate within each sub-region for planning , management and potential users.

Another application of such an approach would be to facilitate the production of many kinds of interpretative maps and , if any updating of mapping data from these printed maps is required it could be performed very quickly and economically .

The creation of the proposed national resource databases for the sustainable development , is that will also increase economic integration in the region and in the international markets which creates the potential for large efficiency production from the available natural resources.

The above development program will develop models in support of the planning and decision-making processes involved in national resources management . It will also develop models which will identify , quantify and possibly value the sustainability constraints in each country.

It will clarify the uncertainty that surrounds the interrelationships between resource use, degradation and depletion. It is these complications that have implications for agricultural planning and policies at national and regional levels. However, many tools are available to deal with this complexity and to determine the constraints related to the resource use and pollution for sustainable development. Once these constraints were identified then many of them can be alleviated through adoption of appropriate improved technology and through policies designed to encourage more ecologically sound agro-forestry-livestock systems. The agro-ecological zoning methodology would permit an objective evaluation of land potential for agriculture, forestry, and pastures. The efficiencies from this approach will utilize and release the resources essential for realizing sustainable economic development on a scale not realized in the past.

#### **OUTPUTS :**

- Completion of the existing surveys at different scales of the land resources and their potentials and limitations, by mapping and classification in the field, interpretation of remote sensing data and laboratory investigations, thus creating interactive standardized soil, climatic, vegetation, and water data sets.
- Agro-ecological zoning studies and pilot investigations, both in cultivated and non-cultivated lands, to determine the kinds and severity of land degradation, actual or potential. Such investigations would eventually make it possible to appraise the lands in terms of their crop productivity and population supporting capacities on a long-term basis. Eventually the data collected from these investigations would help formulate policies and plans to halt and prevent resource degradation.
- Development of an appropriate database on current water use, land use, rangeland use, forest, land cover and crop requirements, with the capability of assisting in the interpretation of natural resources data through the use of GIS. The purpose of GIS, can help reduce uncertainty by providing relevant, accurate and up-to-date information to the government institutions concerned.
- The above developed databases and models need to be further developed and modified to combine physical, social and economic information to precisely identify and describe individual land units and to match these with combinations of crops and production systems which are socially and economically viable. There is a need for information which cover both suitability and growth modelling.
- Development of a common approach based on a regional system for the exchange of land resource and management information, to avoid or solve problems of land use, such as excessive irrigation or over-exploitation of the land and water resources as related to the various physical and chemical constraints of the soils. This would lead to an improvement in soil and water management techniques, enhancing soil fertility and agricultural in soil and water management techniques, enhancing soil fertility and agricultural productivity.



- Provision of information for estimating the economic benefits of various methods or options for managing the lands.
- Development of sustainable agricultural planning in the Arab countries .
- Assessment of the present land situation and eventual recommendations for the conservation of soil, water, pasture, forestry resources by using appropriate technology.
- Provision of comprehensive approach to land use policies and planning.
- Establishment of an operational georeferenced computerized databases including all necessary facilities and trained manpower in each country.

### **PROJECT COMPONENTS :**

The project consists of the following :-

#### **1. STAFF :**

- 1.1 National Staff (counter -parts )
- 1.1 Experts and consultants
  - 1.1.1 Remote sensing expert
  - 1.1.2 Agro-climatic expert
  - 1.1.3 Agro-ecological zoning expert
  - 1.1.4 Soils expert
  - 1.1.5 Water expert
  - 1.1.6 Vegetation expert
  - 1.1.7 Data base management expert
  - 1.1.8 GIS expert
  - 1.1.9 Soil - Economic expert
  - 1.1.10 Livestock expert

#### **2. EQUIPMENTS :**

- 2.1 GIS Micro computers with Laser printers, plotters, scanners, digitizer and accessories
- 2.2 Photocopying machines
- 2.3 Word processors complete with accessories
- 2.4 Generators and batteries for uninterrupted power supply .
- 2.5 Soil survey equipment
- 2.6 Laboratory equipment
- 2.7 Cartographic equipment

**3. VEHICLES :**

- 3.1 Station -wagon Vehicles (4)
- 3.2 Pick-up (4)

**4. TRAINING :**

- 4.1 In-service Training
- 4.2 Abroad Training

**PROJECT BUDGET :**

**1. Government Inputs :**

**1.1 STAFF :**

The Government of the participating countries shall provide full time and part time counterparts and other support staff to work with the international experts. The number of national expert staff will depend on the amount of data available and the size of the country . In average there will be from each country one full time specialist in soil , climate , vegetation , water, livestock, social economic, database and GIS . The specialists will take part in the studies as organized in the host country as well as in other participating countries .

**1.2 OFFICES AND WORKING SPACE :**

The Government of the host country shall provide suitable office accommodation for all regional and international staff selected for the regional and sub-regional centers , and also make available for full time use by the project computer rooms with the necessary facilities and other working space as required.

**1.3 MISCELLANEOUS :**

The Government of the participating countries shall make available all topographic and thematic maps , aerial photography, satellite imagery and natural resource data as needed for the project .

**2. DONOR INPUTS :**

**2.1 STAFF :**

- 2. 1. 1 Remote sensing (vegetation ) expert
- 2. 1. 2 Agro-climatic expert
- 2. 1. 3 Agro -ecologic expert
- 2. 1. 4 Soils expert
- 2. 1. 5 Water expert
- 2. 1. 6 Vegetation expert
- 2. 1. 7 Data base Management

2. 1. 8	GIS expert	
2. 1. 9	Socio-Economic expert	
2. 1. 10	Livestock expert	
2. 1. 11	Others to be identified	= 2.700.000
<b>2. 2</b>	<b>EQUIPMENTS :</b>	= 5.000.000
<b>2. 3</b>	<b>VEHICLES :</b>	= .300.000
<b>2. 4</b>	<b>TRAINING :</b>	
2.4.1	In - service and abroad training	= 1.300.000
<b>2. 5</b>	<b>OPERATIONAL COSTS :</b>	
2. 5	Operations (Vehicles, Equipments	= 900.000
-	Travelling	= 1.000.000
-	Sundry	= 400.000
-	Expendable items	= 400.000
		<u>3.100.000</u>
<b>2. 6</b>	<b>Miscellaneous</b> (including staff of implementation plan )	= 1.000.000
<b>2. 7</b>	<b>Project Management (10%)</b>	= 1.000.000
	<b>Grand Total</b>	= 14.000.00 \$

#### **IMPLEMENTATION PLAN :**

Stage I. Preparaion of Project Document by visiting the countries for detailed identification of existing institutions , equipment , facilities and availability of data.

Stage II . Project Implementation

1. Recruitment of experts
2. Purchase of equipment
3. Purchase of Vehicles

Stage III . Execution of the project including training .



## **5 - Improvement of Water use efficiencies in Agriculture in the Arab Region**

### **A. Background :**

The growing water scarcity and the misuse of the available water resources in the Arab Region are nowadays a major threats to sustainable agricultural development sector which accounts for about 80 to 85% of the water consumption . The majority of the Arab Region suffers from water shortages due to evident mismatches which exist between the demand and supply of water in this region which is characterized in general by semi arid and arid climate.

The situation has worsen further during the last decades due to the occurence of occasional droughts which hit very often the Arab Region and cause very negative impacts on surface water and groundwater reservoirs thus resulting in a devastating effects on crops production and food crisis.

These developments are placing enormous pressure on agricultural policy markers and farmers . Throughout the Arab Region, governments assume the prime responsibility for ensuring food security and, because food depends increasingly on irrigation, food security is closely linked with water security

Over 50 percent of the total value of agricultural production comes from the irrigated 15 to 20 percent of the total cultivated land. Irrigation projects can contribute greatly to increase incomes and agricultural production compared with rainfed agriculture . In addition irrigation is more reliable and allows for a wider and more diversified choice of cropping patterns as well as the production of higher value crops. Irrigation's contribution to food security in most of the arab states is widely recognized , but in view of the water shortages in most of the Arab Region, irrigated agriculture is expected to produce much more in the future while using less water than it uses today. This implies of course that the security and efficiency of irrigated crops will become more important to the sustainability of the agricultural sector.

In the present time water shortages have led most of the Arab states to increase food imports because the local agricultural sector is not able to produce sufficient food to fill the existing food gaps.

These increasing food gaps which concern both national governments as well as the international and regional agencies which provide assistance in this field, appear nowadays to pose a serious challenges beyond the economic and political capacity required for the necessary adjustments concerning the allocation and use of water in agriculture.

Despite the considerable efforts undertaken so far by most of the Arab states to mobilize their available water resources to ensure food self sufficiency , there appear very serious indicators of a forthcoming water crisis in most of the Arab States which may worsen in the future. Added to this complex water crisis context of the Arab region, is the fact that more than 50% of the global water demand is supplied by surface water resources shared with neighbouring countries. Also there exist several extended groundwater aquifers shared with these neighbouring countries and which are subjected to a severe over exploitation which might have very serious negative impacts on the available groundwater resources .

In order to cope with these water crisis threats, water issues in the Arab Region have been the focus of increasing national and regional debates. Very recently the Social and the Economical Council of the League of Arab States has charged the relevant Arab organizations , among them the Arab Organization for Agricultural Development, to prepare a Regional Arab water security Master Plan which should define innovative approaches to the assessment and national management of water resources and which involve the integration of sectoral water plan within the frame work of national and regional economic and social policies. These approaches imply therefore the development of range of strategies and policies based upon : efficiency and rationalization of water utilization in agriculture as well as the extension of the use of modern irrigation techniques and development of the local water resources through wide utilization of water harvesting techniques. But the implementation of these water use policies necessitates the establishment of incentives, regulations and restrictions that will help guide, influence and coordinate how farmers use efficiently water in irrigation , while encouraging innovations in water saving technologies .

## **B - OBJECTIVES**

The project aims at promoting rational and efficient water use in agriculture in the Arab Region in order to increase agricultural productivity . Therefore its main objectives are :

- 1- Improvement of Building capacity of the Arab institutions in charge of water utilization in agriculture.
- 2 - Promotion of the use of appropriate technologies in irrigation.
- 3 - Promotion of the use of appropriate technologies in the field of water harvesting
- 4 - Improvement of the extension services in the field of irrigation.
- 5 - Development of a comprehensive rational training programme in the field of water utilization in agriculture .

## **C - TARGETED INSTITUTIONS**

- 1 - Government institutions in charge of irrigation water management .
- 2 - Training institutions in the field of water and irrigation.
- 3 - Irrigation water Users Associations

## **D - PROJECT COMPONENTS :**

Based upon the project's objectives, the project components include the following activities :-

### **1 - Institutional and technical support activities :**

- Survey and assessment of technologies and approaches being used for the utilization of the available water resources in agriculture .
- Survey and evaluation of programmes and activities of the training institutions in the field of water and irrigation.
- Assistance of the national training institutions in the field of water and irrigation.
- Adoption and promotion of the use of appropriate techniques for efficient and rational water utilization in agriculture.
- Assistance of the relevant institutions in the elaboration and implementation of a comprehensive national action plan for improvement of efficiencies of water utilization in agriculture .

### **2 - Promotion of the use of Water harvesting and irrigation appropriate technologies .**

## **E - PROJECT DURATION**

The project will be implemented during four years over four phases as follow:

### **1 - phase 1- (six months )**

This phase will be devoted to :

- Finalization of the design of the project document .
- Setting up the organizational and administration frame work of the project.
- conducting preliminary survey about the current state of water utilization planning and management policies in each individual country of the project area.



- preparation of the terms of references of a master plan for improvement of water utilization efficiencies in the agricultural sector.

## **2 - Phase 2 - (one year )**

Includes the following activities:-

- Formulation of a Master Plan for improvement of water use efficiencies in the agricultural sector.
- Adoption and adaptation of appropriate techniques for water rational utilization .
- Technical Assistance of the governmental institutions in charge of irrigation development of training programme packages; implementation of water management rational programme ; etc.
- Training of the local staff.

## **3 - Phase 3 - ( Two years )**

Includes the following activities :-

- Finalization of the Master Plan for improvement of water use efficiency.
- Extension services for the implementation of the project identified appropriate techniques related to rational water utilization in irrigation and water harvesting .
- Training of the local staff

## **4 - Phase 4 (6 months)**

This phase will be devoted to the final evaluation of the project

### **F. Project implementation procedures and institutional relationships**

#### **1- Administration of the project:**

Administration of the project will be conducted at the regional and country levels as follows :-

##### **a- Regional level :-**

- Six (6) Arab Countries will be selected as follows:-
- Two from North Africa
- Two from Arab Eastern Region
- Two from the Gulf Region

The selection of these countries will depend on the outcome of the expected preliminary survey about the current state of water utilization and management policies in the Arab Region.

The regional administration of the project will be consisting of the steering committee and the project general coordinator. The steering committee consists of three members from each selected country, a representative from The Arab Organization for Agricultural Development (AOAD), the executing Agency, and another from the funding institution.

the mandates of this committee will be :

- Ratification, approval, amendment of the project work plans.
- Follow up of the implementation of the project
- Planning of experts consultations in the Arab countries
- Coordination of project activities between Arab and international organizations which are participating in funding or implementation of the project .

The general coordinator of the project is responsible for the following :-

- Supervision of the project implementation
- Follow up of the steering committee resolutions concerning project's different activities .
- Recruitment of staff .
- Organization of Experts consultations .
- Reporting
- Representing the project in all meetings and related activities of the funding and implementing Agencies .

**b - Administration of the project at country level.**

- The country coordination committee will consist of:-
- Two government representatives in charge of water resources and irrigation.
- A representative from AOAD

- A representative from the Funding Agency
- The general project coordinator
- The national project coordinator
- The senior project expert

The mandates of this committee will be as the same as that of general committee at the regional level .

- The National Coordinator : He is responsible for project implementation in the selected country and has the same responsibilities of the general coordinator at the regional level.

## **2- The Institutional Relations :-**

- The project in the selected country will be sponsored by the relevant ministry in charge of water resources and irrigation.
- All project activities, management and infra-structure should belong to the participating country, represented by the relevant ministry at the end of the implementation period.
- The project should be linked to other government and local institutions that have similar activities .

## **G - PROJECT OUTPUTS :**

### **1 - Direct out puts :**

- improving planning level of the government institutions involved in water resources management and development.
- Raising the execution capabilities of government institutions.
- Improving personnel capabilities in the field of water resources rational management.
- Securing statistical and technical database about water resources and their efficient use.
- Identification and experiment of technologies package concerning the development and efficient utilization of water resources in rainfed and irrigated agriculture in the Arab Countries .
- Formulation and implementation of water rational utilization action plan



## **2 - Expected outputs in the long term**

- Increasing the potentials of water resources
- Increasing crop production
- Alleviation of drought incidences
- Raising the Socio-economic status of farmers.
- Increasing the stability of agricultural production

## H - PROJECT BUDGET

The global budget estimated to be as 7.5 millions Dollars to be allocated as follows: -

Component	Salaries & Wadges Millions \$	Monitoring Millions \$	Equipments Millions\$	Total Mollions \$
1- Institutional and technical support	1.0	0.5	1.5	3.0
2 - Irrigation and water harvesting technologies	1.0	0.5	3.0	4.5
Total	2.0	1.0	4.5	7.5